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# CONSERVATION INTERNATIONAL

**USAID “Biodiversity in Regional  
Development ” (BiRD) Cooperative  
Agreement**

**LAG-A-00-98-00059-00**

**June 15, 2001  
FY01 Semi-Annual Progress Report**

**Conservation International**  
**Biodiversity in Regional Development (BiRD)**

**June 15<sup>th</sup> Semi-Annual Report**  
**FY01: October 1, 2000 - March 31, 2001**

**Biodiversity in Regional Development (BiRD)**  
**Cooperative Agreement No. LAG-A-00-98-00059-00**

**Introduction**

This report covers the first six-month period of FY01 from October 1, 2000 through March 31, 2001 for activities completed under the USAID BiRD Cooperative Agreement. For FY01, obligated funding for the BiRD Cooperative Agreement supported activities in Bolivia, Brazil and Papua New Guinea.

**Highlights**

**1) CI-Bolivia**

- The coordination established with strategic allies has allowed us to increase the scope and impact of the project and also to increase the FY01 BiRD budget. We are working with CARE, for example, on an environmental education program and on erosion and desertification research in Apolo. The Wildlife Conservation Society (WCS) is also our partner in the development of a monitoring program. The focus is to monitor the flora and fauna use by peasant and indigenous communities. In addition, WCS also helps us in the complementation of the biological research. With aid from the Project for Sustainable Forestry Management (Proyecto Manejo Forestal Sostenible - BOLFOR), the Forestry Superintendence (Superintendencia Forestal) and the Enterprise for Agroforestry Services (Empresa de Servicios Agroforestales - ESAF); 69 hectares of agro forestry plots were established.
- An integral biological study is being carried out in the northeastern part of the National Park and Area of Integrated Management Madidi (PN ANMI Madidi), under a cooperative agreement signed with the Institute of Ecology, Bolivian Fauna Collection, and Bolivian National Herbarium (IE-CBF-HNB).
- The verification of legal holdings within the NP ANMI Madidi Ixiamas municipality will begin in March and will take place in collaboration with the National Institute of Agrarian Reform (INRA). The total surface area for verification is 595,524 hectares.

**2) CI-Brazil**

- Visits to the Una Ecopark were at record high, reaching nine hundred and ninety nine visitors in January 2001. Two thousand and ninety nine people visited the Una Ecopark between October 2000 and March 2001. The number of monthly visits was similar between peak tourism season (Oct-March) 1999/2000 and 2000/2001. In March, the Ecopark closed for three weeks for canopy walkway maintenance. Since it reopened in February 1998, a total of nine thousand seven hundred people have visited the Ecopark. (See Attachment Brazil-1)
- The Cooperative of Organic Producers of Southern Bahia was created. IESB assisted the farmers in elaborating the statutes, writing-up meeting minutes, bureaucratic procedures and the creation of the logo. IESB has also supported the creation of the Organic Certification State Committee – created in March 2001.

- IESB organized 5 workshops on environmental legislation for rural producers from 30 Associations of Una municipality (of these, 20 associations are the Una Rural Producers Cooperative members). Three people from each association were invited and a total of 69 participated in the workshops. The main goal of these workshops was to discuss the importance of environmental protection, appropriate uses of natural resources, and the role of the environmental governmental agencies and legislation. A manual will be produced including all the issues discussed and what was agreed upon. (See Attachment Brazil-2)
- IESB has supported the creation of 10 RPPNs (1,500 ha) and has initiated the process of creating 8 additional RPPNs (1,700 ha). Six farmers have also shown interest in creating RPPNs within their properties (3,000 ha). (See Attachment Brazil-3)

### 3) CI-Papua New Guinea

- The communities in the Lakekamu Basin and the Wide Bay area are moving forward with the help of CI-PNG to secure parts of their land as Wildlife Management Areas (WMA). This legislation allows communities to set the terms of land use, development and conservation for their areas.
- Community members of the Lakekamu Basin are taking an active roll in the development and workings of the Ivimka Research Station. There has been positive interest shown in understanding what types of research are being conducted at the site, as well as understanding the results of that research. Community members have asked CI-PNG to establish a reference library of all research conducted at the IRS so that they may consult their findings to understand more about their area and the work being done there. In addition, with the help of CI-PNG the communities have worked to improve the facilities of the IRS and promote its services to a wider audience.
- Nine youths from the Lakekamu Basin joined students from the University of Papua New Guinea and the PNG University of Technology in a field-training course put on by the universities. This course was designed to prepare university level students in field biology techniques. The youths from the village did very well and received words of encouragement from their instructors. These youths will be able to assist in further conservation monitoring done by CI, and will also have the skills and knowledge needed to be hired as field/research assistants by visiting researchers.
- CI-PNG has helped the communities of Taintop and Klampun in the Wide Bay Region make linkages with organizations that can assist them with needed technical support. The Taintop people have formed a relationship with the Center for Environmental Law and Community Rights (CELCOR) in Port Moresby, to assist in land rights issues regarding the encroachment of timber entities into their area. The communities have also started to work with the East New Britain Tourist Bureau, in order to work on Eco-Tourism in the area. With the assistance of the OISCA, a Rabaul-based Japanese development institute, the communities have had workshops in rice farming and butterfly farming. It is hoped that the farming of rice and butterflies, as well as eco-tourism, will provide sustainable income sources for the people of the Taintop and Klampun.
- The communities of the Wide Bay region and CI-PNG have published the first issue of "Tokaut Nius Bilong Wide Bay" (Wide Bay News Forum), a biannual newsletter for all the stakeholders in the Wide Bay Region. The publication has been written in Tok Pisin so that local community members as well as government and national NGOs may take advantage of the news source.

**Progress by Activity Component**

**1) CI-Bolivia**

**Objective 1:**

*Increase scientific understanding of Madidi National Park's biodiversity in order to raise awareness of the Park's importance and counteract existing threats.*

**Activities:**

*A) In conjunction with the Institute of Ecology (Instituto de Ecología), CI-Washington, CI-Peru, General Directorate for Biodiversity (Dirección General de Biodiversidad), Madidi National Park, Bolivian scholarship students and local communities, CI-Bolivia will complete the GIS-database for Madidi National Park, including its Multiple Use Zone and Buffer Zone. This database will be used for planning purposes and for monitoring and evaluation - highlighting the threats to the Park. More specifically, this activity will include: FY00-01.*

*A1) Completion of a GIS database initiated in year one, and further compilation of geographic information, including historical data (including satellite imagery already in existence).*

FY 2001: Obj1, A1	O	N	D	J	F	M	A	M	J	J	A	S
Purchase of satellite imagery	X	X										
Analysis of satellite imagery to identify areas undergoing erosion		X	X	X						X	X	
Map the human settlements areas												
Compilation and organization of studies on the project area	X	X										
Analysis of satellite imagery to classify vegetation by species			X	X	X							
Analysis of NOAA satellite imagery to identify chacofied areas		X	X	X								
Field mapping of mining sites				X								
Field mapping of hydrocarbon prospecting and exploitation sites					X							
Field mapping of forest use sites						X						
Field mapping of tourism sites and scenic routes							X					
Organization and computerization of Keara, Azariamas, 5 de junio, El Tigre, Maravilla and Santa Fé peasant communities monitoring program								X	X		X	X
Updating of ownership rights and land occupancy for the project's area of influence				X			X			X		
Support to institutions for computerization of the Management Plan			X	X	X	X	X	X	X	X	X	X
Organization and computerization of other project results				X				X				X

***Progress to-date:***

Updated satellite imagery has not been purchased. Coordination with government agencies and non-governmental institutions and the Department of Biology at George Mason University (a partner in the current research being done on the "Impacts of Three Human Settlements on the Area of Influence of the Madidi National Park in Bolivia"), however, has allowed us to obtain a coverage of 75% of the protected areas with images from the year 2000.

Analysis of the satellite imagery to determine surfaces undergoing erosion processes, establishes that approximately 29,376 hectares are undergoing erosion in the Apolo Municipality, inside the area of influence of the National Park and Natural Area of Integrated Management Madidi (this is based on the satellite imagery from 1993). Approximately 30,665 hectares of the total surface are currently undergoing erosion (based on satellite imagery from 2000).

A collection of existing secondary information referring to human settlements and biological studies of the project's area of influence was complemented. It is important to mention, however, that there are neither new human settlements nor recent scientific studies.

Classification of the vegetation in the area of influence of the National Park and Natural Area of Integrated Management Madidi (10 kms. outside of the established boundaries) was performed. Once the satellite imagery is completed, a new vegetation classification will be performed for the protected area.

Analysis of NOAA satellite imagery from 1997 to 1999, June to September, shows that there were no heath points (burnings) inside the National Park and Natural Area of Integrated Management Madidi. A new analysis for years 2000 and 2001 will be performed in the second six-month period of FY01.

Due to the inaccessibility of the area, mapping for field mining sites, forest use sites, tourism sites, and scenic routes was not performed. These activities will be carried out between May and June.

The National Institute of Agrarian Reform (Instituto Nacional de Reforma Agraria - INRA) upon request by Conservation International has submitted information about ownership rights in March 2001. The information initially submitted for FY00 has not been modified until now. INRA expects to finish the process of formal legalization of rural properties in the project's area of influence by August 2001. This information will be entered into the project's database during the second six-month period of FY01.

All the information developed by the BiRD project during FY00 was delivered to the government and non-governmental organizations. This will support the development of the Management Plan for the National Park and Natural Area of Integrated Management Madidi. There was little progress accomplished in relation to this activity because development of the Management Plan will start in April or May.

In addition to the dissemination of the information produced by the BiRD project, 24 people from different organizations were trained in managing this information. Trained professionals are officials from the municipalities and other organizations working in the project's area of influence.

***Problems, delays, shortfalls and proposed solutions:***

The quality of the satellite imagery provided by partner organizations is not the highest quality (cloudiness is present). This has limited our ability to perform all the planned analysis. We will continue our actions in order to obtain satellite imagery of better quality that will cover the entire National Park and Natural Area of Integrated Management Madidi.

There is a delay in the field mapping of mining sites, forest use sites, tourism sites and scenic routes, caused by the long rainy season and by the intensity of the rains, which made access to the area impossible. Now that the adverse weather is over this activity will be carried out in May and June

**FY01 Outputs/Benchmarks for Objective 1, Activity A-A1**

1. GIS Database for the Madidi ANMI NP with better information, used as a planning tool and distributed to other institutions that work in the Madidi area of influence
2. The database and GIS are being used for decision-making by SERNAP, the Madidi ANMI NP Administration, municipalities, CI-Bolivia and other institutions that work in the Madidi area of influence.

**Status:**

1. The Database for the Geographic Information System (GIS) of the National Park and Natural Area of Integrated Management Madidi was enhanced. It was also distributed to government agencies and non-governmental organizations working in the area. It is currently being used (precariously) as a tool for decision-making.

*B) Complete targeted biological research and ecological impact assessments. This activity will be carried out by both Bolivian scientists and Bolivian scholarship students, with direction provided by the Institute of Ecology and CI-Bolivia. In addition to original scientific research in Madidi National Park. Results of the targeted research and assessments will be peer-reviewed and published in professional scientific journals. FY00-01.*

*B1) Targeted biological research will include:*

- a) Fish inventory of the Tuichi River FY00.
- b) Small rodent and epiphytes inventory/study FY00.
- c) Ethnic-botanical study of Madidi using the vegetation map FY01.
- d) Coordinate with other NGOs and institutions working in the area, such as WCI who is running a program entitled "Ecosystem Species" focused on large mammals, to gather complimentary biological and ecological data and research. FY00-01.

FY 2001: Obj1, B1	O	N	D	J	F	M	A	M	J	J	A	S
<b>Lagoons, Rivers</b>												
Selection of graduate students	X											
Formation of teams		X										
Creation of a research plan		X										
Performance of Research			X				X					
Production of interim reports				X				X				
Publication of results											X	X
<b>Small mammals, epiphytes</b>												
Selection of graduate students	X											
Formation of teams		X										
Creation of a research plan		X										
Performance of research			X				X					
Writing of interim reports				X				X				
Publication of results											X	X
<b>Non-timber yielding - palms</b>												
Identification of peasant communities and species	X	X	X									
Selection of local guides from the community			X									
Performance of quantification studies			X	X	X	X	X	X				
Development of a model for exploitation									X	X	X	
Publication of results												X

***Progress to-date:***

Initially an analysis was carried out in coordination with the Wildlife Conservation Society (WCS), in those areas that could be affected by development projects and/or activities. This analysis helped to identify the northeastern part of the Alto Madidi River – Campamento, as the most vulnerable area to-date. This is because programs for Human Settlements are being implemented. Also, ownership rights for peasant communities, indigenous and private owners are being consolidated. In addition, the construction of a road of national and international importance is planned.

The Institute of Ecology (IE), Bolivian Fauna Collection (CBF) Bolivian National Herbarium (HNB), also analyzed this decision. Afterwards, it was decided that a complete study on biodiversity resources should be carried out during two seasons of the year (humid and dry). The following topics will be included in the biological study: ictiology, mastozoology (small mammals), herpetology, ornithology and botany.

Review of secondary information has begun in March. Logistical and safety support for the field phase was coordinated with the Directory of the NP AMNI Madidi. The fieldwork will be performed in April and July.

The results that are expected from the biological research are:

**For fauna**

- Awareness about relative diversity, richness and abundance of fauna in the northeastern part of the National Park and Natural Area of Integrated Management Madidi.
- Documented information, scientific collections and other records (recordings of bird songs and photos) of the studied species
- Records of the species' distribution and location.
- Preliminary knowledge about the ecological and biological aspects of the species
- Identification and description of the principal ecosystems and habitats that are important for the conservation of the fauna in the studied area.
- Knowledge about the species that have economic importance.
- Knowledge about potential threats and different anthropological impacts in the area.

**For Flora**

- List of existing species, with diameter > 10 cm. Lianas should be included as part of the floristic diversity.
- List of non-timber forestry species and their uses.
- Species frequency and abundance.
- Data about the structure of vegetation formations in the area.
- Documented information and scientific collections about the vegetation found.

Unfortunately, so far in FY01 we have not been able to coordinate with the Wildlife Conservation Society (WCS) the participation of WCS professionals in this fieldwork. Nevertheless, the biological research that WCS will perform in the area complements the research activities that the IE-CBF-HNB are carrying out along with the CI – BiRD project.

Initially, we talked with more than ten communities and identified their needs and demands related to the use of natural non-renewable resources. This was done in order to carry out research and develop models for the proper use of non-timber forestry species. After concluding this task, work was coordinated and defined with the community of San José de Uchupiamonas.

San José de Uchupiamonas, is located within the National Park and Natural Area of Integrated Management Madidi. The quantification and development of models for the proper use of natural resources will be addressed to the Palma Real (*Mauritia flexuosa*), which is being successfully used by the community artisans (currently three families). There is also the possibility of spreading the studies to Jipijapa (*Carludovica palmata*) that is used for basket making. We already have signed agreements with the community in order to carry out the work in May.

The studies on Soil Erosion and Desertification in Apolo were coordinated with the Saint Andrew Major University (Universidad Mayor de San Andrés - UMSA), specifically with professors in the Agronomy and Geography Departments. As part of the coordination, an invitation was sent to students that have finished college and are interested in writing a thesis.

The four students that responded to the letter were requested to submit the profile of their thesis. The theme selected was "Soils Erosion and Desertification Processes in the Apolo Municipality". CARE and CI have analyzed the thesis proposal and the academic performance of the student. One student from the Geography Department was selected and she is now completing the administrative requirements in order to start fieldwork in May. CARE will contribute to this activity by covering 50 % of the total costs of the study. Because the study will require quite some time to be completed, the results of the study will be presented once the BiRD project comes to an end.

**Problems, delays, shortfalls and proposed solutions:**

The biological studies and the evaluation of non-timber forestry resources were not performed according to schedule due of the intense rains in Bolivia that made access to the research areas impossible. At the time of writing this report, the rainy season is ending and it will be possible to travel into the area of study.

The ethno-botanic studies were not performed during FY01 because the Bolivian National Herbarium (HNB), through an agreement with the Herbarium of Madrid, started a specific project in Madidi on ethnobotany, vascular plants and flora biodiversity. We have decided to wait until this project is completed in order to avoid duplication. The ethnobotanic studies were replaced with the research of general botany performed in the northeastern area of Madidi.

*B2) Ecological and/or environmental impact assessments and monitoring of the following:*

- a) Monitoring of gold-mining along the Tuichi River and assessment of its contamination impacts. FY00.
- b) Monitoring of future prospective oil exploration and production using the environmental impact assessment done by TOTAL INC. during their exploration phase. FY01.

FY 2001: Obj1, B2, a	O	N	D	J	F	M	A	M	J	J	A	S
<b>Monitoring of mercury contamination</b>												
Fieldwork (taking of 3rd samples)	X											
Analysis of samples		X	X									
Production of report				X	X							
Publication of results						X						
FY 2001: Obj1, B2, b	O	N	D	J	F	M	A	M	J	J	A	S
Joint follow-up by CI and SERNAP to the Vice Ministry of Energy and Hydrocarbons		X		X		X		X		X		X
Environmental impact assessment of prospecting sites, if they exist (within the Madidi ANMI NP)						X						X

***Progress to-date:***

The study of mercury contamination in the Tuichi river basin was completed (See Attachment Bolivia-1A-1C).

The results show that: fish in the Tuichi river are not contaminated. The fish that have the highest mercury content, both in the higher and lower parts of the river, are carnivores. Three samples of carnivores were collected, and the results show that one sample is within the established contamination limits (0.48 ug/g). The value recommended by the World Health Organization is of (0.5 ug/g).

Also, the results on hair show that people living at the edge of Tuichi river (Azariamas and San José de Uchupiamonas communities) are not contaminated with mercury. Mercury concentration in hair averages 0.59 ug/g. The recommended risk value by the World Health Organization is 6 ug/g.

The concentrations of mercury dissolved in water vary from 1.71 to 4.63 ng Hg/L. These concentrations are low when compared to the value of 200 ngHg/L considered by WHO as the contamination index for river water.

Minimum values of mercury concentration were found in the sediments, both in the higher and lower parts of the Tuichi river. The average is 0.03 ug/g. WHO considers a value of 0.08 ug/g as the beginning of the risk level.

The final report of mercury contamination in the Tuichi river basin, points among the recommend actions to continue the fish, hair, water and sediments sampling for a longer period of time, taking into consideration dry and rainy seasons.

The monitoring of existing oil concessions in the "Bloque Tuichi" granted to Repsol Exploration Secure S.A. and Perez Companc S.A., covering an area of 1,000,000 hectares, was completed. Information provided by the Viceministerio de Energía e Hidrocarburos states that Repsol Exploration Secure S.A. and Perez Companc S.A. returned to the Bolivian government 200,000 hectares. This is 20% of the "Bloque Tuichi" concession. This same report confirms that up-to-date prospecting, and/or drilling activities inside the NP AMNI Madidi have not started yet.

***Problems, delays, shortfalls and proposed solutions:***

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity B, B1-2**

1. Existence of biological information to identify zones of importance and determine effects produced by human settlements
2. Identification of non-timber-producing forest resources with potential for sustainable use
3. Results published in scientific documents
4. Thesis being produced or in the process of being presented
5. Mercury contamination levels in the Tuichi River basin known for water, sediments, fish and human hair and awareness of the information attained in the communities for purposes of prevention

**Status:**

1. Existing secondary information about biological research in the northeastern area of the NP NSIM Madidi was compiled. The field collection of primary biological information will start between April and July
2. Royal palm and Jipijapa palm, were identified as non-timber forestry species used by the people of the San José de Uchupiamonas community to make baskets. We plan to work with agro-forestry systems in the El Tigre community.
3. The results of the mercury contamination study in Tuichi river basin were delivered to municipal governments, communities involved in the study, organizations working in the project's area of influence, National Service for Protected Areas and the Directorate of the National Park and Natural Area of Integrated Management Madidi.
4. The information obtained with the mercury contamination study will be included in a thesis that one student from the Chemical Engineering Department will present soon.
5. The mercury contamination levels for fish, hair, water and sediments in the Tuichi river basin are known. We also have reference of the same levels in Beni river basin (southeastern edge of the National Park and Natural Area of Integrated Management Madidi) in order to make a comparison.

*C) In collaboration with local communities and other stakeholders, CI will design a long-term monitoring and evaluation program, which will be fed information from different sources, that will be applied (e.g.) in the Madidi Management Plan and others. FY00-01.*

FY 2001: Obj1, C	O	N	D	J	F	M	A	M	J	J	A	S
Analysis and coordination of assessment parameters with the communities - Commencement of monitoring	X	X										
Training of community experts	X	X										
Collection of information in communities					X	X			X	X		
Organization of information and augmentation of database							X				X	
Preparation of fundraising proposal					X	X	X	X	X	X	X	X
<b>Monitoring of tourism, hydroelectric, roads, settlements, etc.</b>												
Compilation of secondary data	X						X					
Analysis and organization of data		X	X					X	X			
Publication of results											X	X
<b>Financial management and strengthening of monitoring program</b>	X	X	X	X	X	X	X	X	X	X	X	X

**Progress to-date:**

All the activities related to the monitoring of flora and fauna use are completed. The forms used in peasant communities (See Attachment Bolivia-2) were developed in coordination with Wildlife Conservation Society (WCS). The forms were tested in the communities of El Tigre and San José de Uchupiamonas.

40 heads of household (men and women) attended the training sessions. Now they are using the forms in order to record the use of flora and fauna.

Monitoring of flora and fauna use in the two peasant communities that the BiRD project is carrying out is in its second month of activities. WCS will perform the same work in two indigenous communities in May.

It is important to mention that the initial results show that the level of fauna use (hunting) in the peasant communities is below our assumptions.

The development of a fundraising project to help implement the Monitoring Program for Flora and Fauna in the mid and long term was initiated. The primary monitoring information obtained in the peasant communities was used for this purpose.

The monitoring of road construction, hydroelectric services and human settlements was performed based on the secondary information provided by government agencies working in this field. It is important to point out that not one of these actions was concrete. Therefore, there was no impact on the NP AMNI Madidi.

The monitoring of tourism activities started with the systematization of visit recordings from the Rurrenabaque Migration Directorate (Dirección de Migración en Rurrenabaque) and with the visit recordings of the protected area during the last year. The analysis includes the following information: length of stay, nationality, age and destination.

***Problems, delays, shortfalls and proposed solutions:***

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity C**

1. Monitoring and assessment program is carried out.
2. Database has two collections of information per community for first year of the monitoring program available.
3. Determine and assess indicators of change in activities such as tourism, hydroelectric, road building, land use, natural resources, settlements, etc.
4. Financial management strategy created.
5. Financial resources secured for monitoring program with bilateral and/or multilateral donors.

**Status**

1. The monitoring program is underway.
2. Monitoring records for the first month are being entered into the database.
3. We already have change indicators for tourist activities.
4. The monitoring of road construction, hydroelectric services and new human settlements shows that there were no changes in comparison to FY00.

***Objective 2:***

*Influence economic and policy decisions in Bolivia to counter threats to Madidi National Park.*

***Activities:***

- A) *CI-Bolivia proposes to carry out economic and policy analyses, utilizing accumulated data, in order to understand the forces that influence regional and local land use decisions. Analyses will be used to demonstrate the economic benefits associated with protected areas and the impacts of proposed development projects, which threaten the biodiversity of the Park. Topics for analysis will be defined by threats determined to be most critical. FY00-01.*

A1) Complete thorough social, economical and political study. FY00-01.

FY 2001: Obj2, A1	O	N	D	J	F	M	A	M	J	J	A	S
Studies to complement the baseline analysis for the (Bolivian and foreign) human settlements in Ixiamas		X	X	X	X	X						
Evaluation of sustainable economic alternatives for the AAHH within the Plan for Reduction and Mitigation of Environmental Impact			X	X	X	X	X	X	X	X	X	X
Analysis of national and international markets						X	X	X	X	X	X	X

**Progress to-date:**

The complementary socio-economic study of human settlements in the Ixiamas municipality (with foreign families) was completed. The information obtained is being analyzed and in May we will develop a report. It is important to mention that the number of foreign families settled in the area is small and that the trend is to return to their countries of origin.

Coordination of the support that CI will provide to the new human settlements in the "El Tigre" community through the BiRD project has been demanding. Several proposals were rejected and had to be reanalyzed. Most of the time, proposals were rejected because the beneficiaries ignore the laws, do not know much about the species and are not organized.

The final agreement signed with El Tigre, states that CI will assist them in the implementation of 69 hectares of agro-forestry plots for 138 peasant families (1/2 hectares per family). This task will be carried out with the Enterprise for Agro-Forestry Services (ESAF) and the Project for Sustainable Forestry Management (BOLFOR). At request of the community, this activity will be complemented with training activities about regulations for sustainable forestry. The Forestry Superintendence will hold this training with support from the project.

The market analysis for non-timber forestry species has started for the Royal Palm (*Mauritia flexuosa*) and Jipijapa Palm (*Carludovica palmata*). The families from San José de Uchupiamonas that make baskets are currently using those species.

**Problems, delays, shortfalls and proposed solutions:**

The principal problem was to reach an agreement on how the BiRD project would provide support to El Tigre. The families from the community are aware of the productive practices in regions without forest coverage (as part of their culture). It is therefore difficult to make them understand that all the new productive activities should be in harmony with the forest and its natural resources.

A2) In conjunction with other partners working in the area, such as CARE and WCS, CI-Bolivia will carry out a baseline threats analysis of Madidi National Park. FY00-01.

FY 2001: Obj2, A2	O	N	D	J	F	M	A	M	J	J	A	S
Dissemination of threats analysis results	X											
Organize and hold an inter-institutional threats analysis workshop to establish a global strategy		X	X									
Compilation of complementary information for FY00 threats	X	X	X	X	X							
Produce report with the threats analysis					X	X						
Compilation of information on new threats		X	X	X	X	X	X	X				
Economic Assessment of threats				X	X	X	X	X	X	X	X	X
Produce report on the global threats analysis									X	X	X	
Meetings of CI-Bolivia with donors to discuss the results						X					X	
Dissemination of new results						X					X	X

**Progress to-date:**

The document about "Analysis of Threats to the National Park and Natural Area of Integrated Management Madidi" was submitted to the national, departmental and municipal governments. The document was also delivered to the Administration of the Protected Areas, to non-governmental organizations working in the area, and to academic institutions that have carried out activities with the project. In very specific cases the report on "mercury contamination" was submitted to the communities that had collaborated with this research.

In order to complement the fore mentioned document, planning for an inter-institutional workshop on threat analysis was performed with the National Service for Protected Areas (SERNAP) and the League for Environment Defense (LIDEMA). This workshop was designed to establish a big alliance and to design the global strategy for threat reduction. Unfortunately due to factors out of the project's control, the workshop was not held. During the coordination meetings with SERNAP, however, it was established that the workshop would be carried out in July.

The last version of the report "Analysis of Threats to the National Park and Natural Area of Integrated Management Madidi" includes information updated through March 2001. This last report was developed for the workshop.

In coordination with the Fund for Conservation Strategies (CSF), (as part of the case studies that will be developed during the August Workshop on "Analysis of Development Projects Environmentally Sensitive"), an economic estimation of threats will be performed. At this stage we are coordinating the workshop and the case studies that will be presented during the workshop with CSF.

**Problems, delays, shortfalls and proposed solutions:**

The workshop about threats to Madidi was delayed due to the existing political problems in Bolivia and because the SERNAP has not paid enough attention to this issue.

The economic estimation of the threats to Madidi was delayed due to the financial actions carried out in order to pay the workshop costs.

Both activities will be carried out during the second six-month period of FY01.

A3) *Gather information of development plans held by municipalities and regional government in order to determine potential effects on land-use in the Madidi area.*

*During FY00, analysis of development policies was completed for the three municipalities that have jurisdiction over Madidi NP, as well as at the departmental level. In FY01, analysis will be done to establish development plan project performance levels for the measures for 2000 and the first half of 2001.*

*To complement the development policy analysis, an evaluation of the financial resources allocated to the projects will be performed for the purpose of establishing the percentages allotted to concrete conservation activities and the percentages within the projects corresponding to conservation activities, natural resources and the environment.*

FY 2001: Obj2, A3	O	N	D	J	F	M	A	M	J	J	A	S
Compilation of information	X	X							X	X		
Financial-economic analysis of the projects				X	X	X	X	X	X			
Incorporation of the results into the GIS database			X								X	
Dissemination of results											X	X

**Progress to-date:**

During the first six-month period of FY01 we have compiled information about departmental and municipal development plans. At the same time, we have initiated the data analysis of the information gathered and it is now being incorporated into the Madidi database.

It is important to mention that the analysis is not complete, because governmental agencies have provided only partial information. We are still trying to get official and complete information

**Problems, delays, shortfalls and proposed solutions:**

We have faced some problems completing this activity because the governmental agencies and municipalities involved are not able to provide official data.

**FY01 Outputs/Benchmarks for Objective 2, Activities A1-A3**

1. Socioeconomic study of the human settlements finished
2. A minimum of two sustainable economic alternatives assessed
3. Baseline threats analysis completed
4. Development plans and policies information organized
5. Financial-economic analysis of the projects

**Status:**

1. The complementary socio-economic study for human settlements of foreign families in Ixiamas has been completed
2. We have started to work on the economic estimation of two sustainable alternatives in coordination with the communities
3. The baseline analysis for threats to Madidi was completed
4. We have started work on the analysis of the Plans, Development Policies and Financial Analysis of the Projects using the partial information submitted by government officials

**B) CI-Bolivia will facilitate and carry out a FODA (Fortalezas, Oportunidades, Debilidades y Amenazas) Workshop. FY00-01.**

FY 2001: Obj2, B	O	N	D	J	F	M	A	M	J	J	A	S
Organization of the workshop		X										
Hold the workshop			X									
Production of the workshop report			X	X								
Distribution of the report				X								

**Progress to-date:**

The testing of the status analysis (SWOT) carried out during FY00, has been included in the agenda for the workshop on threats to Madidi because of methodological and organizational reasons. As we have already reported in Obj 2 – A2 the workshop will be held on July.

**Problems, delays, shortfalls and proposed solutions:**

As we reported before in Obj. 2 – A 2; the workshop on threats to Madidi, that will include the testing of the SWOT situation analysis for the protected area, was delayed due to existing political problems in the country, and due to the poor attention that SERNAP has paid to this issue.

**FY01 Outputs/Benchmarks for Objective 2, Activity B**

1. Report on the Threats Analysis and FODA Workshop
2. Commitments from the municipalities to incorporate Madidi ANMI NP support activities in their POAs
3. Distribution of the workshop reports

**Status:**

For all the reasons mentioned, the results of this activity will be reported during the second six-month period of FY01.

**C) CI-Bolivia will facilitate and carry out a second workshop as follow-up to the Fall 1999 action-coordination workshop. The purpose will be to discuss coordinated action to-date, reach consensus on possible solutions, and provide recommendations to counteract the imminent threats. As a consequence of this workshop, efforts to influence development planning and biodiversity conservation in the Madidi region will be furthered. Attendees could include: the General Directorate for Biodiversity, the Ministries of Energy and Economic Development, the Department of La Paz, the private sector, local NGOs and other interested stakeholders. This activity will be complemented by additional meetings, public presentations and a Web Page with links to CI, CARE, WCS, the Institute of Ecology, and other interested stakeholders. FY00-01.**

FY 2001: Obj2, C	O	N	D	J	F	M	A	M	J	J	A	S
Preparation of Peru-Bolivia agenda				X	X							
Production of the technical proposal				X	X							
Regional workshops				X	X	X						
Second workshop							X					
Dissemination of results/workshop report								X				

**Progress to-date:**

Legal actions with Bolivian governmental authorities in order to establish the agenda for the Vilcabamba-Amboró corridor have continued. The agenda includes the development of a technical proposal and the organization of a political meeting for the corridor

The technical proposal for corridors developed by SERNAP was reviewed in collaboration with Wildlife World Fund (WWF).

It was decided to delay the planned actions for the Vilcabamba – Amboró Corridor until May. The decision was made in coordination with the Bolivian Technical Director for the Corridor and was also coordinated with the Executive Director of the VA Corridor of Peru.

**Problems, delays, shortfalls and proposed solutions:**

All the actions for this activity will be delayed by four months. The decision was made with all the people responsible for the Vilcabamba-Amboró corridor at Conservation International.

It is important to point out that this decision was made taking into consideration the political problems (change of government officials) that both countries are facing, and because of the new organizational structure of the Vilcabamba-Amboró corridor that is being implemented by Conservation International.

**FY01 Outputs/Benchmarks for Objective 2, Activity C**

1. Regional technical workshop held / technical proposal
2. Second bi-national workshop held
3. Workshop report / recommendations for corridor implementation
4. Integrated Corridor Web page created

**Status:**

For all the reasons mentioned above, the results of this activity will be reported during the second six-month period of FY01.

*D) Work directly with private sector operating in the Madidi region on best practices. CI-Bolivia and its partners will do outreach to those private sector actors associated with the targeted development projects operating in the Madidi region, and help them to develop and promote best practices. FY01.*

FY 2001: Obj2, D	O	N	D	J	F	M	A	M	J	J	A	S
Study of the degree of technification and minerals exploited						X	X					
Inter institutional coordination to produce a technical proposal								X	X			
Production of the Economic-Technical Proposal document										X	X	

**Progress to-date:**

The first contacts for coordination with the mining sector were made, both at the government level and at the mining cooperative organization level. We have also been in touch with the Foundation for Environment and Mining (MEDMIN).

Detailed research has also started to find out the degree to which mining concessions are following the environmental regulations. The preliminary results show that the owners of the mining concessions have submitted legal requisites for environmental impact to the relevant authorities. Practices to reduce the impact, however, are not being implemented yet.

A profile for the project was developed. The objective of the project is to develop a workshop that trains the owners of the mining concessions and the mineworkers on new gold exploitation techniques, which cause less environmental impact (See Attachment Bolivia-3).

We are currently coordinating with officials of the Natural Area of Integrated Management Apolobamba in order to carry out joint financial actions and to perform these workshops. This protected area has the highest percentage of mining concessions that throw their remnants into the rivers crossing the National Park and Natural Area of Integrated Management Madidi and its area of influence.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 2, Activity D**

1. Better information about private mining activities
2. Technical proposal drawn up and financial management initiated
3. Private mining companies in the Madidi ANMI NP area of influence implementing better production practices

**Status:**

1. This activity has been carried out in advance of the schedule submitted.
2. The project profile was developed and the financial actions will start in April.
3. The implementation of productive practices that limit environmental impact depends on fundraising

**Objective 3:**

*Improve regional, national and international awareness of the importance of Madidi National Park and surrounding region to biodiversity conservation in the tropical Andes.*

**Activities:**

*Very little national awareness exists on both the importance of Madidi National Park as a biodiversity reservoir, as well as the impacts, which are threatening its ecological richness and health. In association with staff already working in the region, there is a need to involve the participation of others - both key people and institutions - in order to create a communications strategy and awareness raising tools for this protected area.*

A) *CI-Bolivia will gather baseline information at the local level with social surveys in order to raise awareness among the population surrounding Madidi NP. FY00-01*

FY 2001: Obj3, A	O	N	D	J	F	M	A	M	J	J	A	S
Preparation of materials and results	X		X		X		X		X		X	
Seminars and informal talks in schools and communities		X		X		X		X		X		X

***Progress to-date:***

In order to hold non-formal workshops in communities and schools, educational materials (flip boards with typical colored drawings from the area) were produced and validated in coordination with the Directorate of the National Park and Natural Area of Integrated Management Madidi.

The themes selected for the flip boards include: the food chain; earth; erosion; fertilizers use; agriculture; compost; water, a valuable resource; contamination; irrigation; biodiversity; ecological balance; sustainable development; benefits of living within the protected area or in the area of influence; potential threats; richness of ecological soils; ecosystems; habitats; climates; Madidi's geographic relief; maps of the protected area; solid remnants; sorting garbage according to origin; consequences of contamination; treatment of organic and inorganic garbage and recycling.

Unfortunately the material produced has not been used in the communities yet, due to the inaccessibility of the region during the rainy season. We should mention that this activity will be carried out with the support of environmental educators from the protected area (they will provide transportation via boat, horses and vehicles). The fieldwork has not yet been performed.

The testing of all the developed materials took place at schools on February and March, just after the new school year started.

***Problems, delays, shortfalls and proposed solutions:***

This activity is delayed due to weather conditions (a long and intense rainy season). The team was not able to get to the communities and schools because of the reasons previously described. Academic activities at schools started in March.

The materials produced for non-formal lectures to be held in communities and schools will be delivered to the Directorate of the National Park and Natural Area of Integrated Management Madidi. Therefore, the activities that the environmental educators from the protected area will teach will be extended until November. This will allow us to regain lost time.

**FY01 Outputs/Benchmarks for Objective 3, Activity A**

1. Communications strategy implemented in communities and schools

**Status:**

1. Education materials were produced in order to continue the implementation of the communication strategy in communities and schools.

*B) CI-Bolivia in cooperation with CI's International Communications department will produce communications and awareness tools and implement the conservation awareness campaign for key national and international audiences FY01.*

FY 2000: Obj3, B-C	O	N	D	J	F	M	A	M	J	J	A	S
Produce and distribute radio spots			X	X	X	X	X	X	X	X		
Film trip to capture footage for video documentary on Madidi.								X	X			
Production of Documentary.									X	X		
Production of additional materials for Madidi National Park Phase 2									X	X	X	X
Produce Environmental Education Kits with Teacher's Manual				X	X	X	X	X				
Produce Promotional Kit on Ci-Bolivia				X	X							
Carry out Biodiversity Report Award		X	X	X	X	X	X	X	X	X	X	X
Carry out Journalist Training Seminar						X	X	X				
Launch of documentary and related materials for Phase 2											X	X

**Progress to-date:**

In agreement with a local radio station, the project has produced three radio spots. The main audience of this radio station lives in three surrounding municipalities of the National Park and Natural Area of Integrated Management Madidi. The radio spots are being broadcasted 10 times per day.

The same radio station produced the program called "Report from the Environmental Watchman of Madidi". During the informative programs, the "Watchman" will report on environmental issues using the information produced by Conservation International.

The possibility of broadcasting images from Madidi (André Barchi photos) and presenting the journalistic reports of the Environmental Watchman through the local TV, is currently being analyzed.

The Communication Staff from Conservation International - Bolivia and from INTERCOM in Washington developed and tested the script.

In order to develop the education material that will be used by teachers and facilitators, we have reached an agreement with government education agencies (Ministry of Education, Departmental Education Directorate, Municipal Districts of Education and the Educative Reform). Unfortunately we have had an adverse result. The process of education reform that incorporates the "environmental" component has only reached its assessment phase. Therefore, the circular plans and methodological guides for the area (Amazon) do not yet exist.

This activity was replaced with the initiative of the "Madidi Green Tent". Educational and recreational activities will be carried out inside the tent. The "Madidi Green Tent" will be movable in order to reach different communities within the municipalities of Ixiamas, San Buenaventura and Apolo.

The "Madidi Green Tent" attempts to combine former experiences and new ways of working with teachers and students that involve the community. It also attempts to open innovative spaces in order to learn and think together over the problems affecting the conservation of existing biodiversity and natural resources in the National Park and Natural Area of Integrated Management Madidi. Through this experience we also seek to value the importance of local knowledge about environmental issues. .

This activity has been coordinated with CARE. Additional funding was obtained in order to build the green tent and to produce the education games (biodiversity bingo, jigsaw puzzles showing the degradation of natural resources, a game depicting good and bad actions, boxes with fauna sounds, tree cross section, tactile tables, photographs, and others).

A specialist who designed and built three permanent environmental exhibits for the Kusillo Cultural Museum is constructing the "Madidi Green Tent". We expect to open the Green Tent in June in the municipality of Apolo.

The promotional material for Conservation International Bolivia (CI-Bolivia) has already been developed. Twenty-four informative sheets that complement the folders of Conservation International were designed and printed in Spanish and English.

We developed and have specific promotional material for the institutional presentation of CI-Bolivia and the Vilcabamba – Amboró Corridor. There also exists information about the Biodiversity and Regional Development Project (BiRD), as well as other projects that CI – Bolivia is carrying out.

The start of the contest for the best report about biodiversity has taken place. The contest was coordinated with the National Association of Journalism. Press releases have also been distributed to the Departmental Associations of Journalism and principal printed media in six of the nine departments of Bolivia.

The Jury has been selected. The contest was open until May 3rd.

We are considering the possibility of changing the activity "Seminar for Journalist Training" to an activity that strengthens environmental education efforts. This is because the actions started in the National Park and Natural Area of Integrated Management Madidi have proven to be quite effective.

The "Madidi Green Tent" has captured the interest of several institutions that want to participate in activities related to Environmental Education. There is an urgent need to carry out a workshop in order to design a strategy for regional environmental education.

INTERCOM and GreenCom are analyzing this last initiative. One of these two activities will be performed during the second six-month period of FY01.

***Problems, delays, shortfalls and proposed solutions:***

Due to the lack of curricular plans and methodological guides for the area of the Amazon, the educational materials for facilitators were not developed.

**FY01 Outputs/Benchmarks for Objective 3, Activities B**

1. Radio spots produced and in use
2. Video documentary produced and distributed
3. Produce Environmental Education Kits with Teacher's Manual
4. Produce Promotional Kit on CI-Bolivia
5. Carry out Biodiversity Report Award
6. Carry out Journalist Training Seminar
7. Launch of documentary and related materials for Phase 2

**Status:**

1. Radio spots were produced and are being broadcasted.
2. The "Madidi Green Tent" is being constructed and will start traveling in June.
3. Promotional materials for CI – Bolivia were produced.
4. A contest for the best report about biodiversity was launched.

**2) CI-Brazil**

**Objective 1:**

*Reduce deforestation, soil degradation, and landscape degradation in forest fragments critical to biodiversity conservation.*

**Activities:**

A) *Obtain conservation commitments from private landowners and communities in strategic forest fragments through agricultural extension activities offering income-generating alternatives. FY 99-00-01.*

A1) *Institutionalization of a municipal environmental council and a municipal "income and jobs" council for Una. IESB will do the paperwork for agricultural loan applications for the communities with projects approved by the councils, and orient them in sustainable agricultural practices, show them how to diminish hunting, control burning and how to implant nurseries of economic and natural trees for reforestation of river margins and buffers around forest fragments. FY 99-00-01.*

<b>FY 2001: Obj1, A1</b>	<b>O</b>	<b>N</b>	<b>D</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>US\$</b>
Joaquim Blanes – talks	x	x	X	x	x	x	x	x	x	x	x	x	1,230
Alessandro, Joaquim, Walter – Farm Plans				x	x	x	x						1,050
Joaquim and Flávio –Reforestation and Agroforestry Demo.							x	x	x	x	x	x	1,050
Evandro – cooperative organization	x	x	X	x	x	x	x	x	x	x	x	x	1,054
<b>Total</b>													<b>4,384</b>

**Progress to-date:**

- IESB coordinated and participated in twenty-four rural producers associations and Una Municipal Council on Development and the Environment (CONDEMA) meetings (four meetings each month, for six months). The CONDEMA has been responsible for managing the negotiations between IBAMA and farmers who have properties inside the Una Reserve area. These meetings have helped to accelerate the process of indemnification to the farmers and to pass the total area included in the decree of the Una Reserve creation (11,400 ha) over to IBAMA administration.
- IESB is organizing a Regional Seminar on Organic Agriculture in partnership with the Municipality of Itabuna. During the event that will take place April 23-24, the Municipality will deposit the amount equivalent of a 10% match to the money collected by the Organic Producers Cooperative. This may help to stimulate the other municipalities to contribute similarly.
- The research on exploration of piaçava (*Attalea funifera* Mart.) to identify patterns and criteria for the forest certification of the species was concluded. A report including all the results is being produced.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

A2) *Also at the Una municipal level, IESB has collaborated with the Secretary of Education in the development of teacher education workshops and the recuperation of rural schools. IESB will work with municipal educational authorities on improved curricula, teacher training, and proposals to obtain governmental funding for improved educational services. FY 99-00-01.*

FY 2001: Obj1,A2	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Gabriel Santos – Teacher training	x	x	x	x	x	x	x	x	x	x	x	x	
Joaquim Blanes – Infrastructure	x	x	x	x	x	x	x	x	x	x	x	x	
Total Obj1,A2													

**Progress to-date:**

- After the October 2000 change in Una Secretary of Education, the work conducted with the municipality teachers was reviewed. A seminar was organized and the results of the work realized in partnership with IESB were presented. The new secretary and school representatives approved the continuation of the teacher training and supported the rural school infrastructure programs.
- Two workshops to train rural teachers were held, indirectly reaching 2,600 students. Four workshops specifically for teachers from the Una Biological Reserve buffer zone were also held. The objective of these training workshops for rural teachers is to implement environmental education in the schools. The program is more intensive around Una Rebio. The program also intends to show to the local authorities the importance of training teachers and other alternatives to improve education quality in the schools. (See Attachment Brazil-4)

**Table: Teachers trained and schools reached by the IESB's Environmental Education Program**

	Total	Rebio Una Buffer Zone
Teachers	72	22
Rural Schools participants	48	17

- The environmental team participated in the production of two publications:
- Caminhos & Aprendizagens - educação ambiental, conservação e desenvolvimento. Publishing coordinated by: Irineu Tamaio and Denise Carreira, Brasília, WWF Brasil, 2000; 67:70. (Funding by USAID)
- Santos, G.R. and Blanes J.J. (1999) Environmental education as a strategy for conservation of the remnants of Atlantic forest surrounding Una Biological Reserve, Brazil. Dodo, Journal of the Wildlife Preservation Trusts 35: 151:157.
- IESB supported the implementation of the Environmental Education Program in the Teimoso RPPN and participated in seminars for teachers and students from Jussari municipality in October and November of 2000.
- In March 2001, TV Santa Cruz reported about the Land Regularization of Una Biological Reserve. It helped to pressure federal authorities to find a definitive solution to the problem. The report reached about 2 million people. In April 2000 the same report was repeated on the State TV and reached 5 million people.
- IESB extensionists elaborated two projects to install water wheels and pipes to supply two rural schools of Una municipality: Ribeirão das Navalhas Association school and Bandeira Association school.

**Problems, delays, shortfalls and proposed solutions:**

- It has been difficult to find trained technicians and financial resources to contract people to work in the rural zone.

A3) IESB plans to continue to support the cooperative we helped Una farmers to establish for agroforestry product commercialization. (The elaboration of a municipal coastal tourism development plan including Una is under Objective 2, Activity A2) FY 99-00-01.

FY 2001: Obj1, A3	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Joaquin Blanes and Walter Lima – certification	x	x	x	x	x	x	x	x	x	x	X	x	1,503
Joaquin and Marc – exportation					x	x			x	x	X		1,300
Total													2,803

**Progress to-date:**

- IESB extensionists organized files including all the information about the properties, which have applied to receive organic certification. Between October 2000 and March 2001, 28 rural properties were inspected and included in the organic certification process. Twenty-four farms are located in Una, two in Uruçuca and one in Itacaré municipality.
- With IESB's support and OCP's cooperation, 20 tons of organically certified cocoa was sold.
- On December 14, 2000, the newspaper Gazeta Mercantil da Bahia published a report about IESB's cocoa projects around the Una Reserve and the cocoa exportation. Santa Cruz TV reported about the certified organic producers, emphasizing IESB's support and assistance in the process.
- From October 2000 to March 2001, 3 shipments of guaraná grains produced by 9 farmers, members of the COOPERUNA (Cooperative of Una Rural Producers), were sold (a total of 1.5 tons) for a selling price 200% higher than the local market.
- IESB has arranged organic fertilizer for the COOPERUNA, making the product available and cheap enough to be accessible to the producers, stimulating the small farmers to adopt conservationist practices.
- IESB implemented three surveys to learn the social, economic and environmental conditions of the COOPERUNA members (this activity was funded with matching funds from FUNBIO). The results will help to plan technical support, mainly regarding on economic and environmental questions.
- IESB has produced, in partnership with the COOPERUNA, a project proposal to the German Institution (LAZ) to renovate the COOPERUNA building and to promote training and administrative organization.
- After a visit to some rural associations to show the small farmers the advantages of working in a cooperative, the COOPERUNA received 20 new members.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

*A4) Continuing the partnerships developed with landowners of key forest fragments committed to conservation, IESB extension officers have helped them plant acai seedlings to multi-crop rubber and cocoa plantations, establish greenhouses for commercial and natural tree species for reforestation, and learn organic mulching techniques to increase production at low cost. These initiatives increasingly involve partnerships with the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) and CEPLAC to disseminate these alternatives. These agroforestry extension activities will continue under the cooperative agreement. FY 99-00-01.*

FY 2001: Obj1, A4	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Joaquim Blanes and Flávio - Greenhouses	x	x	x	x	x	x	x	x	x	x	x	x	724
Flávio Leopoldino - Native plant collect	x	x	x	x	x	x	x	x	x	x	x	x	776
Total													1,500

**Progress to-date:**

- IESB planted a Leguminosae bank and a demonstrative area of açai between rows of rubber trees in the Una Ecopark. Both activities were developed together with the producers from Barro Vermelho and Maruim Associations.
- 5,000 açai seedlings were distributed to producers to be planted in agroforestry systems.
- 500 native tree seedlings were distributed to rural producers to be planted as divisor barriers between organic plots.
- Two clonal gardens for cocoa grafting and recovering were installed in the Colonia and Lençóis Associations' areas.
- IESB produced a manual for organic certified production which includes information about organic inputs, the certification process and biofertilizer preparation.
- Six expeditions to collect native forest species' seeds were conducted in the Una and Itacaré regions.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

*A5) In partnership with M&M Mars' local research farm, IESB extensionists will cooperate in the field testing and distribution of a biocontrol agent for the witches broom disease of cacau, on the farms of cooperators who are implementing forest-conserving management in the buffer zones of protected areas. FY 00-01.*

<b>FY 2001: Obj1, A5</b>	<b>Q</b>	<b>N</b>	<b>D</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>US\$</b>
Joaquim Blanes and Technician TBD: analyze the results	x	x	x	x	x	x	x	x	x	x	x	X	
Subtotal Obj1,A5													

**Progress to-date:**

- IESB has assisted in the maintenance (cleaning, plant's growths and plagues) of four cocoa clonal gardens in the Barro Vermelho, Maruim, Lençóis, Bandeira and Ribeirão das Navalhas Associations.
- IESB has inventoried all cocoa plantations (area size, total production, etc) in the Barro Vermelho and Maruim Associations with the objective of recuperating these areas.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity A1-A5**

In this first six-month period:

- 69 producers from 30 Associations participated in 5 workshops on environmental legislation;
- The Cooperative of Organic Producers was created.
- 100, 000 açai seedlings were planted.

Objective 1 (A) Benchmarks	Measure	By
Rural producers' associations consolidated	80 rural producers trained in environmental legislation.	March 2001
Organic production disseminated	150 producers trained .	Oct 2001
	50 tons of organic cocoa sold.	Oct 2001
	The Organic Producers' Cooperative created.	Oct 2001
	40 producers in the process of convert the conventional cocoa production system into organic certificate production.	Oct 2001
Product sold though improved marketing	10 tons of guaraná, rubber sold.	Oct 2001
	5 tons of piaçava sold.	Oct 2001
	2 tons of rubber sold.	Oct 2001
Forest effectively protected as a result of raised incomes	20 Legal Reserves demarcated.	Oct 2001
Agricultural alternatives developed and implemented	100,000 açai seedlings planted.	Oct 2001
	5,000 piaçava seedlings planted.	Oct 2001
	6 demonstration areas with "witch broom" natural resistant cocoa trees planted.	Oct 2001
	5 demonstration areas with "green fertilizer" implanted.	Oct 2001

*B) Phase-out commercial logging that supplies non-local demand with implementation of command and control procedures and policies mitigating social impact of industry decline. FY 99-00-01.*

FY 2001: Obj1,B	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Helofsa Orlando – research on logging activities inspection	x	x	x	x	x	x	x						
Flávio Leopoldino – research on main current logging sites	x	x	x	x	x	x	x						
Marcelo Araújo – workshop organization					x	x	x	x					
Total Obj1,B													

**Progress to-date:**

- Heloisa Orlando and Anita Akella have finished their research, supported by PROBIO (matching funds) on the logging activities inspection system in the State of Bahia.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity B-B1**

Obj 1 (B) Benchmarks	Measure	By
Logging activities inspection system improved	The results of the survey on logging activities in South Bahia published. A workshop together with IBAMA and DDF on inspection realized.	April 2001 May 2001
Enforcement plan adopted by multi-agency task force	Implementation of controlled logging on cocoa lands pursuant to regulation	Oct 2001
Main current logging sites identified	White paper distributed	Oct 2001

- C) *Eliminate incentives encouraging the location of agrarian reform settlements on forested lands with fragile soils. Work with government to achieve the implementation of policies integrating forest conservation with land reform on sites appropriate to small-farmer agriculture. FY 99-00-01.*

FY 2001- Obj1, C	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Rui Rocha, Salvador Trevisan and Joaquim Blanes – organic production	x	x	x	x	x	x	x	x	x	x	x	x	
Total Obj 1, C	x	x	x	x	x	x	x	x	x	x	x	x	
<b>Total Obj 1</b>													<b>8,687</b>

**Progress to-date:**

- IESB organized a participatory process to identify problems, possible solutions and actions in the Viva Vida (Jussari municipality) and Ipiranga (Una municipality) rural agrarian settlements. The discussions involved local families and the representatives of the Municipalities.
- In October 2000, IESB began a project with the objective of generating income for three rural agrarian settlements around Serra do Conduru State Park (with matching funds from FUNBIO and Ford Foundation). This project will assure the conservation of the forests that connect the Conduru Park to the Private Reserves of farmers from the APA Itacaré-Serra Grande. Twenty-five greenhouses for native species have already been installed and three new projects to recover degraded areas will be initiated and funded by the state government, which will give US\$ 60,000 to buy the seedlings produced in the rural agrarian settlements. The three communities involved in the project are assuming conservationist compromises by committing to avoid illegal logging and the use of fire in agriculture. For the project development, Rui Rocha and Joaquim Blanes have assisted the team coordinated by Salvador Ribeiro.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity C-C1**

Obj 1, (C) Benchmarks	Measure	By
Organic production implementation in agrarian reform settlements	Organic production in 2 settlement	Oct 2001

**Objective 2:**

*Public policy alternatives reversing existing incentives favoring forest degradation implemented, with subsequent adoption of environmentally and socio-economically sustainable land-use practices beyond demonstration sites.*

**Activities:**

A) *Implementation of new fiscal incentives for private reserves (federal private nature reserve legislation - RPPN - reinforced, creation of state-level private reserve law), for municipalities with conservation areas (ICMS ecologico), and for tourism practices that contribute to conservation and community development. FY 99-00-01.*

A1) *CI and IESB have produced model legislation for a Bahian ICMS ecologico, and additionally will work to provide legislators with background on how this serves local interests. FY 99-00-01*

FY 2001: Obj2, A1	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Rui Rocha and Marcelo Araújo— Meetings							x	X	x	x	x	X	
Gustavo Fonseca, Keith Alger – Probio Research and Publications	x	x	x	x	x	x	x	X	x	x	x	X	
Marcelo e Rui - Committee for Biosphere Reserve	X	x	x	x	x	x	x	x	x	x	x	x	789
Marcelo e Rui – Condema Ilhéus		x	x	x	x	x	x	x	x	x	x	X	
Joaquim Blanes – Regulation of Organic Products	x	x	x	x	x	x	x	x	x	x	x	X	500
Publications/IESB					x	x							6,000
Total Obj 2, A1													7,289

**Progress to-date:**

- The process of establishing RPPNs (Private Reserves) on the lands of two organic certified producers was initiated – Marc Nuscheler (40 ha) and Fausto Pinheiro (120 ha).
- Rui Rocha has been in the position of Executive Secretary of the APA Itacaré-Serra Grande Administrative Council that by now has held 10 meetings. Although there are 23 APAs in the State of Bahia, this council has been the first one to work in the state, and has been a model to others in Brazil due its regularity and participatory representation. Between October 2000 and March 2001 the APA Itacaré-Serra Grande Environmental Education program has published the APA monthly newsletter using local private funds.
- In December 2000, the Environmental Education Primer (Cartilha de Educação Ambiental) was launched and, starting in April, it will be distributed to the APA Itacaré-Serra Grande school libraries.
- In November-December 2000, Marcelo Araújo participated in the Ecological Corridors Project (PPG-7) Appraisal Mission, together with World Bank, Environmental Ministry, KFW, GTZ and CRA (Environmental Resources Center of Bahia) technicians.
- Marcelo Araújo organized the Biosphere Reserve State Committee monthly meetings. The Committee has been recognized by the Brazilian government and World Bank as the Corridor Program administrative organization. In January and February 2001, the Committee deliberated about the Atlantic Forest Central Corridor Patrolling Plan.
- In March 2001, IESB signed a contract with CRA, a Bahian environmental agency, to coordinate the activities of the Biosphere Reserve State Committee, including the administration of the Corridor Project (PPG-7).

**Problems, delays, shortfalls and proposed solutions:**

- The lack of funds to promote the measurement of Legal Reserves and RPPNs has delayed the process of creating protected areas and land use plans, mainly on small properties.

A2) *Support sustainable tourism development. In FY00 and FY01, the Una Ecopark will consolidate communications and continue to seek funding for a bona fide visitor center. FY 99-00-01*

FY 2001: Obj2, A2	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Beto Mesquita and Steve: Regional Tourism Planning products.	x	X	X	x	x	X	x	x	X	x	x		1,086
Beto Mesquita: Ecoparque operator, promoting and marketing	x	X	X	x	x	X	x	x	X	x	x		3,337
Flávio – RPPN's		X	X	x	x	X	x	x	X	x	x	x	831
Total Obj 2, A2													5,254

**Progress to-date:**

- The Una Ecopark was a cover story in an issue of the *Horizonte Geográfico* magazine, one of the most important Brazilian magazines about environmental tourism and adventure.
- The Una Ecopark received the "Top 10 in Ecology" award in the "Conservation Project" category for its partnership with Ford Motors Company.
- The Una Ecopark was used as a case study during the "Economic Tools Applied to Tropical Ecosystems' Conservation" course. The present financial situation of the Ecopark, as well as future perspectives using different scenarios, was analyzed.
- The Una Ecopark was included in the Ilhéus City Practical Guide.
- The visitation to the Una Ecopark by the Transamérica Hotel guests was re-established. The visitation was suspended for 6 months due to the lack of an agreement between the Hotel and tourist operators.
- New Una Ecopark promotional advertising products, including folders and posters, have been launched. The material has been distributed in hotels, restaurants, at events and other commercial establishments.
- Representatives of IESB, DDF (State Forestry Development Agency) and SUDETUR (Tourism Development Superintendence) visited the Serra do Conduru State Park for two days to know more about the present regulation of the Park's land (situação fundiária) and to discuss new partnerships between the three institutions, mainly to accelerate the process of the Park's land regularization and the installation of a interpretative trail inside the area already purchased.
- A proposal to implement an interpretative trail in the Serra do Conduru State Park, including an environmental interpretative project, determination of the tourist carrying capacity and a mini-course for environmental interpreters has been produced. The proposal was submitted to SUDETUR and was approved.
- A meeting with Dr. Wait Thomas from the New York Botanical Garden was held to discuss a project to continue the management activities in the Serra do Teimoso Private Reserve--to be written-up and submitted to the Beneficia Foundation. The project concept includes the building of 30-meter high observation platforms, implementation of the interpretative trail and support for print promotional material (folders and posters).
- IESB organized a workshop on "Tourist Product Planning for Pataxó da Jaqueira Indigenous Reserva" in Porto Seguro, with 23 indigenous participants. Two more events are planned to train the Ecotourism Pataxó Association members and other interested native Brazilians. A third event has also been planned to evaluate the implemented activities and their results.
- IESB Participated in the Working Group "Conservation Units Economic Sustainability" during the meeting to regulate the Conservation Units National System (II CBUCC).
- A proposal has been elaborated to enlarge and improve the Una Ecopark installations with an Education and Environmental Interpretation Center, a new trail, interpretative panels in the two trails (in the new and in the old one), a plan for a marketing strategy, revision in the business plan and purchase of another vehicle to transport visitors. The proposal was submitted to the Walt Disney Foundation.

- In December 2000, Flávio and Carlos Alberto concluded the Management Plan for the Serra do Teimoso Private Reserve, in partnership with the O Boticário Foundation and Santa Cruz State University.
- IESB supported the creation of the Uiraçu Institute, in Camacã, to administrate the funds to implement the Serra Bonita Private Reserve (500 ha).
- The negotiations to create a RPPN with 500 ha in the Nossa Senhora da Vitória Farm, property of Fernando Gomes, were initiated.
- On March 5, 2001, the Preserva – Private Protected Areas Owners Association, convened its general assembly and started arrangements for the Association’s legal registration.
- On November, 2000, the results of the research “Serra do Teimoso Private Reserve Visitors Profile, Berbert, H. Berbert, L., Leopoldino, F.S. and Schiavetti, A.” were published on an Atlantic Forest CD-rom (with matching funds from PROBIO).

**Problems, delays, shortfalls and proposed solutions:**

- The Ecopark has only one car to transport the visitors and it has to close when the car needs maintenance or brake repairs. IESB is seeking funds to purchase another vehicle.

**FY01 Outputs/Benchmarks for Objective 2, Activity A1-A2**

In this first six-month period:

- IESB has initiated the process of creating 8 RPPNs (1,700 ha).

Obj 2, (A) Benchmarks	Measure	By
Improved policies	Inspection of 5 areas to create new RPPNs.	Oct 2001
	5,000 folders about RPPN distributed.	Sept 2001
	8 seminars on RPPN, to producers, realized.	Sept 2001
	An inter-institutional group to monitor the BA 001 road (Itacaré-Camamú) constituted.	Sept 2001
	A proposal to transform Serra das Lontras e Javi in a conservation unit prepared and presented to the government of state of Bahia.	May 2001
	The Administrative Committee for the Corridor Program constituted.	May 2001
Sustainable tourism disseminated	The book “The Conservation of Atlantic Forest in South Bahia” reporting the IESB’s work since 1994, published.	June 2001
	10 South Bahia ecotourism enterprises trained, capacitated and monitored in the Ecotourism Incubator Program.	Sept 2001
Fiscal incentives for municipalities and landowners analyzed, produced	White paper (PROBIO) disseminated	May 2001

*B) Define strategies to eliminate incentives that promote monocrop plantations to the detriment of biodiversity friendly agriculture. FY 99-00-01*

FY 2001: Obj2, B	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Joaquim e Mariella Uzeda – articulation and coordination of the committee		X	X	x	x	x	x	x	x	x	x	x	
Marcelo e Mariella - publication				x	x	x							
Joaquim, Mariella e Marc – meetings with farmers		X	X	x				x	x	x			
<b>Total Obj2, Supplies, Equip.</b>													<b>12,543</b>

**Progress to-date:**

- The State University of Santa Cruz (Ilhéus) will fund a book about sustainable agricultural production (history, techniques and ways of adoption). Currently, Mariella Uzeda is organizing the articles that will be included in the book
- The State Committee for the regulation/certification of organic production was created.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 2, Activity B**

In this first six-month period:

- The State Committee for the regulation/certification of organic production was created.

Obj 2, (B) Benchmarks	Measure	By
Organic production disseminated	Book on sustainable agricultural production published. The State Committee for organic production created.	Oct 2001 March 2001

**Objective 3:**

*Increase knowledge about the significance of region's biodiversity while assisting in the design and implementation of management plans for biodiversity conservation units, zones, and corridors.*

**Activities:**

A) *Prepare conservation planning maps for use in planning, monitoring, biodiversity research, and park management. FY 99-00-01.*

FY 2001: Obj3, A	C	N	D	J	F	M	A	M	J	J	A	S	US\$
Marcelo, Alessandro - Catalog of Maps from Air Photos, Private Reserve Maps, Maps for Park Managers	x	x	x	x									1,730
Marcelo, Alessandro – student training	x	x	x	x	x	x	x	x	x	x	x	x	414
Marcelo, Charlotte – Time-Series Analysis Planned						x	x	x	x	x	x	x	494
Marcelo, Paulo Inacio - Data Base: Organization and Maintenance	x	x	x	x	x	x	x	x	x	x	x		985
Total Obj3A													3,623

**Progress to-date:**

- From October to March 2001, IESB's air photo databank was used in the following projects:
- Forest fragment identification and delimitation of 3 new RPPNs areas—The Bahia State's RPPNs databank was updated and presented in the RPPN Technical Seminar promoted by IBAMA.
- Two master thesis – Characterization and management of Rio Jeribucassú basin (Itacaré-Bahia), Meliani, P., Federal University of Santa Catarina, Florianópolis. Perception of rural communities on environmental questions – Marambaia rural agrarian settlement case, Salomão, J.M., Santa Cruz State University, Ilhéus.

- The following maps of land use and occupation were produced to support the APA Itacaré-Serra Grande monitoring (1:10.000): map of the Rio Jeribucassu basin, map of Serra Grande district and Serra do Conduru Park locations for the Serra Grande community Popular Art and Culture Project, map of the Marambaia agrarian rural settlement to plan an appropriated land use.
- To support the Organic Production Program – demarcation of the Fazenda Boa Vista Legal Reserve; organization of a databank with the identification and location of all the properties involved in IESB's Organic Production Program.
- Maps were produced to support the State Government Action Plans. These maps identified degraded areas bordering the highway BA-001 (Ilhéus-Itacaré) with the objective of elaborating a recovery plan for the area (joint project IESB-CRA). In partnership with CRA and CONDER (Urban Development Company), IESB supported the identification and location of areas to deposit urban garbage in Itacaré.
- Training and publications – one agronomy student from UESC was trained in GIS and aerial photo interpretation (300 hours); a preliminary version of the CD-Room with information on the “Atlantic Forest Central Corridor” was published in partnership between UNICAMP and CRA.
- IESB, in partnership with Birdlife International, flew over the Serra das Lontras region to know the area and identify forest fragments in support of the creation of the Serra das Lontras Conservation Unit.
- IESB has discussed a proposal to acquire aerial photos and to promote another flight over the region in partnership with CRA and CONDER in an effort to monitor the forest remains.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 3, Activity A**

Obj 3, (A) Benchmarks	Measure	By
Maps produced	A detailed map of the remaining forest fragments distribution in the Una Reserve and Conduru Park buffer zone produced and published.	Sept 2001
	A map of remaining mangrove distribution in the Southeast of Bahia produced and published.	Sept 2001
	A map of the remaining forest fragments in South Bahia produced and published.	May 2001

*B) Obtain baseline data on biodiversity associated with land uses to prioritize conservation policy. FY 99-00-01.*

FY 2001: Obj3, B	O	N	D	J	F	M	A	M	J	J	A	S	US\$
Raquel Moura - Research on mammals region wide	X	x	X	x	x	X							
Adriana Martini – Research on forest regeneration	X	x	X	x	x	X	x	x					683
Adriana Martini – seminar						X	x						
Cecília Kierulff - Survey of primates					x	X	x	x	x	x	x	x	
Total Obj3, B													683
<b>Total Obj3 Supplies, Equip.</b>													<b>4,306</b>

**Progress to-date:**

- The research on fauna (amphibious, birds and mammals) distribution in the Corridor region is still ongoing. The surveys have been performed in forests located from the north of Valença to Mucuri.
- A preliminary "Population Viability Analyses" has been conducted for two primate species – *Cebus xanthosternos* and *Leontopithecus chrysomelas* and three bird species - *Amazona rhodocorytha*, *Myrmotherula urostica* and *Xipholena atropurpurea*.
- The preliminary version of a CD-Rom including all the results of the research realized in the Corridor region has been published.
- In December 2000, Adriana Martini finished her fieldwork after two years of seeds rain monitoring. A biologist student has been trained and is currently cataloging the seeds collected and identifying the plants. As a result of the project, an abstract on jussara palm establishment was sent to the Botanic National Congress – Estabelecimento de Euterpe Edulis Mart. (Arecaceae) em ambientes com diferentes graus de perturbação na região sul da Bahia, Adriana M.Z. Martini, Vivian S. Dutra and Flavio A.M. Santo.
- March 15-16, 2000, IESB organized, in partnership with Banco Mundial/CABS/CI-Brazil/PROBIO, a workshop in Ilhéus, Bahia, to discuss economic tools to build the Atlantic Forest corridor. Ken Chomitz and David Storns presented a preliminary version of a computer program that simulates different economic scenarios to preserve biodiversity. The model encourages stakeholders and policy makers to articulate their economic, ecological and social objectives and constraints, and to specify mechanisms they will use to realize these objectives. The results of the fauna and economic surveys were presented and priority actions discussed. During the workshop the Central Corridor Project, funded by the PPG-7 was presented and the integration between projects was discussed. A workshop with the participation of the Biosphere Reserve Committee and a symposium to apply and discuss the results of the model were scheduled for June.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 3, Activity B**

<b>Obj 3, (B) Benchmarks</b>	<b>Measure</b>	<b>By</b>
Database produced	A CD-ROM including the database of remote sensing coverage (maps) and fauna and flora information produced and distributed.	March 2001
Park management improved	Explicit policies and procedures implemented on pasture, fire and hunting threats.	Sept 2001
Fauna information produced	A bird list for the Ecopark 1 scientific report and 1 popular publication.	Sept 2001 Sept 2001

**III. Other**

**A. Presentations**

- Carlos Alberto Mesquita gave a presentation on the Una Ecopark at the International Forest Seminar (Forest 2000), Porto Seguro, Bahia.
- Carlos Alberto Mesquita participated in the II Conservation Units Brazilian Congress, Campo Grande, Mato Grosso do Sul where he gave a presentation on Natural Private Reserves Characterization in Latin America (his master dissertation) and participated in the meeting of Brazilian members of the IUCN World Protected Areas Council.
- On January 27, 2000, Flávio Leopoldino gave a presentation to 25 UESC students on IESB's RPPN Program during the course Management of Natural Areas.
- Flávio Leopoldino presented the results of IESB's RPPN Program in the II Seminar for RPPN Technical Program, promoted by IBAMA, March 12-14, 2001, in Aracaju.

**B. Visitors**

- In October 2000, the APA Litoral Norte representatives and a consultant from the British cooperation visited the Una Ecopark and APA Itacaré-Serra Grande to learn about ecotourism as an economic alternative to preserve natural resources.
- A student from England visited the Ecopark to collect data for her master's dissertation on methodologies to evaluate tourist products' sustainability.
- In December 2000, National Biosphere Reserve Council members and technicians visited the region to learn of IESB's work and to discuss the regional environmental problems.
- In December 2000 Robert Michael, coordinator of the RPPNs of the Energy Company of Minas Gerais visited the region to exchange information and experiences.
- In February 2000, the new Una Sports, Tourism and Environmental Secretary visited the Ecopark with the objectives of knowing the product and establish partnerships.

**C. Training**

- In December 2000 the Ecopark guides and two other people from the local community were trained. The training ranged from how to give attention to the visitors to quality of environmental interpretation utilized.
- Joaquim Blanes participated in the workshop on enterprise development hosted by CI's Conservation Enterprise Development Program (CED) and held in Albergue de Chalalan-Rurenrabaque, Bolivia. The theme discussed was "Development of Small Businesses Associated to Biodiversity Conservation".

**3) CI-Papua New Guinea**

**Objective 1:**

*Increase the link between community-based resource management and biodiversity conservation on Kamea-owned lands in the Lakekamu Basin through expanded use of the Ivimka Research Station (IRS).*

**Activities:**

A) *Work in partnership with the Kamea landowners to maintain and promote the IRS in the Lakekamu Basin as a world-class, lowland rainforest research facility. FY99-01.*

A1) *CI-PNG will help facilitate increased consultation with the IRS Kamea landowners and nearby Kamea community of Tekadu to enhance the information flow between IRS field staff and the Research Station's local stakeholders. FY99-01.*

Regular meetings and Community Consultation	Banak		x			x		x		x
	Eka	x			x			x		x
Consultations with Gulf and Morobe Provincial Governments						x				x

**Progress to-date:**

The area of the IRS was demarcated during the land use mapping exercise in August 2000. The data collected from the land-use mapping exercises with the Kamea community was synthesized for project planning at the CI-PNG March Annual Meeting

The November meeting with the locals did not take place because Banak Gamui, Lakekamu Program Manager, was attending Monitoring and Evaluation and Conservation Economics training workshops in the United States. However, during Banak's January field trip, the Kamea of Tekadu and Nukeva villages were consulted. The first of the meetings was held at Tekadu village on Sunday, January 13 in which 41 villagers attended and among them were the following village elders and leaders:

#	Name	Status/Occupation
1	Timothy Tiamipo	Tekadu Ward Councilor
2	Moses Ingasuo	Lutheran Church elder and landowner
3	Peter Uyepango	Landowner and village elder
4	Ben Opa	Ward Development Committee
5	Kola Timothy	Manager of guest house
6	Alex Moses	Local Field Assistant
7	Brandon Peter	Son of IRS landowner

Also present at the meeting were two project officers from an existing Wildlife Management Area (WMA) in Papua New Guinea (Crater Mountain WMA). These individuals participated in a Training Course conducted by the Wildlife Conservation Society (WCS) at the IRS during the month of January (this training will be elaborated in activity A5 below). The first of them, Mr. Muse Opiang, Coordinator of a field site in the Crater Mountain WMA, based his talk on how the locals he was working with in the Crater Mountain WMA were organized. His speech gave a brief history of the project, the WMA Management Committee, fee schedules and WMA rules. The second speaker, Kepslok Kumilgo, a research student in the Crater Mountain Project, spoke about the importance and purpose of research. This was followed by a question and answer session.

In this meeting, the locals were able to learn from the Crater Mountain experience about the management structure and functions of a WMA Committee, examples of WMA rules, types of fee schedules and the importance of biological research

Several issues raised by the Tekadu landowners during the meeting are as follows:

1. Many researchers often fly into the Basin and head off straight to the research station without explaining to the local people the purpose of their visit. The landowners have asked that all researchers should meet with them and explain their research before they begin their research.
2. The locals also want to be informed of research findings and have asked CI to follow up on previous research conducted in the area and have copies of the research reports kept as records of work done in the Lakekamu Basin.
3. The Manager of the rustic guesthouse in Tekadu (Kola Timothy) raised a concern that the guesthouse was not making money from visitors. Most visitors are researchers who often arrive in Tekadu and walk to Ivimka Research station on the same day. On their return trip, they walk to Tekadu early in the morning to catch the flight out the same day.

Banak responded that all researchers would be requested to attend a short 20 to 30 minute meeting with the locals to explain the purpose of their research. This will also be a venue for an on-going awareness campaign regarding research in the basin. Banak also explained that reports of some of the research activities conducted in the Lakekamu Basin in the past were housed with CI and Foundation for People and Community Development and attempts would be made to have all researchers send copies of their research reports in the future. As for Kola's concern about the guesthouse not making money, the meeting resolved that CI and FPCD officers would inform all visiting researchers about the existence of the guesthouse. Banak stressed the importance of community organization and having some form of committee in place to manage research at the village level. The meeting group agreed to have a WMA Management Committee formulated at the April WMA Workshop.

CI-PNG communicated with the Gulf Provincial Division of Corporate Services (Commerce, Culture, Tourism and Petroleum) in October after receiving a letter from the Division asking for information on eco-tourism in the Lakekamu Basin. CI suggested a meeting with Divisional representatives and other relevant Provincial departmental representatives.

**Problems, delays, shortfalls and proposed solutions:**

- Discussion of problems/delays and proposed solutions is integrated into the discussion of progress-to-date.

*A2) CI-PNG, in consultation with Kamea landowners, also proposes to update the current monitoring and evaluation program. FY99-01.*

	CI	W	LD	EP	IV	LA	PA	PS	SA	SS
Consultation with Experts	X	X	X	X	X	X	X	X	X	X
M & E draft prepared							X			
Final draft of M&E plan prepared										X

**Progress to-date:**

Consultations for developing the Monitoring and Evaluation (M&E) Plan were completed. This process involved a Training Workshop conducted by CI's Monitoring and Evaluation Department conducted September 24-October 1, 2000 in Montana. In February, Banak was involved in developing the Milne Bay (CI's Marine Project in PNG) M&E draft plan. With this new knowledge, he started working on the Lakekamu M&E Plan. The first draft of the Lakekamu M&E Plan is expected to be ready by the end of May.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

*A3) CI-PNG, in consultation with Kamea landowners, will oversee expansion and maintenance of the current trail network, construct observation blinds and make improvements as needed to the IRS. FY99-01.*

Maintenance of current trail network		x			x			x			x
As needed improvements to IRS infrastructure											x
Construct Lodge for IRS Research Assistants with Bush Materials											x
Sites for observations selected and blinds constructed							x				
Additional trails construction					x						
Map IRS Area (incl. trails, and research boundaries)										x	

**Progress to-date:**

In October and November the Local Field Assistants organized groups of field workers to maintain the IRS trail network. Then in January, during Banak's field trip, a group of locals cleared the more than 10 km trail between Tekadu village and the IRS. Routine upkeep of the IRS facility is done by Local Field Assistants as needed. Though observation blinds have not been constructed, there are two Ragianna Bird of Paradise leks (term given to bird of paradise display sites) that have already been identified. These sites do not require observation blinds, as people observe the birds from the ground with the aid of a pair of binoculars. There are also several lookout spots and that should be sufficient for the start. Locals are also building a separate lodging facility of natural materials to house field/research assistants.

**Problems, delays, shortfalls and proposed solutions:**

- The sub-activity of building observation blinds is being put on hold. Mapping of the IRS area cannot be performed until after July when staff returns to the field.

*A4) CI will also promote the 1998 RAP Working Paper Number 9 on the 1996 Lakekamu Basis RAP as a promotional tool to expand use of the IRS by visiting researchers and will explore potential partnerships with research institutions in PNG, Australia and elsewhere in the Pacific. FY99-01.*

FY/2001/CI/ATTN	1	2	3	4	5	6	7	8	9	10	11	12
Partnerships search	x	x	x	x	x	x	x	x	x	x	x	x
Put together promotional information for Science and Adventure Tourism in the Lakekamu Basin						x	x					
Compile Lakekamu Project Reports									x			
Print and Bind copies of Reports											x	
Update PNG Program pages and link CI website to PNG Embassy's website						x						x

**Progress to-date:**

Initial contact has been made with Dr. Terry Sears of the California-based Silvaard Institute of Natural History regarding a potential partnership arrangement. There has also been discussion within CI of a partnership with the Center for Applied Biodiversity Studies (CABS) and the Field Support Division (FSD) to upgrade the IRS into a facility for Conservation International's Network of field stations for Global Monitoring on socio-economic and ecological trends. This has already been incorporated into the project strategy for CI's FY02, which begins in July, 2001. The new Strategy also promotes the building of alliances with local research institutions, universities and NGOs. The ongoing training of university students in biological field techniques by the Wildlife Conservation Society (WCS) and the University of Papua New Guinea, which completed a second training at the Ivimka site in January 2001, looks promising. Project staff of Lakekamu have constant contact with the Management of WCS in PNG.

The informational material for Science and Adventure Tourism is in draft form (See Attachment PNG-1 for "Informational Material for Science and Research Tourism"). The Lakekamu Project Brief is being prepared and will be completed by the end of July. The activity on updating the PNG Program information for CI's web-site and linking it (the CI web-site) to the PNG Embassy website is being taken care of by CI-PNG Communications personnel at the country program level. Therefore, the activity should now be only concentrating on providing the information updates to the Lakekamu Project.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

*A5) CI-PNG will empower the local community to participate fully and meaningfully in the Science and Research Tourism Enterprise. In doing so, CI-PNG will facilitate community training and the establishment of an IRS Management Committee comprising members of the local Tekadu Community.(FY00-01)*

FY/2001/CI/ATTN	1	2	3	4	5	6	7	8	9	10	11	12
Research Assistant Training	Achieved but will continue as and when researchers visit											
Tour/Field Guides Training								x				
Establish IRS Management Committee	Achieved, need to spell out specific duties and roles											
Butterfly Farming Training					x							

**Progress to-date:**

In January, the Wildlife Conservation Society, in partnership with the University of Papua New Guinea (UPNG) and the PNG University of Technology (UNITECH), conducted a month long field training course for biology and forestry students at the IRS. The Lakekamu Project Manager, in close consultation with WCS, arranged for nine (9) local boys to be trained with the university students. The most important part of their training was in field biological survey techniques, which involved setting of traps, taking proper measurements and preparing voucher specimens. They learned survey techniques for birds, plants, herpetofauna and insects. Some of them did very well and received words of encouragement and praise from their instructors. These youths can now be hired by the project to collect biological monitoring data as well as hired by visiting researchers to work on research projects. Some of the previously trained local research assistants do very well in the field and have been hired by visiting researchers to work with them.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity A1-A5**

1. Hold continued informational meetings with the Kamea landowners of the IRS (**Completed with one meeting**)
2. Reevaluation and Revision draft of M & E plan (**Partially Completed-progress slow but may meet deadline**)
3. Expansion and maintenance of current trail network; As-needed infrastructure improvements; New trail network planned; Sites for observation blinds selected (**Partially Completed**)
4. Continued distribution of 1998 RAP Working Paper Number 9 on the 1996 Lakekamu Basin RAP to promote IRS (**Completed-Partnership search carrying over into FY02**)
5. Training completed for Local Research Assistants (**Completed**) and Tour Guides (**Cancelled**). IRS Management Committee Established and some Committee members trained in Basic Book-keeping, (**Completed but committee is not practicing management role**) Butterfly Farming (**Cancelled**)

*B) CI-PNG will continue its efforts to inform the Kamea on the importance the Lakekamu Basin's biodiversity, the importance of sustainable resource use and the various conservation options open to them. This would be accomplished through:*

- *a series of community meetings and workshops. CI-PNG Lakekamu Basin staff will conduct this activity. FY99-01.*
- *delivery of the results of the 1996 Lakekamu Basin RAP to Basin communities in a comic-book format that is widely used for education purposes in PNG, and that will be most useful and accessible to them. FY00 -01.*

Meetings/workshops on biodiversity		x			x			x			x
Comic book consultations				x							
Draft of comic book						x					
Final editions to comic book draft and submit for publication											x

**Progress to-date:**

Although there were no workshops or meetings held specifically on Biodiversity, this activity was partly covered in activity A1 (see report on that section). There will be no workshops on Biodiversity until after July.

A draft of the conservation comic book is nearing completion. The artist should complete all the artwork by the end of May 2001.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 1, Activity B**

1. Series of meetings on biodiversity with the Kamea (**Partially Completed**)
2. Complete consultations on comic book content (**Completed**)
3. Complete draft of comic book (**Ongoing**)

*(C) CI-PNG in consultation with the Kamea Landowners, the Morobe and Gulf Provincial Governments, the Department of Environment and Conservation and other relevant authorities will declare the Ivimka Research Station (IRS) and surrounding Kamea/Watut held lands as a Wildlife Management Area (WMA).*

WMA Awareness		x			x			x			x	
Site Visits		x						x				
Formation of WMA Committees		x			x							
Develop Rules								x				
Boundary Descriptions									x			
Submission of WMA plan and proposal to the National government for gazettal												x

**Progress to-date:**

The planned workshop was postponed until November. However, some WMA awareness was conducted in January during Banak's field trip (Read the section under activity A1- Community consultations and meetings above). Progress and status on all the activities pertaining to the declaration of WMAs will be presented and further developed during the rescheduled WMA workshop in November.

Regarding the Local Field assistants, Clement and Alex have been keeping their field diaries and reports. The third, Mathew Yawi, didn't do a good job as he was not used to it. Banak spent some time with him, showing him what the other two field assistants did and he will be assessed on his performance next time Banak makes a field trip. Unfortunately, the remoteness of the project and lack of a postal service in the area has made it difficult for the local field assistants to provide CI with monthly reports. After some discussion, it was agreed that the Local Field Assistants would provide reports every time CI project officers visit the field.

During Banak's field trip in January, the local field assistants reported that there was a trip by representatives of an oil palm company into the Lakekamu Basin. According to their report, the oil palm officers and certain Provincial Government representatives asked the local landowners to form land groups. There is no progress report on this. The company officials also asked them about coming up with a land-use plan and the locals referred them to the same land-use maps they did in August (FY00) with CI Project staff. The company officials have not contacted the CI office for the land-use map since then.

**Problems, delays, shortfalls and proposed solutions:**

- Sustaining the momentum of the WMA activity is now in question, as CI-PNG no longer has constant communication with the field.

**FY01 Outputs/Benchmarks for Objective 1, Activity C**

1. WMA Awareness in all Kamea villages (**Not Completed**)
2. Several site visits to proposed areas (**Not Completed**)
3. Formation of WMA Committees (**Not Completed**)
4. Develop Rules (**Not Completed**)
5. Boundary Descriptions (**Not Completed**)
6. Submission of WMA plan and proposal to government for gazettal (**Not Completed**)

**Objective 2:**

*Foster biodiversity conservation in targeted communities in Wide Bay, East New Britain Province through exploration of conservation-based enterprise development and support of community-based resource management.*

**Activities:**

*CI and our local NGO partner, the East New Britain Sosek Eksen Komiti (ENBSEK), work with local communities in Wide Bay to increase their knowledge and understanding of conservation-related issues.*

*A) CI-PNG, in partnership with ENBSEK and local communities, and with technical support provided by CI-Washington, will conduct a targeted RAP survey and continue participatory rural appraisals in order to formulate community-based resource management plans.*

*A1) At the request of the communities of Taintop and Klampun, CI will conduct a small-scale RAP survey on their lands. Information obtained from the survey will be used in developing community-based resource management plans. Results of the RAP survey will be published and disseminated within Wide Bay communities. FY00-01.*

FY 2001 Objectives	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Compilation and dissemination of Final RAP Report	X	X	X	X	X	X	X	X	X			
Community capacity building training workshops	X	X	X	X	X	X	X	X	X	X	X	X
Formation of Community Association & Registration with IPA	X	X	X	X	X	X	X	X	X	X		
Interpretation of GPS data	X	X	X	X	X							
Submission of Requirements (a), (b),(c) to OEC for gazettal of WMA	X	X	X	X	X	X	X	X	X	X		
Promotional & Awareness activities	X	X	X	X	X	X	X	X	X	X	X	X
Compilation & documentation of lessons learnt in Wide Bay	X	X	X	X	X	X	X	X	X	X	X	X

**Progress to-date:**

*a) Community capacity building*

Creating a community association was identified as a basis for capacity building, and the initial step has been taken to register the community association with the Investment Promotion Authority (IPA). The constitution of the Klampun Community Association was submitted to the IPA in January 2001 for incorporation as an association. The community, in the long-term will have an institution to carry out conservation as well as any related businesses in the area, based on the objectives of the association.

*b) Networking and building alliances*

Identifying roles and responsibilities, and sourcing expertise from alliances for strengthening the community has become very important for the project. One such initiative has been working with OISCA, a Japanese run institute based in Rabaul, which has been very successful in its community-based training in Rice and Butterfly farming. We hope to develop a long-term relationship to link the communities and the OISCA facilities.

CI-PNG is also working to develop ties with the East New Britain Tourism Bureau in order to assist the community in eco-tourism development in the area, in line with the Bureau's Pomio District Tourism Development Plan.

CELCOR, a Port Moresby based local legal NGO, is currently assisting with the land issues in Tiemtop, where the initial assessment of the social issues in the community was conducted in April, 2001; and followed by attending to related case at the Kokopo District Court on the 22<sup>nd</sup> May, against the Kaluan Landowner Company of the neighboring Wawas community.

*c) Awareness raising*

The first issue on "Tokaut Nius Bilong Wide Bay", was released on December 10, 2000. The bi-annual Newsletter will be released on the 10<sup>th</sup> of June and 10<sup>th</sup> of December of each year. The first issue has been circulated to all stakeholders: NGOs, representatives of East New Britain Provincial Government Departments, Local Level Governments, and the Wide Bay communities. As requested by the community, the News is written in "Tok-pisin" targeted towards local communities. (See Attachment PNG-2 for "Tokaut Nius Bilong Wide Bay".)

*d) Establishment of Wildlife Management Areas*

The survey of land boundaries using GPS in Klampun lands has been conducted in May, 2001 and facilitated by Peter Bosip, Wide Bay Field Officer. GPS data, after interpretation will be submitted together with other requirements to the PNG Office of Environment and Conservation (OEC) for gazetting of the Klampun WMA before the end of FY03. (Full report on GPS survey will be given in the next Semi-annual Report.)

*e) Addition of RAP recommendation into CBRM plans*

The RAP survey identified the area to have all four criteria for conservation priority: endemism, diversity, threat, and limited area. As one of the areas in Papua New Guinea to have all four criteria, Wide Bay was recommended to have a high conservation priority. This recommendation was based on observations and assessments of the extent of threats to biodiversity posed by large-scale logging operations in the nearby forests and findings of species diversity and endemism in the surveyed area.

This recommendation has added weight to the efforts to set up WMAs (*See above section-d*) based on the preliminary findings.

In addition, Dr. Andrew Mack, Team Leader of the RAP, is compiling the final RAP Report. In the process, Maureen Ewai, Wide Bay Project Officer, has compiled a draft component of Introduction on the Social aspects of the Wide Bay area. (See Attachment PNG-3 for "RAP Introduction") Also note that the Preliminary RAP Report was circulated in 2000.

***Problems, delays, shortfalls and proposed solutions:***

Unfortunately, most of the activities are behind schedule, and those marked as "incomplete" may not be completed by the end of the BIRD Agreement. Those "in progress" may be completed by the end of BIRD Agreement.

Those project activities that require visits to Tiemtop village have been on-hold since April 2000. This is due to the Tiemtop community's land tenure issues with neighboring Wawas village and the logging company. The Wawas community is in favor of logging, and any activities planned for Tiemtop village were disrupted by staged confrontations and threatening of Tiemtop community members' lives.

Given the above situation, all activities conducted outside of Tiemtop have included representatives from Tiemtop in order to keep them involved in the project.

Several initiatives have followed on this issue:

- District land mediators were invited to discuss the matter and a consensus agreement between the disputing individuals was signed in April 2000;
- A consensus agreement between Tiemtop and Wawas villages was signed, also in April 2000. The logging operation extended into the project area after this activity.
- Pomio District Forestry officers were invited to visit the project area, and the logging extension into the project area subsequently came to a halt.
- The landowners were organized to write and sign a letter to the East New Britain Provincial Forestry Board in Rabaul in November 2000. This letter outlined the social issues and community concerns as a result of the logging extension into Tiemtop land; copies were sent to authorities responsible.
- The community also sent a letter to CELCOR, a Port Moresby based local legal NGO, to assist in assessing the situation in January 2001. This assessment was conducted from 20-27 April 2001, and the results are not yet available.

- The Wawas councilor, and the Chairman of Kaluan landowner company, took a Court injunction against Peter Vomne, the principal landowner from Tiemtop over the land boundary, and the Case is set for June 6 at Kokopo District Court in Rabaul. (Full report on the outcome will be given in the next semi-annual Report.)

*A2) CI-PNG with local partner, ENBSEK, will carry out additional participatory rural appraisals (PRAs) in targeted communities in Wide Bay. FY00-01.*

Community capacity building training Workshops, a follow-up to PRA	X	X	X	X	X	X	X	X	X	X	X	X
Conflict Resolution Training	X	X	X	X	X	X						
Legal Rights Workshop	X	X	X	X	X	X						
Training on Monitoring & Evaluation	X	X	X	X	X	X	X	X	X			

**Progress to-date:**

An application for the Klampun Community Association’s incorporation was submitted to IPA. The IPA regulations governing incorporation comprised a three-part process including:

- (i) Form 1. “Intention to apply for the Incorporation of an Association”, has been approved on February 19<sup>th</sup>, 2001;
- (ii) Advertising in the daily newspapers. The approved Form 1 was submitted to the PNG *Post Courier* newspaper on April 18<sup>th</sup> 2001, and was advertised on the 19<sup>th</sup> of April 2001.
- (iii) Form 2. “Application for the Incorporation of an Association”, and a copy of the newspaper advertisement were submitted to the IPA a week after the advertisement appeared, and pending approval as well as “Certificate of Incorporation” from IPA.

In addition, the WMA Committee and the WMA rules were compiled through the WMA set-up process. (See Attachments PNG- 4 “ Tiemtop WMA Committees & Rules”, and PNG-5 “Klampun WMA Committees & Rules”.)

PRA activities have resulted in developing land use plans, and mapped out for Tiemtop/Sampun and Klampun villages. These plans are recognized in the Constitution for each area.

Further activities are identified as a follow-up to PRA, to strengthen community capacity. Some of these activities conducted were based on the identified needs of the community, including; “Start Your Business” conducted by Herbertshohe Business Services Ltd in 2<sup>nd</sup>-6<sup>th</sup> April, and “Conflict Resolution & Management training ” conducted by Peace Foundation Melanesia in 7-18<sup>th</sup> May 2001, all conducted in Klampun village. In addition, 3 participants from Wide Bay community are undergoing a 4-week course on “Basic Agriculture” in OISCA, Rabaul for the month of May 2001. (Full Reports on the Training will be given in the next semi-annual Report.)

**Problems, delays, shortfalls and proposed solutions:**

- Most of the “incomplete” activities are, in fact, behind schedule.

**FY01 Outputs/Benchmarks for Objective 2, Activities A1-A2**

1. Final write-up of RAP Results (**Partially Completed**)
2. Community capacity building training workshops (**Partially Completed**)
3. CBRM working document (**Partially Completed**)
4. Awareness materials (**Partially Completed**)
5. Documented report on lessons learned (**Partially Completed**)

*B) CI-PNG proposes to continue its work with ENBSEK to help the communities of Wide Bay explore conservation-based enterprise development options that will promote the sustainable use of their forest and coastal ecosystems. This will be accomplished through:*

- *initial community consultations followed by targeted feasibility studies by CI's Asia Pacific Enterprise Manager, Darwin Flores, who is a specialist in small-scale enterprise development at the community level; and*
- *presentation of studies' findings and evaluation of various feasible conservation-based development alternatives by communities, who choose which ones, if any, they would like to pursue further. (FY00-01)*

Targeted skills training of community on the identified projects	X	X	X	X	X	X	X	X	X	X	X	X
Promotion of guesthouse, training center & Eco-tourism sites	X	X	X	X	X	X	X	X	X	X	X	X
Networking with alliances	X	X	X	X	X	X	X	X	X	X	X	X
Development of eco-tourism sites in the proposed conservation area	X	X	X	X	X	X	X	X	X	X	X	X
Develop trail network in the proposed Conservation area (s)	X	X	X	X	X	X	X	X	X	X	X	X
Negotiations with maritime authorities to facilitate improved shipping in Wide Bay	X	X	X	X	X	X	X	X	X			

***Progress to-date:***

*The following outlines the update on activities;*

***Klampus Village Guesthouse and Training Center***

The Klampus Village Guesthouse and Training Center, established by the community in July 1999, is now managed by the Conservation Committee, which is comprised of representatives of the clans and sub-clans of the village community. The Guesthouse accommodates up to 20 guests and the Training Center is available for workshops, seminars, conferences, and meetings. A promotional brochure has been developed and the facility is being promoted through the East New Britain Tourism Bureau as part of its effort to develop eco-tourism in the province. In addition, two young women from Klampus and Tiemtop attended the catering training at Vunamami Farmers Training Center in Rabaul in September 2000, to assist in improving the capacity to manage the guesthouse. When guests stay at the village, the community sells their vegetables at a reasonable price to the guesthouse. The village is organized into zones, which provide each household an opportunity to sell their produce.

## **Training in Rice Farming**

From September 18-22, 2000, 12 community members participated in a training session dedicated to growing and processing rice. The training was conducted by OISCA, a Japanese institute based in Rabaul, in response to the farmers' strong interest in growing rice in East New Britain. Rice production has become an attractive alternative due to the decreased value of other commodity crops, such as cocoa and copra, and the increased demand for and escalating retail price of rice. Farmers have also realized that rice grows well in Papua New Guinea.

The participants started growing rice following the training by the end of September 2000 on old garden land after harvests of vegetables. The first harvests of about 300 kilograms were transported to OISCA in Rabaul for processing on April 11<sup>th</sup> 2001. The processed rice will be transported back to Wide Bay for communities' consumption.

It has shown to be an expensive exercise for the community to continue to transport the harvest to Rabaul for processing. This encourages the community to seek assistance in securing a local rice processing facility.

## **Training on Butterfly and Insect Farming**

From October 31-November 10, 2000, thirteen participants from the Wide Bay community attended the butterfly farming course at OISCA, which covered the basic skills needed for butterfly farming and management of insects. The training included the identification of host plants, food plants and nectar plants; landscaping; shading; quality control; and insect collection and preservation, including drying, storage, mounting, labeling, packing and marketing. There are eight butterfly farms in Wide Bay Province, with room for expansion of the initiative. While the major market for this product is the Wau Ecology Institute, the insects are also sold to tourists. The Provincial Department of Agriculture and Livestock (DAL) helps to facilitate this operation of marketing insects.

In addition, preparations are underway in the community to start farming butterfly; and they have already begun growing food plants for the insects.

## **Other Small-Scale Enterprise Initiatives**

Eco-tourism development has primarily occurred in association with the guesthouse facility. The community has developed a trail network within a designated conservation area. The trails reach an altitude of 600 meters above sea level and connect many of the area's outstanding scenic features, including caves (believed to be the homes of the Masalais spirits), waterfalls, Kauri Pine (*Agathis spp.*, tallest of the trees in the area and of commercial value), and plane wreckage from World War II. The trail network initiative requires further development and promotion.

In order to help source local markets, Elizabeth Kaupun of Wide Bay Project Coordinator with ENBSEK, met with representatives of "Fresh Produce Development Corporation" (as a middleman) to negotiate the possibility of marketing the fresh vegetables and other products from Wide Bay to wholesalers in Rabaul. (The follow-up to this will be reported in the next semi-annual report.)

### ***Problems, delays, shortfalls and proposed solutions:***

Lack of dependable access is still a large issue and a major threat to enterprise development in Wide Bay. However, the planned activities as a follow-up were:

- Socio-economic surveys of Pomio District; and
- Accessing support from the political heads from the area.

These activities were not achieved and will be extended beyond the BIRD Agreement, particularly the socio-economic surveys, as there is currently insufficient funding for field operations. The planned meetings with the Governor, Koimanrea, were not carried out as planned, due to changes in the provincial political system. This will have to be delayed as well.

**FY01 Outputs/Benchmarks for Objective 2, Activity B**

1. Reports on Community Capacity Building training (**In Progress**)
2. Regular transport (shipping) system (**Not Complete**)
3. Trail network developed (**in progress**)

**Objective 3:**

*Increase the number of viable legal options for biodiversity conservation in Papua New Guinea through policy analyses of Conservation Area legislation and identification of suitable locations for its application.*

**Activities:**

*A) CI will conduct policy and economic analyses leading to the formulation of conditions precedent for likely successful sites for CA implementation. FY01.*

FY 2001 Obj3.A	O	N	D	J	F	M	A	M	J	J	A	S
Policy and Economic Analyses completed						X						
Combined Trip Report						X						

*B) Research potential sites using existing biological and sociological data, as well as submitted landowner conservation requests to the Office of Environment and Conservation.*

FY 2001 Obj3.B	O	N	D	J	F	M	A	M	J	J	A	S
Research continued on potential CA sites	X	X	X	X	X	X	X	X	X	X	X	X

**Progress to-date for A and B:**

- Economic and policy analyses under Activity A are completed and copies will be sent to USAID under separate cover (in combined trip report format).
- As part of Activity B, an assessment of the potential impacts on biodiversity of planned logging concessions has been prepared to assist in identifying priority areas for conservation in PNG and will be sent to USAID under separate cover.
- Consolidation of socio-economic, cultural and biological analyses is underway regarding marine and terrestrial conservation sites in Milne Bay Province and the Owen Stanley Range extending into Central and Oro Provinces. The marine component for Milne Bay Province is complete, including a review of landowner requests to OEC, and will be sent to USAID under separate cover.
- Landowner requests to OEC for the Owen Stanley priority area continue to be compiled.
- TWPF funds were used as match to support work under Activity A, and for terrestrial conservation issues under Activity B. GEF funds were used as match for Milne Bay marine work done under Activity B.

**Problems, delays, shortfalls and proposed solutions:**

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 3, Activity A**

1. Complete policy and economic analyses. (Completed)
2. Complete combined trip report. (Completed)

**FY01 Outputs/Benchmarks for Objective 3, Activity B**

1. Continue analysis of potential sites. (Completed for Milne Bay marine component)
- C) *CI-PNG will consult with DEC, NGOs and local communities about policy analyses and site research results in order to choose the most viable sites for future CA implementation, and increase public awareness about viable legal options for biodiversity conservation in Papua New Guinea. CI-Washington's Conservation Policy and Biology departments will provide technical support to CI-PNG. FY01.*

Given the funding cuts mentioned above, this activity will not be included in this year's workplan.

**Objective 4:**

*Increase CI-PNG's ability to influence conservation policy-making and community-based development planning through building CI-PNG's institutional capacity.*

**Activities:**

*The goal of CI-PNG's long-term institutional capacity building is to empower the office to be more strategic, effective, efficient, and responsive in implementing its mission to conserve PNG's biodiversity by promoting community-based resource management. CI-PNG's strategy to address its capacity-building needs, with USAID support, is to augment existing staff expertise and capacity, as well as to recruit additional staff.*

- A) *Priority new positions include the following: a Program Manager, Finance Manager, and two additional field staff for the Lakekamu Basin. FY99.*

Activity	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Orientation/Training/site visits for CI-PNG Program Manager				X					X				
Project and office management training	X												

**Progress to-date:**

As part of the overall strategy of Conservation International, CI-PNG continued to recruit additional staff required during the period to improve and further strengthen its financial management and administrative capabilities. The new staff members recruited include, Daniel Mirmiro, Finance Manager formerly with KPMG (a chartered Accounting firm). Daniel holds a Degree in Accountancy with a wealth of experience that he has brought in to CI-PNG Program particularly analytical work in terms of recording and processing of accounting information, budget preparation and analysis, reporting to donors and preparing financial statements.

After Daniel's appointment, Lisa Dean from Washington, DC visited PNG and ran a one-week on-the-job course. This is aimed at establishing a proper financial recording and processing of accounting information system in CI-PNG Sub offices in Kokopo and Alotau. The orientation program was also useful especially for Daniel to be more familiar with CI's financial operations and its practices. During this round of visit, both Lisa and Daniel visited Alotau and Kokopo sub offices. Daniel also came to CI's Head Office in Wash D.C. on an orientation visit.

Nancy Ebbes, our new Natural Resource Economist is an Economics graduate from the University of PNG. Nancy was formerly employed by the Department of Finance & Planning before she joined CI-PNG in March this year. She brings a wealth of experience to the CI-PNG Program particularly in project planning, design, appraisal, policy formulation and evaluation. Nancy's work has already begun with the Milne Bay Marine Project as we are already seeing timely results especially in preparation for securing Counterpart Funding from the Government of PNG.

Albert Kamar, our GIS Programmer was also recruited in July, 2000 to provide technical support services in Computer networking and programming (both hardware/software) for Port Moresby, Kokopo and Alotau offices. Albert holds a degree in Computer Science. Since his appointment, Albert has been our "computerman" responsible for maintenance, networking and programming in CI offices in PNG. He has also been to the Alotau and Kokopo CI offices.

Banak and Maureen attended the training on Conservation Economics course in Occidental, California on 30<sup>th</sup> September to October 12, 2000. Following this training, project workplans for FY02 were developed in March to reflect the economics of natural resources. A proposal was developed for funding to undertake the "Cost-Benefit Analysis" of Logging in Wide Bay, Oil palm impact studies in Lakekamu Basin and Commercial Fisheries studies in Milne Bay province.

Banak attended the Strategic Management Workshop in Montana, from 24-30<sup>th</sup> September, 2000; in which experiences and lessons were exchanged among CI's field representatives from around the world. New approaches and tools were taught at the training workshop. Following this Banak made a presentation to his colleagues at the CI-PNG office. He has developed an in-house summary guide to writing Monitoring and Evaluation (M&E) Plans and distributed to Project Managers and Officers within the Country Program. He has also helped in the development of the Milne Bay Project M&E Plan draft.

Frank Agar, Assistant Program Director has continued to focus on bringing greater clarity to CI-PNG's administrative and financial management protocols and systems including fundraising initiatives with bilateral sources. This has become particularly important as the CI-PNG Program has now expanded to other areas in the country.

***Problems, delays, shortfalls and proposed solutions:***

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 4, Activity A**

1. Complete orientation, training, and site visits by Assistant Program Director. Completed except Assistant Program Director as reasons shown above.

*B) CI-PNG will augment existing staff expertise and capacity with technical support from CI-Washington's Conservation Policy, Biology and Enterprise Development departments. FY99-01.*

***Progress to-date:***

Darwin Flores, former Asia-Pacific Regional Enterprise Development Manager, conducted a Feasibility study on enterprises in Wide Bay in October, 1999. Currently, there are follow-up activities to his recommendations (see *Objective 2 on Enterprise Development*).

In March 2000, Andy Mack former New Guinea Senior Ecologist for CI and now Director of Wildlife Conservation Society-PNG Program (WCS-PNG) coordinated a small-scale RAP survey in Wide Bay. The final report is currently being compiled by Dr. Andrew Mack. To follow up on the RAP report CI/ENBSEK are working towards getting the area designated a WMA. This goal will be beyond the scope of the BiRD Agreement.

A further Training of Biology students by Andrew Mack of WCS-PNG in partnership with the University of Papua New Guinea and the Ivimka Field Station was conducted in January, 2001. The training was similar to the 1996 RAP survey and training conducted by Dr. Mack while still with CI. Twenty third-year Biology students participated in the Training. Banak Gamui (Lakekamu Project Manager) was on his field trip during the one-month training session. He trained nine locals as research assistants alongside the students. With his academic background in Biological Sciences, especially working with plants, he was also able to supervise the university students when their instructor was not available. With this, he has gained a wealth of experience in training biological field survey techniques.

***Problems, delays, shortfalls and proposed solutions:***

- Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 4, Activity B**

1. Activities under Objectives 1 through 4 will use technical assistance provided by CI-Washington in order to increase CI-PNG staff expertise and capacity (**Completed**)

*C) CI-PNG's field site activities in Wide Bay, will be strongly supported by its local NGO partner ENBSEK. FY99-01.*

***Progress to-date:***

Due to lack of funds for field operations for CI, ENBSEK have been facilitating all field activities since the beginning of 2001. The activities have been centered on capacity building of the local communities as well as maintaining dialogue with alliances in East New Britain, particularly East Pomio LLG. Some of the activities facilitated by ENBSEK include; Conflict Resolution training, Catering Training, Basic Agriculture, "Start Your Business" and GPS land boundary survey.

***Problems, delays, shortfalls and proposed solutions:***

Nothing to report at this time.

**FY01 Outputs/Benchmarks for Objective 4, Activity C**

1. Activities in Wide Bay will be carried out in partnership with ENBSEK, CI-PNG's local NGO partner. (**Some Progress**)

## Success Stories

### **Organic Certification in Bahia**

Organic Certification is necessary to guarantee that a product has no chemical residuals (chemical fertilizer and insecticide, for example) and that the farmer is not causing a negative environmental impact by both preserving the forest within his/her property and respecting the labor laws. In Southern Bahia, IESB has stimulated organic certified agriculture as an economic alternative for appropriate land use by helping farmers to be paid a premium for their organic products.

The Brazilian Ministry of Agriculture is the institution responsible for the regulation of agricultural activities. The Ministry requires that each State establish a Certification College, composed of representatives of both the government and civil society. These "Colleges" are created to monitor and guide organic production and certification activities. However, the State of Bahia did not have a Certification College and had historically not shown any interest in creating one before October of 2000. The organic producers had to be inspected by teams from other States' Colleges. As most inspectors had to come all the way from São Paulo, it made the certification process more expensive and bureaucratically cumbersome.

In October 2000, IESB and UESC (Santa Cruz State University) organized a Regional Seminar on Economic Alternatives. During the event, IESB proposed the creation of a State Certification College in Bahia. IESB, with the support from UESC and UFBA (Federal University of Bahia) organized many meetings and discussions with the State government. In January 2001, the Bahian Certification College had its first meeting with the participation of 5 NGO and 5 government institutions. In March 2001 the Ministry signed regulation number 31/2001 officially recognizing the State of Bahia Organic Agriculture Certification College.

Since then, the process to certify organic production has become easier and cheaper and it has encouraged farmers to convert conventional production into organic. Fifteen producers have already received organic certification from the Bahian Certification College and 48 others are currently in the certification process.

**INFORME DE TRABAJO  
CONSERVACIÓN INTERNACIONAL**

**ESTUDIO DE LA CONTAMINACIÓN POR  
MERCURIO EN LA CUENCA ALTA DEL RÍO TUICHI**

**DE : LUCIA ALANOCA CH. Y Dra. LAURENCE MAURICE**

**13 de diciembre 2000**

**La Paz - Bolivia**

**AGRADECIMIENTOS**

A *Conservación Internacional*, por hacer posible la realización del proyecto: "Estudio de la contaminación por mercurio en la Cuenca Alta del Río TUICHI".

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## Attachment Bolivia-1A

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A mis amigos quienes me acompañaron en la travesía hasta Azariamas: Marcos Espinosa y Gustavo.

A Claudio Rosales por su colaboración en la identificación de especies de peces.

## RESUMEN

En el presente trabajo se estudió la contaminación por mercurio en aguas, sedimentos, peces y en poblaciones ribereñas del río Tuchi, desde la región de Azariamas hasta la desembocadura del río Tuchi al río Beni.

El mercurio es desechado al medio ambiente, en parte, por las actividades auríferas y naturalmente en las aguas, debido a la fuerte erosión de los suelos en época de lluvias.

Las muestras de aguas, sedimentos, peces y cabellos fueron colectadas en la región de Azariamas y también en la población de San José hasta la desembocadura del río Beni, en tres salidas al terreno.

Se ha observado que entre las poblaciones ribereñas, en los cabellos de pobladores de San José, la concentración de mercurio total es mayor que en la población de Azariamas. Sin embargo ninguna está contaminada, es decir que no sobrepasan el valor recomendado por la organización Mundial de la Salud (de  $6 \mu\text{g/g}$ ).

En aguas y sedimentos, las concentraciones de mercurio son bajas y se encuentran en el nivel del promedio mundial. No se ha notado ninguna contaminación, aguas arriba.

Mientras que en peces, las especies más afectadas son las piscívoras seguida de las carnívoras, llegando casi al límite del inicio de contaminación recomendado por la OMS, de  $0.5 \mu\text{g/g}$ . Se recomienda:

- ♦ coleccionar mas muestras de especies piscívoras, de peso mas alto, para concluir si el río Tuchi esta en riesgo de contaminación, y
- ♦ prever un monitoreo de las poblaciones pescadoras de la región, como la de San José.

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**8. CONCLUSIONES Y RECOMENDACIONES** \_\_\_\_\_ *Error! Bookmark not defined.*

**10. BIBLIOGRAFÍA** \_\_\_\_\_ *Error! Bookmark not defined.*

# ESTUDIO DE LA CONTAMINACIÓN POR MERCURIO EN LA CUENCA DEL RIO TUICHI

## 1. INTRODUCCION

El mercurio es uno de los elementos más tóxicos de la naturaleza, existen fuentes naturales y antropogénicas de emisión del mercurio al medio ambiente que pueden contaminar hasta el hombre.

Entre ellas se encuentran la utilización de mercurio para la recuperación del oro, y las prácticas agrícolas, como la deforestación, que aumentan la erosión de los suelos en época de lluvias.

El mercurio desechado en la atmósfera puede viajar por centenares de kilómetros por el curso de los ríos o los vientos, hasta ser depositado en zonas alejadas de las fuentes. En el agua, el mercurio tiene una gran afinidad por las partículas finas arcillosas de carga negativa sobre las cuales puede adherirse por la carga opuesta que presenta. Este elemento de carga positiva puede fácilmente reaccionar con compuestos orgánicos, y formar compuestos órgano-metálicos tales como el metil mercurio.

Existiendo una gran variedad de fauna piscícola en los ríos, estos se alimentan de materia orgánica, frutas y sedimentos. El mercurio ingresa al organismo de los peces mediante su alimentación y al organismo humano mediante la alimentación de estos peces provenientes de ríos y lagos contaminados por mercurio.

En el caso del río Tuichi, las fuentes antropogénicas de desecho de mercurio son las minas auríferas ubicadas en la cabecera del río y las prácticas agrícolas que implementan la erosión de los suelos en época de lluvias.

Las fuentes naturales pueden ser:

- ◆ la erosión de las series del Ordovico cuyo contenido en schistes es importante,
- ◆ la presencia de fajas geológicas activas en la zona que pueden relargar mercurio en forma vapor o disuelta
- ◆ la presencia de fuentes de agua termales enriquecidas naturalmente en metales pesados.

El mercurio ingresa al organismo humano en dos diferentes formas: inorgánica y orgánica. Por ejemplo el mercurio que ingresa en los mineros es en forma de vapor durante la quema de la amalgama, o por contacto directo con las manos, algunas veces mediante heridas abiertas durante la amalgamación; estas formas son inorgánicas. Mientras que el mercurio que ingresa en los ribereños a través el consumo regular de peces, es el orgánico, en forma de compuestos metilados.

### 1.1 Antecedentes

La amalgamación fue conocida y usada por primera vez en Bosnia, en el año 54-68 d.c. (*Pastoy Konigstein, 1992*).

## Attachment Bolivia-1A

Desde 1550 a 1880 en la amazonía se estima el uso de mercurio para recuperación del oro una cantidad de aproximadamente 200000 toneladas (*Nriagu J.O. et al., 1992*).

En Bolivia, muchos de los placeres auríferos están constituidos por sedimentos aluviales en terrazas. Estos son explotados por remoción de los sedimentos y tratados con mercurio, cuyos desechos son vertidos en las riberas de los ríos y en la atmósfera.

La explotación aurífera en Bolivia es concentrada en cuatro áreas geográficas : las fajas andinas, la región de los ríos Kaka, Tipuani y Mapiri, alrededor de Guanay, la zona de San Simón y en la frontera con Brasil (ríos Madre de Dios, Orthon y Madeira).

Se han identificado centros mineros auríferos en dos regiones del Parque Madidi, ubicado el primero en la cabecera del río Tuichi y región de Azariamas ; el segundo en el río Madidi mismo (*Conservación Internacional, 2000*)

Aun no se conoce la cantidad utilizada de mercurio por los mineros de la zona del río Tuichi y Madidi, por la dificultad de llegar a estos centros mineros.

Estudios realizados acerca de la contaminación de mercurio en el hidro-ecosistema de la Cuenca de la amazonía brasilera desde 1990 hasta 1998 confirmaron la contaminación de mercurio en peces, sedimentos, aguas y cabellos en habitantes de poblaciones cercanas a los ríos de la cuenca del Madeira (*Malm et al., 1990 y 1995*).

Durante este siglo, en Bolivia, se ha estimado la utilización de 300 toneladas de Hg con fines de extracción del precioso metal (*Maurice Bourgoin et al., 1999a*).

En Bolivia, en el año 1992, un grupo de investigadores bolivianos realizaron un estudio del impacto ambiental por la explotación de oro en la región de Nueva Esperanza (Araras), departamento de Pando, a la frontera con el Brasil. Trabajo en el cual determinaron que los seres más afectados por las actividades auríferas y la utilización de mercurio para la recuperación de oro, son los peces. El contenido promedio de mercurio en los peces analizado fue de 575 ppb en época de aguas altas, y de 799 ppb en épocas de aguas bajas, valores superiores al nivel permitido por la legislación brasilera (500 ppb). Una gran cantidad de mercurio permanece en el lecho del río Madera, muy difícil de ser eliminado debido a la insolubilidad del mercurio en el agua y a su alta densidad. Del contenido de mercurio en sólidos suspendidos y en sedimentos, los autores concluyen que es mayor en el primero respecto al segundo (*LIDEMA, 1993*).

Respecto al estudio por contaminación por mercurio en la cuenca del Río Beni, actualmente se cuenta con resultados de estudios realizados en muestras de peces, sólidos suspendidos, aguas y cabellos humanos que a continuación se mencionarán.

El primer trabajo realizado por L. MAURICE *et al.* en 1997, en muestras de aguas, en la Cuenca del río Beni, determinó que las actividades auríferas no contaminan directamente las aguas superficiales de los ríos explotados por su oro aluvional pero si 150 Km más abajo de estos centros. Detectaron que las concentraciones de mercurio total en el agua potable de las minas, sobrepasa hasta 50 veces las concentraciones normales encontradas en aguas potables (de 1 ng/l).

Se ha estimado un aporte de 20 a 24% de mercurio total proveniente del río Kaka, a través del río Beni en Rurrenabaque; el flujo diario de Hg total en el Angosto del Bala para la época seca de 1995 y 1996 es de 500 y 320 gramos de Hg/día.

Recientemente las mismas personas realizaron un estudio en la subcuenca del Río Beni concluyéndose que la concentración de mercurio en peces carnívoros rebasa el límite permisible hasta 4 veces y que el impacto causado por el mercurio afecta a los habitantes que utilizan regularmente pescados del río Beni en sus dietas alimentarias (*Maurice Bourgoïn et al., 1999b y 2000a*).

### 1.2 Justificación

La contaminación por mercurio es uno de los problemas más importantes para el medio ambiente, por las graves consecuencias que puede producir al ecosistema acuático, la atmósfera, los suelos y a la salud del hombre, a corto, mediano y largo plazo.

La deficiente aplicación del proceso de amalgamación en las regiones auríferas ponen en riesgo la salud de los habitantes, no directamente ligados con la actividad aurífera, pero los que consumen pescado en forma regular.

El mercurio inorgánico presente en el organismo de los mineros es fácilmente eliminado por las vías urinarias, mientras que en los ribereños y comunidades ribereñas es muy difícil de eliminar por la forma del compuesto como se encuentra (órgano-metálico).

Se torna aun más peligroso para las mujeres embarazadas por la siguiente razón: durante la etapa de gestación el mercurio es transmitido al feto por medio de la sangre en el vientre uterino, y el bebé nace con una concentración normalmente menor al de la madre (*Barbosa et al., 1998*).

Los pescados constituyen una de las fuentes de contaminación por mercurio más peligrosas para los pobladores ribereños, debido a que este elemento tiene gran capacidad de bioacumulación en los organismos de los peces.

En el hombre, las concentraciones de metilmercurio ( $\text{MeHg}^{+1}$ ) presentes en los peces, se absorben prácticamente en su totalidad por la vía digestiva, acumulándose en el hígado; en el cerebro son muy estables y resistentes a la biotransformación (*Organización Mundial de la Salud, 1976*).

En concentraciones altas produce problemas en el sistema nervioso central en adultos, malformaciones en fetos en desarrollo y abortos en mujeres gestantes (*Palheta and Taylor, 1995*).

Los fetos pueden acumular concentraciones altas de mercurio en la sangre si sus madres están muy expuestas (*Barbosa et al., 1998*). Producen daño cerebral y físico al feto en desarrollo, síndromes neurológicas múltiples, con deterioro físico y mental, parestesia, temblores disfunciones sensoriales, ataxia, irritabilidad pérdida de visión, audición, y memoria, convulsiones y la muerte (*Maurice Bourgoïn et Malm, 1999c*).

Algunos síntomas asociados con la intoxicación por mercurio metálico en mineros son los siguientes: bronquitis aguda, cefalea, temblor, catarata, flaqueza, insuficiencia renal crónica, edema pulmonar agudo, neumonía, disminución de capacidad intelectual, parestesia, etc.

Es importante la preservación de la salud de los habitantes de las riberas del río Tuichi principalmente de las poblaciones de escasos recursos económicos cuya fuente de alimentación lo constituye el río Tuichi, expuestas diariamente a ser contaminados de forma indirecta e irreversible mediante el consumo de pescado si es contaminado.

Además de gran importancia la preservación del Parque Madidi como Patrimonio Nacional, son motivos más que suficientes por los que se realizó un estudio acerca de la contaminación por mercurio en aguas, sedimentos, peces y cabellos humanos, evaluación que pueda proporcionar información del grado de contaminación a la que se ha llegado.

## 2. OBJETIVOS

### 2.1 Objetivo general

Se ha planteado como objetivo principal :

Determinar el impacto del uso masivo del mercurio en Bolivia por la actividad minera, sobre el ecosistema acuático y sobre los habitantes de la Cuenca Alta del río Tuichi, por medio del análisis químico de mercurio en aguas, sedimentos, peces y cabellos humanos.

### 2.2 Objetivos específicos

- ✓ Cuantificar el mercurio total en aguas y sedimentos en diferentes puntos del río Tuichi.
- ✓ Cuantificar el mercurio total presente en peces, a lo largo del río Tuichi.
- ✓ Cuantificar el mercurio total contenido en los cabellos de los habitantes de las comunidades de Azariamas y San José, ribereños del río Tuichi.
- ✓ Verificar si existe una contaminación por Hg en los peces y una relación entre esta con la de los cabellos de los habitantes estudiados.
- ✓ Verificar si existe una relación entre la concentración de mercurio encontrada en los peces por especie y sus pesos.

## 3. METABOLISMO DEL MERCURIO EN EL SER HUMANO Y TOXICIDAD

### 3.1 Metabolismo del mercurio en el ser humano

Los compuestos orgánicos e inorgánicos ingresan al cuerpo humano por medio del agua, de los alimentos y del aire (*Pastoy Königstein, 1992*). Por medio de las bebidas y los alimentos llegan al aparato digestivo (gastro-intestinal) del cual pasa a la sangre y pueden ser excretados mediante las vías urinarias.

El mercurio que ingresa mediante el aire en los pulmones pasa a la sangre y puede como no ser distribuido en el organismo y/o eliminado por las vías urinarias (*Maurice Bourgoïn y Malm, 1999c*).

En el hombre, los compuestos orgánicos del mercurio presentes en los peces, se absorben prácticamente en su totalidad por la vía digestiva, acumulándose en el hígado ; en el cerebro son muy estables y resistentes a la biotransformación. La concentración de mercurio total en los cabellos humanos es proporcional a la concentración en la sangre (*Pastoy Königstein, 1992*).

### 3.2 Toxicología

La toxicología varía según :

- A. La forma química como se encuentre:
  - a) Mercurio inorgánico:  $\text{Hg}^0$ ,  $\text{Hg}^{1+}$ ,  $\text{Hg}^{2+}$
  - b) Mercurio orgánico:  $\text{MeHg}^{1+}$ ,  $\text{Me}_2\text{Hg}^{2+}$
- B. La vía de entrada al organismo humano:
  - a) Vía respiratoria (aire que se respira)
  - b) Vía digestiva (mediante los alimentos)

También los signos y síntomas asociados a la intoxicación por mercurio dependen de la forma química como se encuentra el mercurio.

#### . Intoxicación por mercurio metálico

Los signos y síntomas asociados con la intoxicación por mercurio metálico son los siguientes :  
bronquitis aguda, catarata, temblor, insuficiencia renal, edema pulmonar agudo, neumonía, mercurialismo (con eretismo), disminución de lívido y de capacidad intelectual, parestesia e inseguridad.

Con las sales inorgánicas, son :  
ceguera, dermatitis esfoliativa, eretismo, gastroenteritis aguda, gengivitis, mercurialismo, nefritis crónica  
y síndromes neurálgicos.

#### . Intoxicación por metil mercurio

El metil mercurio afecta a los tres sistemas : neurológico, renal e inmunitario. Entre las que se tienen el daño cerebral y físico al feto en desarrollo, síndromes neurológicas múltiples con deterioro físico y mental (parestesia, temblores, disfunciones sensoriales, ataxia irritabilidad, pérdida de visión, audición, memoria, convulsiones y la muerte). Cabe aclarar que la intoxicación por metil mercurio es irreversible (*Maurice Bourgoin y Malm, 1999c*).

### 3.3 Límites permisibles

Los límites de exposición ambiental general para el mercurio se basan en la correlación dosis / efecto y en la correlación dosis / respuesta observadas principalmente en lo sucedido en Minamata y Niigata, Japón e Iraq y más recientemente en grupos indígenas del Canadá expuestos prolongadamente a metilmercurio a través del consumo de pescado de lagunas contaminadas.

Los valores generales están de acuerdo con los niveles que se han verificado en varias partes del mundo en donde no se han relatado efectos en la salud de la población expuesta. A diferencia de los límites ocupacionales que han sido objeto de estudios de variada naturaleza y de constantes evaluaciones. Los límites ambientales todavía necesitan mayores estudios y evaluaciones.

Así, esas valores límites son susceptibles de modificación, debido a nuevos hallazgos o a nuevos resultados obtenidos sobre los efectos del mercurio en la salud humana.

## Attachment Bolivia-1A

- En el aire urbano: inferior a 15  $\mu\text{g}/\text{m}^3$  (OMS)
- En el agua potable: 1  $\mu\text{g}/\text{l}$  (OMS)
- En el agua de río: 0.2  $\mu\text{g}/\text{l}$  (200 ng/l)
- En el agua de mar 0.3  $\mu\text{g}/\text{l}$

En alimentos:

- en general inferior a 60  $\mu\text{g}/\text{kg}$
- en pescados de agua dulce, inferior a 500  $\mu\text{g}/\text{kg}$  (o 0,5  $\mu\text{g}/\text{g}$ )
- en pescados de mar, inferior a 150  $\mu\text{g}/\text{kg}$ , con excepción de grandes especies carnívoras como el pez espada que puedes tener normalmente de 200 a 1500  $\mu\text{g}/\text{kg}$ .

### . Índices biológicos de exposición recomendados

Con relación al mercurio se dispone de suficientes antecedentes como para recomendar la aplicación de métodos de monitoreo biológico que permita detectar ya sea una dosis interna excesiva o bien la carga corporal de la sustancia.

a) Mercurio en la sangre:

- Límite de tolerancia biológica (LTB) para derivados inorgánicos: 3  $\mu\text{g}/100$  ml.
- Límite de tolerancia biológica (LTB) para metilmercurio: 10  $\mu\text{g}/100$  ml (signos precoces de intoxicación aparecen ya a los 20  $\mu\text{g}/100$  ml).

b) Mercurio en la orina:

- límite de tolerancia biológica (LTB) para derivados inorgánicos y mercurio metálico de 50  $\mu\text{g}/\text{g}$  de creatinina.

c) Mercurio en la saliva (derivados inorgánicos):

presenta correlación con las concentraciones de mercurio en sangre y en orina.

d) Mercurio en el pelo:

indicado para evaluar la exposición en el ambiente general, especialmente a metilmercurio; no recomendable, en cambio, para evaluaciones de exposiciones ocupacionales a vapor de mercurio. La concentración de 6  $\mu\text{g}/\text{g}$  pelo equivale a la ingesta de metilmercurio semanal tolerable provisional establecida por la OMS.

## 4. CICLO DEL MERCURIO

### 4.1 Ciclo global en la Amazonía

En la minería de placeres auríferos, la pulpa, donde el oro está presente, se pone en contacto con mercurio en mezcladoras o en canaletas con estrías para formar el amalgama de oro. De un total de 100% de mercurio utilizado para la recuperación de oro, del 5 al 30 % es desechado en las orillas del río, entre el 50 a 60% en la atmósfera, durante recuperado por los mineros para ser utilizado nuevamente (*Maurice-Bourgoin et al., 1999a*).

El mercurio en forma de vapor es muy estable en la atmósfera en aire puro, sin embargo en presencia de agua, ozono u radiación UV se oxida a  $\text{Hg}^{+2}$  (*Cotton y Wilkinson, 1978; Maurice Bourgoin y Malm, 1999c*), puede viajar hasta centenares de kilómetros y volver a la superficie

terrestre mediante las precipitaciones, contaminando suelos y ríos de otras cuencas que las de origen.

Por otra parte el mercurio desechado directamente en los suelos y sedimentos de áreas auríferas contaminan aproximadamente 50 Km. alrededor del área de emisión. Bajo condiciones favorables es metilado y/o depositado aguas abajo junto a sedimentos como mercurio metálico ( $Hg^0$ ), incorporándose en el organismo de los peces mediante su alimentación (Maurice Bourgoin y Malm, 1999c).

Finalmente en el hombre es almacenado el mercurio casi en su totalidad por el consumo de alimentos contaminados, de pescados en el caso de la Amazonía.

La figura 1 muestra el ciclo del mercurio:

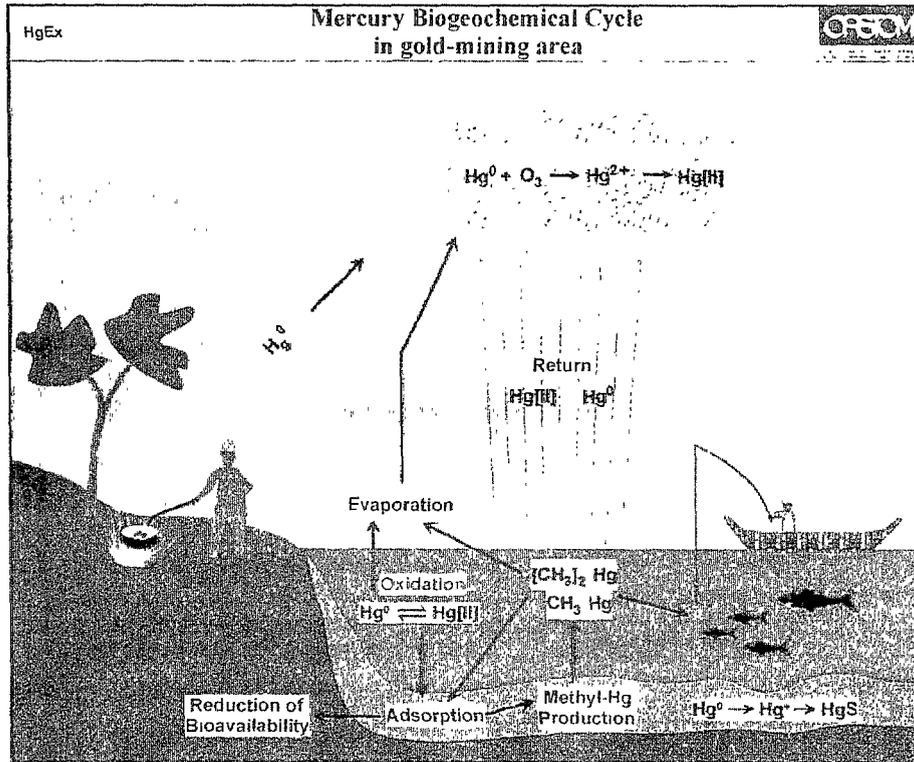


Figura 1. Ciclo del mercurio

## 5. AREA DE ESTUDIO

Bolivia cuenta con una superficie territorial de 1.098.581 km<sup>2</sup> de los cuales 724.000 km<sup>2</sup> (66%) es ocupada por la Cuenca del Amazonas. De gran número de sabanas y con clima tropical, la Cuenca está surcada por importantes ríos ya sea por su caudal, navegabilidad o su aprovechamiento potencial. Esta Cuenca, comprende a su vez 5 subcuencas de los ríos Beni, Abuná y Acre, Mamoré, Itenez y Madera.

## Attachment Bolivia-1A

La Cuenca del Río Beni está constituida por los ríos Madre de Dios, Orthon, Alto Beni, Kaka, Quiquibey, Tuichi, Emero, Madidi, y otros más arriba (*Montes de Oca I.*, 1989).

De ríos de gran caudal, clima tropical y belleza natural, el Parque Madidi, está surcado por dos importantes ríos: Tuichi y Madidi. Representa una de las reservas ecológicas más importante de nuestro país. Entre estos dos ríos el río Tuichi es conocido por baja navegabilidad y fuertes corrientes de agua.

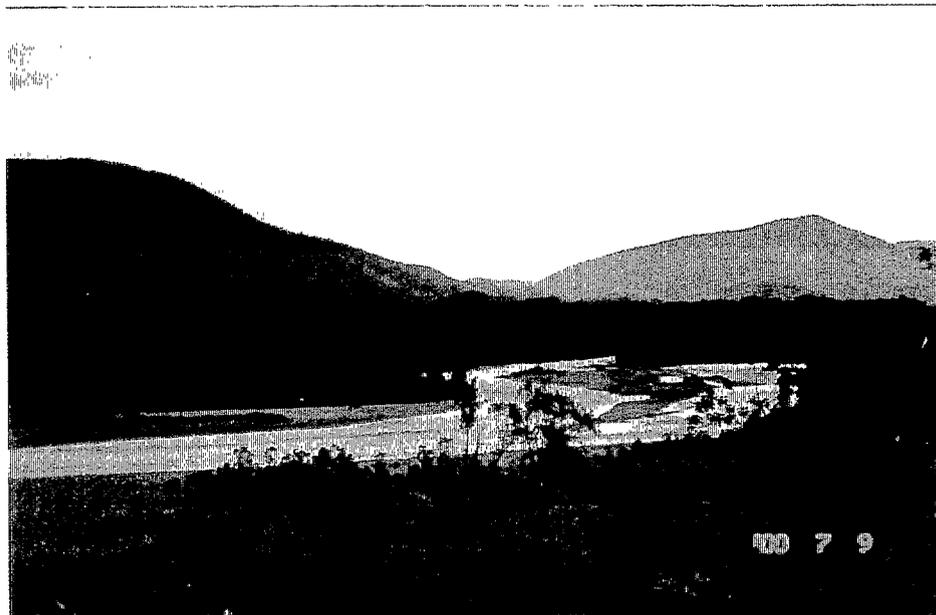


Figura 2. Río Tuichi, región de Azariamas área de estudio

A su paso se encuentran dos poblaciones conocidas: Azariamas y San José, los cuales son muy poco accesibles por no existir caminos carreteros hasta los mismos. El medio utilizado para llegar hasta Azariamas es el de herradura, partiendo desde Apolo de aproximadamente dos días de travesía. A San José se aproxima una carretera partiendo desde Ixiamas, sin embargo el medio más usual son los botes, a través del río Tuichi partiendo desde Rurrenabaque.

La mayor parte de esta región presenta alternativas de producción como bosques de protección y producción de maderas, pieles, etc. La explotación agropecuaria, para cultivo permanente, es apropiada por las condiciones del suelo. Con el tiempo lo más importante será la actividad del turismo por la biodiversidad que ofrece la zona.



Figura 3. Río Tuichi , región de Azariamas

Los flujos de sedimentos desde las partes altas de los son muy grandes, esto se ve claramente en el área de Rurrenabaque donde el flujo de sedimentos alcanza hasta  $10^6$  toneladas por año (Maurice-Bourgoin *et al.*, 2000b).



Figura 4. Río Tuichi, región de San José

## 6. MATERIAL Y METODOLOGÍA

### 6.1 Campañas de muestreo

En la siguiente tabla 1, se presenta el número de muestras de aguas, sedimentos, peces y cabellos colectadas en las tres campañas de muestreo en las regiones del Río Tuichi, Azariamas y San José para Conservación Internacional.

Tabla 1.

<i>Fecha de colecta</i>	<i>Lugar</i>	<i>Nº de muestras de aguas</i>	<i>Nº de muestras de sedimentos</i>	<i>Nº de muestras de peces</i>	<i>Nº de muestras de cabellos</i>
1ra. Campaña 18 al 22 de junio 2000	Río Tuichi	5	5	1	
2da. Campaña 3 al 15 de julio 2000	Azariamas	4	4	16	12
3ra. Campaña 14 al 18 de octubre 2000	San José			6	20
<b>TOTAL</b>		<b>9</b>	<b>9</b>	<b>23</b>	<b>32</b>

### 6.2 Técnicas de muestreo y conservación de las muestras

#### 6.2.1 Colecta de peces

Cada muestra de pez fue identificada (familia, género y especie, tabla 2, Fig. 5) y se midió su longitud y su peso. Se tomó un trozo de carne de filete entre la parte posterior del opérculo y la aleta dorsal.

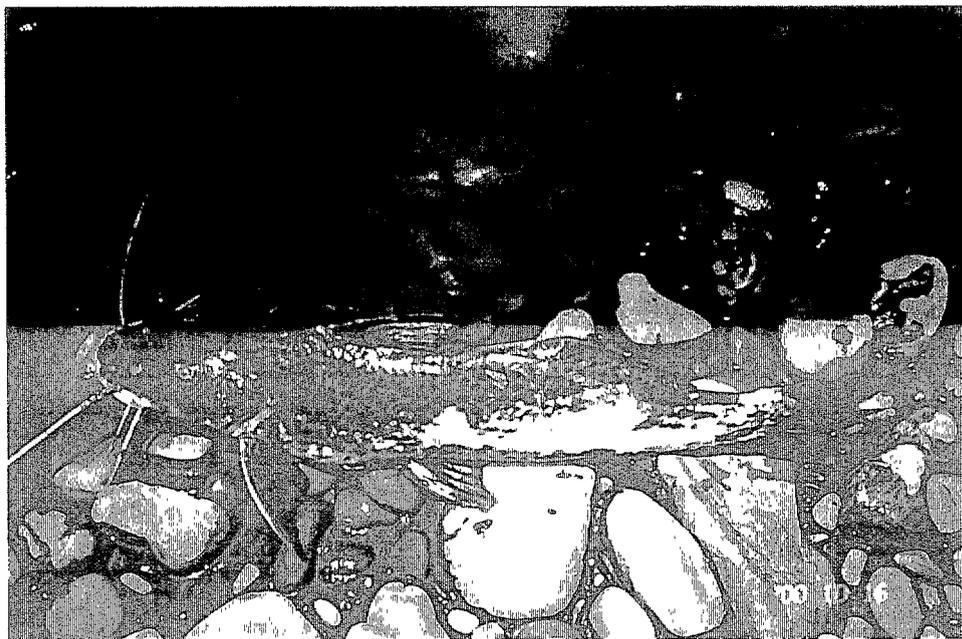


Figura 5. Se muestra uno de los ejemplares de la que se tomó una muestra, denominado comúnmente *tujuno*.

## Attachment Bolivia-1A

Se puso cada muestra de pez en una bolsa de polietileno de congelación, con su número de identificación, lugar, fecha y hora. La congelación de las muestras de peces, se hicieron inmediatamente en un tanque de nitrógeno líquido hermético llenado en La Paz. Este conservador permitió congelar y mantener las muestras durante 10 días.

### 6.2.2 Colecta de cabellos

Para las muestras de cabellos se colectaron, datos de los puntos de muestreo, coordenadas GPS, fecha, dieta alimentaria de las personas, sexo, edad, antecedentes familiares, tiempo de residencia en la zona, profesión, etc. (ver tabla 2).

El muestreo de cabello se hizo en tres áreas del cuero cabelludo, 2 en las partes laterales (parietales) y uno la parte trasera (occipital). Cada muestra de cabello fue guardada hasta el análisis en una bolsa hermética de polietileno con el respectivo número de identificación, lugar, fecha y hora.

### 6.2.3 Colecta de aguas y sedimentos

Las muestras de aguas fueron colectadas según protocolos "ultra-limpios" con guantes y en frascos descontaminados al ácido (Ahlers *et al.*, 1990 ; Maurice-Bourgoin, 1999c) ; estas fueron conservadas hasta sus filtraciones en medio de hielo.

Las muestras de sedimentos también fueron conservadas en medio de hielo hasta sus análisis.

En cada punto de muestreo, se tomó la conductividad, el pH, la temperatura del agua y las coordenadas geográficas al GPS.

## 6.3 Métodos de análisis

El análisis de mercurio en peces, sedimentos y cabellos, fue realizado por Espectrometría de Absorción Atómica PERKIN ELMER 3110 en el Laboratorio de Calidad Ambiental del Instituto de Ecología de la UMSA (con la técnica FIMS, Flow Injection Mercury System) después de sus digestiones (Malm *et al.*, 1989 ; Maurice Bourgoïn *et al.*, 1999b). Mientras que los análisis de mercurio total en aguas fue realizado en Canadá por Espectrometría de fluorescencia atómica ; es un método más sencillo, más preciso y con un límite de detección más bajo.

El equipo de absorción atómica realizó lecturas en blancos de reactivos como valor mínimo en concentración de mercurio de  $0.2247 \pm 0.177 \mu\text{g/ml}$  como límite detectable para peces, y para cabellos de  $0.0819 \pm 0.0745 \mu\text{g/ml}$ , con una reproductividad del 95%.

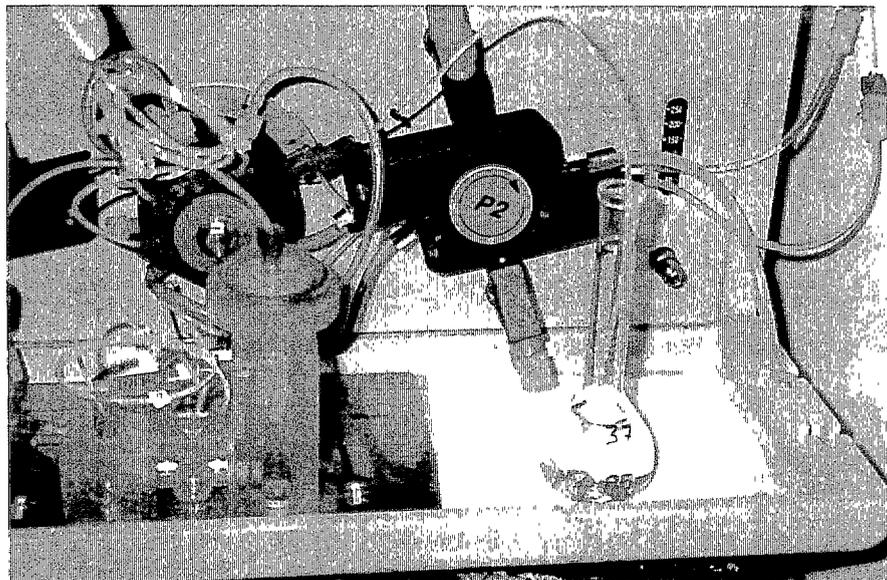


Figura 6. Equipo de FIAS conectado al equipo de absorción atómica, realizando las lecturas de concentración de mercurio en las muestras digeridas. Laboratorio de Calidad ambiental (UMSA-IE).

## 6.4 Protocolos de mineralización de las muestras

### 6.4.1 En peces

El contenido total de mercurio en muestras de peces se analizaron como sigue :  
Una cantidad conocida de muestra (alrededor de 400 mg) fue depositada en un tubo de digestión de 30 ml con 1.5 ml de peróxido de hidrógeno más 4 ml de mezcla de ácido nítrico p.a. y ácido sulfúrico p.a. en una proporción de (2:1) ; el conjunto fue digerido en baño maria a 70 °C durante 2 horas ; una vez enfriados, se agregaron 6,0 ml de permanganato de potasio al 5%, y se introdujeron nuevamente los tubos en el digestor durante 60 minutos, tiempo al cabo del cual se refrigeró y se agregó algunas gotas de hidroxilamina al 12% hasta la neutralización. Finalmente se enrazó hasta 25 ml con agua Milli-Q (*Malm et al., 1989*, adaptado a nuestro equipo).

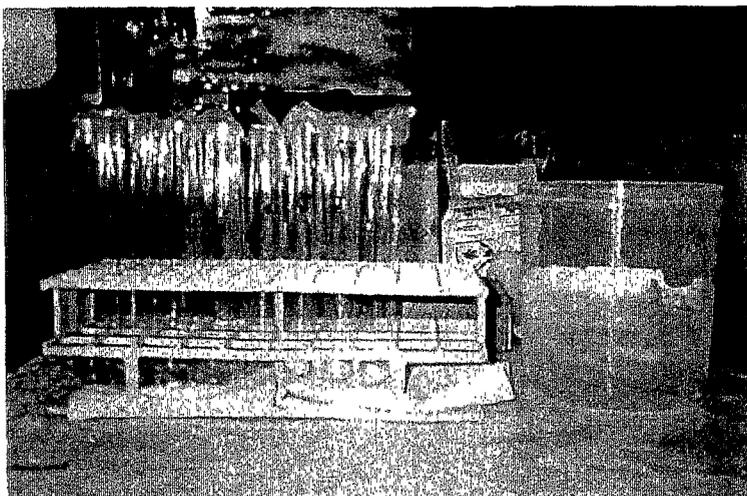


Foto 7. Muestras de peces en tubos de digestión oxidadas por peróxido de nitrógeno y mezcla ácida.

#### 6.4.2 En cabellos

La digestión de los cabellos fue similar a la digestión de muestras de peces. Antes de la digestión de los cabellos, se tomaron aproximadamente 40 mg de cabello finamente cortados en trozos muy pequeños y lavados con EDTA (17) con el objeto de sacar el polvo y las grasas que los acompañaban.

#### 6.4.3 En sedimentos

Antes de analizar las muestras de sedimentos estas fueron secadas a temperatura ambiente, luego tamizadas por malla 0.5 mm. Se pulverizó finamente, para pesar 0.400 g del mismo, al que se agregó 1 ml de HCl (c) p.a. más 10 ml de HNO<sub>3</sub> (c) en tubos de digestión. Las muestras con los ácidos en los tubos fueron digeridas en un digestor con reflujo a 100° C, durante 3 horas, al cabo del cual se filtraron y enrazados hasta un volumen final de 25 ml, antes de las lecturas de mercurio en el equipo de absorción atómica.

#### 6.4.4 En aguas

Las muestras filtradas bajo campana para evitar todo riesgo de contaminación, y acidificadas (a 2%) fueron conservadas refrigeradas justo hasta el momento de realizar los análisis de mercurio. Antes de realizar el análisis se debe agitar muy bien la muestra que contiene el frasco. Después se toma tres alícuotas de 10 ml de la muestra en tubos de cuarzo. La oxidación de mercurio total se realiza con solución de persulfato de potasio al 5%, en un volumen de 100 µL y se deja expuesta a radiación ultravioleta por 30 minutos. El mercurio es analizado por fluorescencia atómica, en 5 ml de muestra, reducida por Sn(II). Las muestras son digeridas en triplicado y cuando la diferencia es superior al 10%, se toma la porción restante de 5 ml, la cual es inyectada dentro del tubo. La digestión es repetida en triplicado nuevamente si los resultados no son reproducibles. El aparato es calibrado diariamente por inyección de cantidades conocidas de Hg(II) (50 a 400 pg de Hg).

#### 6.5 Material y reactivos

**Equipo:** Espectrofotómetro de Absorción Atómica con FIMS, Equipo de fluorescencia atómica, digestor con reflujo programable.

**Materiales:** tanque de nitrógeno líquido, conservadoras, refrigerador, congelador, bolsas de polietileno de congelación, equipo de digestión, baño María, guantes sin talco, balanza, huincha, etiquetas, marcadores, tubos grandes de digestión, matraces aforados, pipetas, etc.

**Reactivos:** ácido nítrico p.a., ácido sulfúrico p.a., ácido clorhídrico p.a., permanganato de potasio p.a., clorhidrato de hidroxilamina p.a., cloruro estanoso p.a., agua Milli-Q.

## 7. RESULTADOS Y DISCUSIÓN

### 7.1 En peces

Los resultados de las *concentraciones de mercurio total*, analizados en muestras de peces *carnívoros y no carnívoros*, colectados durante las campañas de junio, julio y oct. 2000, en el río Tuichi están presentados en la tabla N°2 y representados en el gráfico 1. Presentando, según el hábitad alimentario, las siguientes concentraciones de mercurio total en:

#### . Especies piscívoras

Entre las especies piscívoras se tienen las siguientes : *Erythrinus erythrinus (Chachao)*, Pimelodidae *Rhamdia sp. (Bagre)*. Estas dos especies representan el 8.7 % del total de peces colectados, con un contenido promedio de  $0.447 \mu\text{g/g} \pm 0.047$ .

La muestra de Bagre se encuentra al límite de la contaminación por mercurio de  $0.5 \mu\text{g/g}$  (establecido por el OMS, 1976), seguida por la de Chachao.

#### . Especies carnívoras

De los análisis realizados, las especies de peces carnívoros presentan un resultado promedio de  $0.092 \mu\text{g/g} \pm 0.095$  de desviación estándar. Representan el 47.8 % del total de peces colectados. Estas son : Pimelodidae, *Hoplias malabaricus (Bentón)*, Potamotrygonidae, *Disceus thayeri (Raya)* y Pimelodidae, *surubium lima, (Chawalla)*. Cabe destacar que se menciona la tercera especie con el nombre común como se conoce en la región de Azariamas.

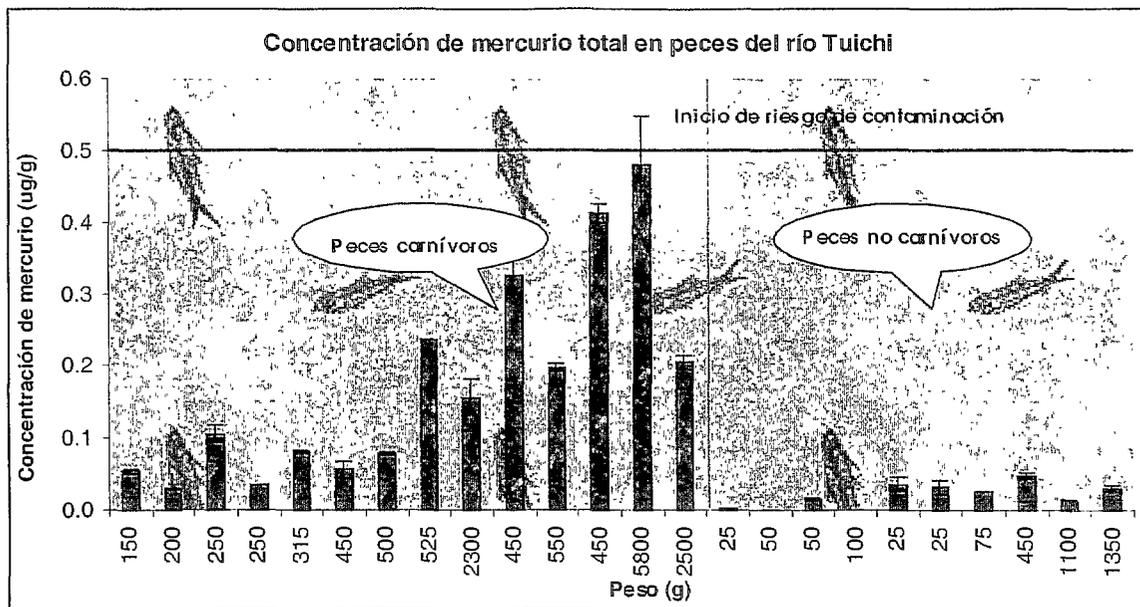
Ninguna de estas especies está contaminada, la concentración de mercurio encontrada en ellas está por debajo del valor de  $0.5 \mu\text{g/g}$  recomendado por la OMS.

Attachment Bolivia-1B

Tabla 2. Resultado de mercurio total en peces del río Tuichi-CI - Clasificación por especie

Punto GPS	Fecha de colecta	Código	Nombre común	Nombre científico	Sexo	Long. (cm)	Peso (g)	Lugar de procedencia	Régimen alimentario	Hg tot. µg/g	SD
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-14	Bentón	Erythrinidae, Hoplias malabaricus	F	20	150	Tuichi (Azariamas)	C	0.054	0.003
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-15	Bentón	Erythrinidae, Hoplias malabaricus	F	22.5	200	Tuichi (Azariamas)	C	0.029	0.001
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-9	Bentón	Erythrinidae, Hoplias malabaricus	F	25.5	250	Tuichi (Azariamas)	C	0.106	0.011
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-13	Bentón	Erythrinidae, Hoplias malabaricus	F	23.7	250	Tuichi (Azariamas)	C	0.035	0.001
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-12	Bentón	Erythrinidae, Hoplias malabaricus	F	26	315	Tuichi (Azariamas)	C	0.081	0.001
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-10	Bentón	Erythrinidae, Hoplias malabaricus	F	27.5	450	Tuichi (Azariamas)	C	0.056	0.012
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-1	Bentón	Erythrinidae, Hoplias malabaricus	?	27	500	Tuichi (Azariamas)	C	0.078	0.002
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-11	Bentón	Erythrinidae, Hoplias malabaricus	M	30.5	525	Tuichi (Azariamas)	C	0.235	0.000
S:14° 11' 24.3"; W: 68° 06' 19.3"	17/10/00	CI-23	Raya	Potamotrygonidae, Disceus thayeri	?	42.5 * 38	2300	Tuichi	C	0.156	0.025
S:14° 32' 46.6"; W: 67° 44' 38.8"	16/10/00	CI-21	Chawalla	Pimelodidae, surubium, lima	H	37	450	Tuichi	C	0.325	0.025
S:14° 32' 46.6"; W: 67° 44' 38.8"	16/10/00	CI-20	Chawalla	Pimelodidae, surubium, lima	H	41.5	550	Tuichi	C	0.197	0.006
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-8	chachao	Erythrinus, erythrinus	?	30.5	450	Tuichi (Azariamas)	P	0.413	0.013
S:14° 32' 46.6"; W: 67° 44' 38.8"	15/10/00	CI-19	Bagre	Pimelodidae, Rhamdia sp.	H	69	5800	Tuichi	P	0.480	0.067
S:14° 11' 24.3"; W: 68° 06' 19.3"	15/10/00	CI-17	Tujuno, blanquillo	Pimelodidae, pimelodina, flavipinnis	H	54	2500	Tuichi	P-O	0.204	0.010
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-3	Sardina	Triportheus, Albus cuvier	?	8.5	25	Tuichi (Azariamas)	O	0.003	0.000
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-4	Sardina	Triportheus, Albus cuvier	?	12	50	Tuichi (Azariamas)	O	0.000	0.000
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-5	Sardina	Triportheus, Albus cuvier	?	12.5	50	Tuichi (Azariamas)	O	0.015	0.001
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-2	Sardina	Triportheus, Albus cuvier	?	8.7	100	Tuichi (Azariamas)	O	0.000	0.000
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-6	Suchi	Pimelodella, Cristatata	?	11	25	Tuichi (Azariamas)	I	0.036	0.010
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-7	Suchi	Pimelodella, Cristatata	?	11	25	Tuichi (Azariamas)	I	0.032	0.010
S:14° 17' 19.6"; W: 68° 32' 42.6"	08/07/00	CI-16	Chawano		?	17	75	Tuichi (Azariamas)	?	0.025	0.000
S:14° 32' 46.6"; W: 67° 44' 38.8"	20/06/00	CI-0	Sábalo	Curimatidae, Nigricans	?		450	Tuichi (San José)	S	0.048	0.004
San José	15/10/00	CI-18	Sábalo	Curimatidae, Nigricans	?	37	1100	Tuichi	S	0.014	0.001
S:14° 32' 46.6"; W: 67° 44' 38.8"	17/10/00	CI-22	Sábalo	Curimatidae, Nigricans	H	45	1350	Tuichi	S	0.031	0.004

P: piscívoro C: carnívoro O: omnívoro H: herbívoro I: insectívoro S: sedimentófago



**Gráfico 1. Concentraciones en mercurio total en los peces  
colectados en el río Tuichi, entre junio y octubre 2000.**

#### **. Especies piscívoro-omnívoro**

La especie Pimelodidae, *Pimelodina flavipinnis* (blanquillo o Tujuno) representa el 4.3 % del total de peces colectados, con una concentración promedio de mercurio de  $0.204 \mu\text{g/g} \pm 0.01 \mu\text{g/g}$ . Su hábitad alimentario puede variar, alimentándose unas veces de peces y otras de algas sedimento y frutas.

#### **. Especies omnívoras**

*Triportheus*, *Albus cuvier*, conocida comúnmente como sardina son las más abundantes de la zona de Azariamas. Representa el 17.4% del total colectado, con un contenido promedio de  $0.009 \mu\text{g/g} \pm 0.0085 \mu\text{g/g}$ . Esta especie no está contaminada, los valores encontrados se encuentran por debajo del límite recomendado por la OMS, al igual que las especies piscívoro-omnívoras, sedimentófagas e insectívoras.

#### **. Especies insectívoras**

Preferentemente estos peces se alimentan de insectos. Representa el 8.7% del total colectado, y contiene un promedio de  $0.034 \mu\text{g/g} \pm 0.0085$  de mercurio. Esta especie fue colectada sobre el río Tuichi región de Azariamas, denominada Pimelodella, Cristatata, conocida como suchi.

#### **. Especies sedimentófagas**

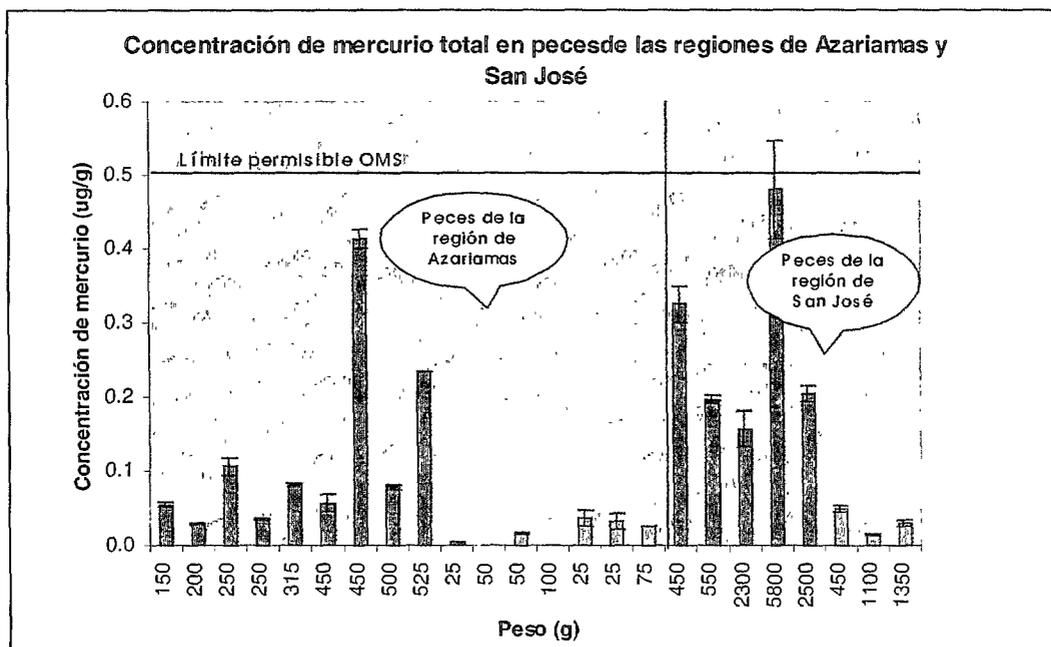
Se tienen tres ejemplares de Curimatidae, *Nigricans*, el que dio un resultado promedio de  $0.031 \mu\text{g/g} \pm 0.017$  en concentración promedio de mercurio total, representando el 13.4 % del total de peces colectados.

*Contaminación por mercurio en la cuenca del Tuichi*

## Attachment Bolivia-1B

Si bien los peces del río Tuichi no están contaminados, los peces de mayor contenido de mercurio, tanto en la parte alta como en la parte baja del río Tuichi, son los peces carnívoros y piscívoros el cual aumenta con el peso del pez (gráfico 2).

Sobre 3 muestras de peces piscívoros colectados, se puede observar que una ya está al límite de la contaminación. Estas observaciones no nos permiten concluir que el río Tuichi no esta contaminado por la falta de un numero mínimo de muestras colectadas representativo de la zona. Le podemos sugerir, ya que 33% de las especies piscívoras están al límite de la contaminación, prever otras pescas para implementar el numero de muestras y verificar si la zona esta en riesgo o no.



**Gráfico 2. Concentración de mercurio analizado en los peces de la cuenca del río Tuichi ; en verde, están representadas por orden creciente de peso, las especies carnívoras y en morado, las especies omnívoras.**

Los peces piscívoros al igual que los carnívoros comúnmente presentan altos contenidos de mercurio en zonas contaminadas, debido a su hábitat alimentario. Se alimentan de peces más pequeños y otros organismos vivos, lo que hace que el mercurio se acumule en su organismo y se biomagnifique en la cadena trófica acuática. En periodos de desovación emprenden migraciones hasta las partes altas de los ríos.

Las especies no carnívoras en general tienen bajos contenidos de mercurio por alimentarse de sedimentos o de frutas, insectos y algas como es el caso de los sábalos, por ejemplo.

## 7.2 En cabellos

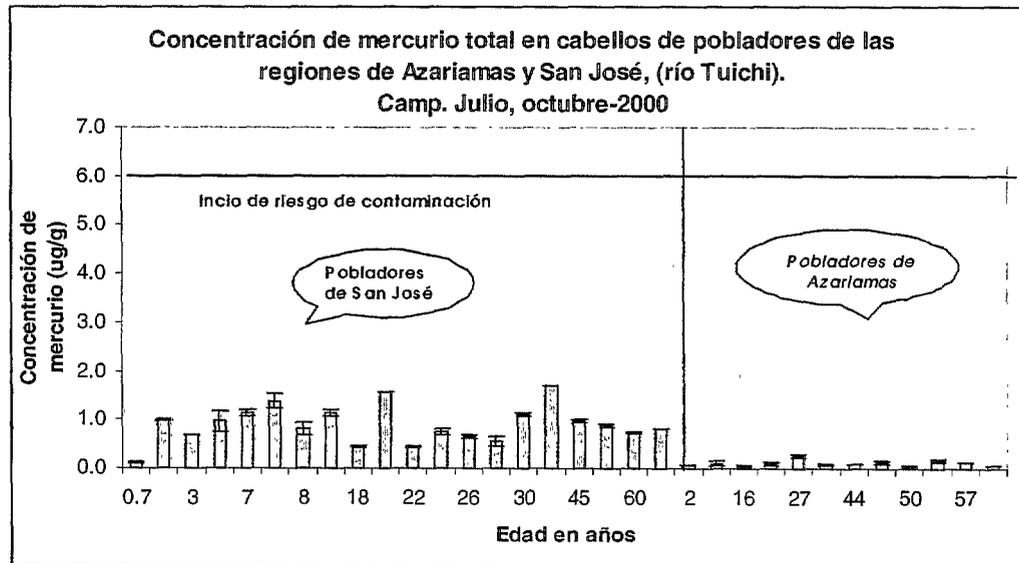
Se tienen resultados de concentración de mercurio total en cabellos (tabla 2) de dos poblaciones : la primera correspondiente a la población de Azariamas y la segunda a la de San José. Ambas poblaciones se encuentran en las riberas del río Tuichi, sus habitantes se dedican a la actividad de la agricultura principalmente y la pesca.



**Figura 8. Familia Valdes Apana**  
**Familia en la que se tomó muestras de cabellos**  
**San José, octubre 2000**

Los pobladores ribereños al río Tuichi no están contaminados por mercurio, ya que los índices de concentración de mercurio en sus cabellos, como resultado promedio, es de  $0.599 \mu\text{g/g} \pm 0.49 \mu\text{g/g}$  (gráfico 3). El valor recomendado por la OMS, como inicio de riesgo de contaminación es de  $6 \mu\text{g/g}$ .

Gráfico 3



Sin embargo la población con mayor índice de concentración de mercurio son los de la población de San José. En efecto los pobladores de San José presentaron una concentración promedio de mercurio total en sus cabellos de  $0.893 \mu\text{g/g} \pm 0.386 \mu\text{g/g}$ , mientras que los pobladores de Azariamas un contenido promedio de  $0.108 \mu\text{g/g} \pm 0.059 \mu\text{g/g}$  en concentración de mercurio (gráfico 3). Deben alimentarse más de los peces del río que presentan como acabamos de ver, un riesgo que no sea nulo de contaminación.

Tabla 2. Concentración de mercurio total en cabellos de pobladores de Azaríamas y San José, río Tuichi. Campañas de Julio, Octubre 2000

Fecha de colecta	Código	Nombre	Edad	Profesión	Parentes	Lugar de procedencia	Habitad alimentario	Hg. (ug/g)	SD
------------------	--------	--------	------	-----------	----------	----------------------	---------------------	------------	----

15/10/00	30-CI	Ribaldo APANA PARIAMO	0.7	bebé	hijo de CI-29	San José	consume pescado como su madre	0.119	0.008
15/10/00	26-CI	Limber VALDES APANA	2.7	bebé	hijo de CI-23,24	San José	Consume pescado al igual que sus padres.	0.982	0.019
15/10/00	21-CI	Froján MAMANI	3	niño	hijo de CI-20	San José	consume pescado	0.687	0.006
15/10/00	32-CI	Rocky APANA PARIAMO	6	niño	hijo de CI-29	San José	consume pescado como su madre	0.967	0.222
15/10/00	22-CI	Miguel MAMANI	7	niña	hijo de CI-20	San José	consume pescado	1.135	0.074
15/10/00	27-CI	Rocio VALDES APANA	7	niña	hija de CI-23,24	San José	Consume pescado al igual que sus padres.	1.382	0.143
15/10/00	31-CI	Rodrigo APANA PARIAMO	8	niño	hijo de CI-29	San José	consume pescado como su madre	0.814	0.130
15/10/00	25-CI	Martene VALDES APANA	10	niña	hija de CI-23,24	San José	Consume pescado al igual que sus padres.	1.135	0.064
15/10/00	13-CI	Rigoberto PARIAMO APANA	18	Agricultor pescador		San José	Sábalo habitualmente	0.432	0.016
15/10/00	18-CI	Dora APANA	21	agricultora	hija de CI-16,17	San José	Consume pescado todo el año: pacu, tambaquí como sus padres	1.572	0.000
15/10/00	14-CI	Nestor PARIAMO	22	Agricultor pescador	hermano de CI-13	San José	Sábalo habitualmente	0.447	0.017
15/10/00	29-CI	Fátima PARIAMO APANA	24	Arma de casa	hermana de CI-15	San José	consume pescado	0.758	0.059
15/10/00	23-CI	Nora APANA PARIAMO	26	Arma de casa	prima de CI-15	San José	consume más sábalo, pacu más que otros pescados, durante todo el año	0.649	0.041
15/10/00	15-CI	Miriam PARIAMO APANA	28	Arma de casa	hermana de 13-CI	San José	consume pescado todo el año	0.555	0.086
15/10/00	24-CI	Eustaquio VALDES	30	Agricultor pescador	esposo de CI-23	San José	consume más sábalo, pacu más que otros pescados, todo el año	1.116	0.033
15/10/00	20-CI	Vicente MAMANI	37	Agricultor		San José	consume pacu, sábalo y otros	1.701	0.006
15/10/00	17-CI	Chstóna de APANA INOJOSA	45	Arma de casa	esposa de CI-16	San José	Consume pescado todo el año: pacu, tambaquí como su esposo	0.982	0.026
15/10/00	28-CI	Ermita PARIAMO de APANA	51	agricultora	madre de CI-25	San José	Consume sábalo, pacu, pintado durante el año.	0.875	0.035
15/10/00	16-CI	Pablo APANA	60	Agricultor pescador	tio de CI-13,14,15	San José	Consume pescado todo el año: pacu, tambaquí	0.734	0.021
15/10/00	19-CI	Chstóna SALAS MACHACA	60	Arma de casa		San José	consume pescado durante todo el año, siempre que puede	0.818	0.006
08/07/00	7-CI	Arnícar JOVE	2	Bebé		Azaríamas	come pescado	0.057	0.001
09/07/00	12-CI	Ximena Quiroga	3	Niña	Hija de 11-CI	Azaríamas	1/c3 meses, sábalo	0.103	0.053
08/07/00	8-CI	Vanilla Mildred SEVILLANO	16	Estudiante	Hija de 5-CI	Azaríamas	2/mes sábalo, suchi	0.060	0.013
08/07/00	6-CI	Sifra JOVE	24	Agricultora	Hija de 5-CI	Azaríamas	2/mes sábalo, suchi	0.098	0.030
08/07/00	1-CI	Guzmán Gavino JOVE Gonzales	27	Agricultor pescador		Azaríamas	1/mes, urupa, suchi	0.262	0.016
09/07/00	11-CI	Nancy SEVILLANO	27	Agricultora	Hija de 2-CI	Azaríamas	1/c3 meses, sábalo	0.075	0.020
08/07/00	5-CI	Mitlago SEVILLANOS	44	Labores de casa, agricultora		Orignario de Chuchilo, habita en Azaríamas desde hace 20 años	2/mes sábalo, suchi	0.112	0.001
08/07/00	4-CI	Augusto TORO Belmonte	50	Agricultor		De Sta Cruz de Valer, habita desde hace 7 años en Azaríamas.	1kilo/año, dorado, sábalo	0.138	0.029
08/07/00	10-CI	Pedro MOLINA	50	Agricultor	Primo lejano de 5-CI	Orignario de Chuchilo, habita en Azaríamas desde hace 20 años	1/mes, sábalo, suchi	0.048	0.001
08/07/00	2-CI	Freddy SEVILLANO	53	Profesor		Azaríamas	3-4/mes, sábalo, suchi	0.156	0.042
08/07/00	3-CI	Justino VALER	57	Agricultor		Azaríamas	2-1/mes, sábalo, suchis	0.122	0.003
08/07/00	9-CI	Severa SEVILLANO	80	Abuela	Madre de 5-CI	Azaríamas	sábalo	0.066	0.002

Contaminación por mercurio en la cuenca del Tuichi

Los pobladores de San José, en su mayoría, son consumidores de pescado. Existen personas que se dedican a la pesca para vender en el pueblo. Las personas a las que se les tomó la muestra son precisamente las que se dedican a la pesca o bien son familiares de los mismos, los que también consumen pescado.

En Azariamas, los pobladores prefieren dedicarse al cultivo, muy pocas veces se dedican a pesca por la fuerte corriente del río y por no contar con el instrumento necesario que les permita realizar esta actividad, es por eso que presentan concentraciones de mercurio bajas respecto a los pobladores de San José.

### 7.3 En aguas

Las concentraciones de mercurio en aguas se presentan en la siguiente tabla :

**Tabla 3**  
**Concentración de mercurio en la fracción disuelta de las aguas de superficie del río Tuichi.**

Punto	Fecha de muestreo	Posición	Temp. (°C)	Cond. (µS/cm)	pH	MES (mg/l)	Hg Dis (ng.Hg/L)	DS
5	08/07/00	S: 14° 17' 48.8" W: 68° 32' 39.3"	21.5	59.8	6.98	1.245	1.71	0.12
9	09/07/00	S: 14° 17' 34.2" W: 68° 32' 40.0"	20.8	60.4	6.89	9.137	1.71	0.13
8	09/07/00	S: 14° 17' 28.7" W: 68° 32' 34.8"	21.6	51.4	7.01	8.703	2.04	0.15
7	09/07/00	S: 14° 16' 57.5" W: 68° 32' 19.9"	22.3	59	7.03	3.591	1.9	0.08
6	09/07/00	S: 14° 16' 55.3" W: 68° 32' 24.4"	21.4	55.5	7.05	8.052	1.96	0.13
1	19/06/00	S: 14° 15' 24.4" W: 68° 03' 02.7"	19.3	61.3	7.69	72.277	4.63	0.16
2	20/06/00	S: 14° 25' 53.2" W: 67° 54' 47.6"	18.7	116.6	7.68	111.299	3.84	0.22
3	20/06/00	S: 14° 32' 46.6" W: 67° 44' 38.8"	20.1	79.5	7.83	124.166	3.11	0.09
4	20/06/00	S: 14° 33' 58.8" W: 67° 40' 22.6"	20.2	72.4	7.7	87.398	3.84	0.31

Las concentraciones de mercurio disuelto en aguas varían entre 1.71 y 4.63 ng Hg/L. Estas concentraciones están muy bajas respecto al valor de 200 ng Hg/L considerado por la OMS para aguas de ríos, como índice de contaminación.

En la región de Azariamas, puntos 5, 6, 7, 8 y 9, las concentraciones de mercurio en aguas son bajas respecto al valor indicado por la OMS, por lo que se considera que no están contaminadas. Los valores de concentraciones de mercurio oscilan entre 1.71 y 2.04 ng.Hg/L, valores que son justificables ya que corresponden a puntos cercanos entre ellos.

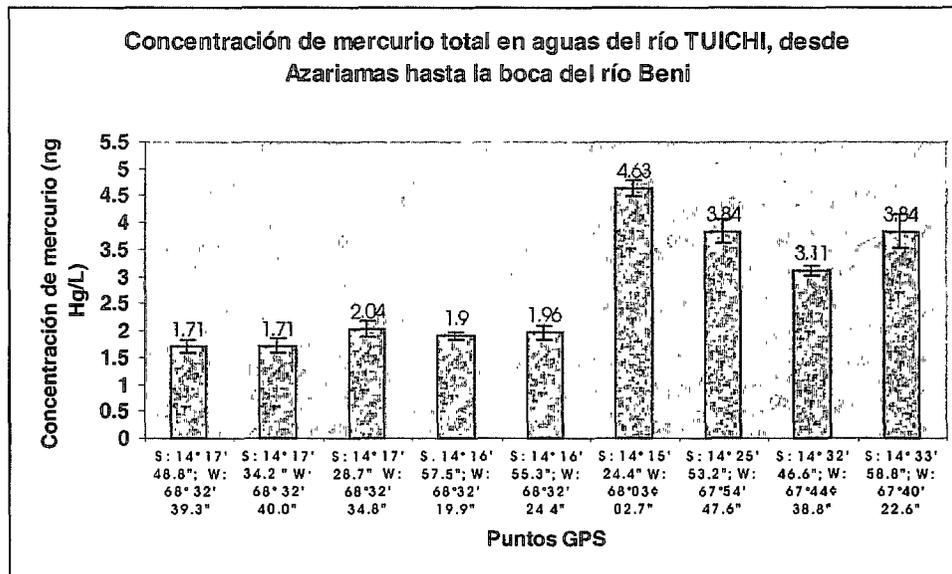
El valor más alto se encuentra en el punto 1, ubicado a unos 15 minutos aguas abajo de la población de San José ( $4.63 \pm 0.16$  ng Hg/L); en los dos puntos siguientes disminuye la concentración ( $3.84 \pm 0.22$  ng.Hg/L;  $3.11 \pm 0.09$  ng.Hg/L), acentuándose significativamente en la boca del río Beni (4 punto:  $3.84 \pm 0.31$  ng.Hg/L). Todos estos valores corresponden a la campaña realizada en el mes de junio 2000.

Es interesante observar que las concentraciones en Hg disuelto son multiplicadas por 2 a la salida de la población de San José y que no consiguen volver al nivel observado aguas arriba (Gráfico 4). Este incremento puede ser explicado por la presencia misma de esta población, por :

- ♦ sus desechos humanos
- ♦ sus prácticas agrícolas ; la deforestación y el chaqueo tienen como consecuencia el aumento del proceso de erosión de los suelos en época de lluvias que favorece el desecho a las aguas superficiales de los metales pesados contenidos en los suelos.

Puede haber también fuentes naturales como la presencia de una faja activa, presencia de rocas tales como esquistos, piritas y cinabrio ricos en mercurio fáciles de disolverse a pH ácidos; o una fuente de agua termal como hemos detectado ya en la zona de Rurrenabaque (Maurice-Bourgoin, comunicación personal).

Gráfico 4



#### 7.4 En sedimentos

En los sedimentos la concentración de mercurio total no varía sustancialmente. Se han encontrado valores muy bajos tanto en la parte alta que en la parte baja del río Tuichi (tabla 4, gráfico 5).

Tabla 4. Concentración de mercurio total en sedimentos del río Tuichi.

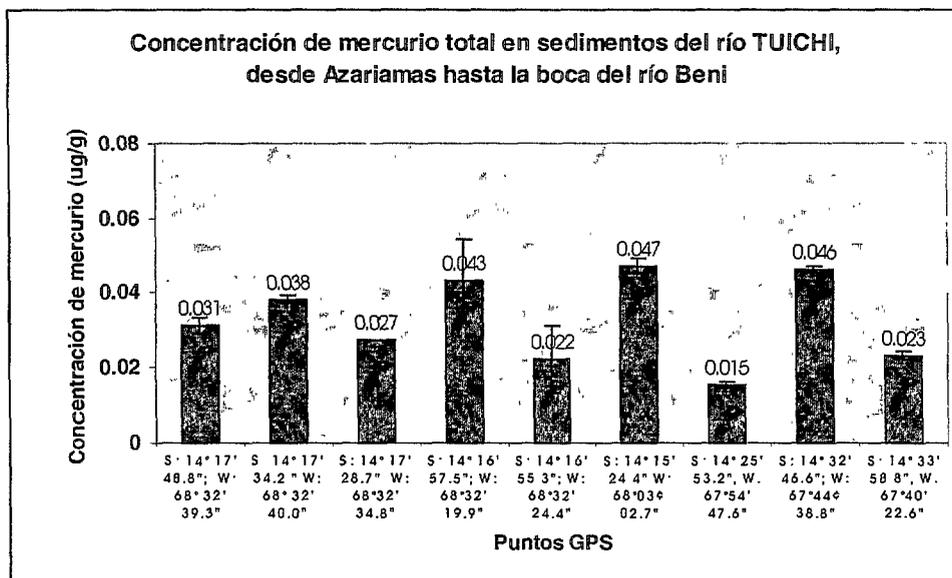
Fecha de muestreo	Código	Posición GPS S; W	Conc. de Hg tot (µg/g)	DS
08/07/00	Tuich5	14°17' 48,7" ; 68°32' 39,3"	0.031	0.002
09/07/00	Tuich9	14°17' 34,2" ; 68°32' 40,0"	0.038	0.001
09/07/00	Tuich8	14°17' 28,7" ; 68°32' 34,8"	0.027	0.000
09/07/00	Tuich7	14°16' 57,5" ; 68°32' 19,9"	0.043	0.011
09/07/00	Tuich6	14°16' 55,3" ; 68°32' 24,4"	0.022	0.009
19/06/00	Tuich1	14°15' 24,4" ; 68°03' 02,7"	0.047	0.002
20/06/00	Tuich2	14°25' 53,2" ; 67°54' 47,6"	0.015	0.001
20/06/00	Tuich3	14°32' 46,6" ; 67°44' 38,8"	0.046	0.001
20/06/00	Tuich4	14°33' 58,8" ; 67°40' 22,6"	0.023	0.001
	Ref NIST		1.25 (exp.) 1.40 (teór.)	0.11 0.08

Se explica que los resultados encontrados son bajos debido a la fuerte pendiente del río. La pendiente pronunciada del río Tuichi hace que las partículas sean arrastradas con mucha facilidad río abajo y poco se depositan sobre las orillas.

En las aguas, se ha observado que el Hg es transportado principalmente adsorbido en las partículas finas, en las arcillas específicamente (Maurice-Bourgoin et al., 2000a).

En las orillas de este río, parte alta, se encontró muy baja cantidad de arcilla respecto a la arena y piedras circundantes. Mientras que en la parte baja predomina arena más que arcillas y piedras.

Gráfico 5



## 8. CONCLUSIONES Y RECOMENDACIONES

De los resultados de mercurio obtenidos en los peces presentados en detalle en la tabla 1, así como en los gráficos, se concluye que ninguna de las muestras colectadas se encuentra ya contaminada, pero los peces que presentan mayor contenido de mercurio son los piscívoros seguido de los carnívoros.

Non obstante, un Bagre (Pimelodidae, *Rhamdia sp.*) de 5.8 kg se encuentra con alto contenido de mercurio por lo que se estima que se encuentra al borde de la limite de contaminación.

Estas observaciones no nos permiten concluir que el río Tuichi **no** esta contaminado ya que falta un numero mínimo de muestras colectadas representativas de la zona (3 muestras de peces piscívoros no es representativo). Le podemos sugerir, ya que 33% de las especies piscívoras están al limite de la contaminación, prever otras pescas para implementar el numero de muestras y verificar si la zona esta en riesgo o no.

Se recomienda de todos modos consumir preferentemente en la zona, peces omnívoros. Sin embargo se puede consumir peces piscívoros una vez por mes sin problema, debido a que el consumo regular de estos peces puede generar la acumulación de mercurio orgánico en el organismo humano.

Hasta el momento no se presentaron casos de personas intoxicadas por mercurio en el río Tuichi, pero si el mayor índice de concentración de mercurio se encuentra en aquellas que consumen pescado habitualmente (Población de San José).

En aguas y sedimentos las concentraciones de mercurio son bajas, lo que significa que los compartimientos abióticos del río Tuichi no están contaminados por mercurio.

Se debe usar recomendaciones serias a los mineros a través de folletos, de los cuidados que deben tener al utilizar mercurio durante la amalgamación y quema posterior del mismo.

Sensibilizar a estas personas mostrando los daños ocasionados por su actividad, río abajo al ecosistema acuático y las poblaciones ribereñas, que nada tienen que ver con la actividad aurífera.

Buscar una forma de control de uso restringido de mercurio y de desecho en los ríos y los suelos de parte del gobierno.

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Attachment Bolivia-2

**Colector de la planta**

**Planta colectada**

**Parte de la planta**

**Uso de la planta**

**Lugar de colecta**  
  
 Pampa Chaco Barbecho Monte

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**Colector de la planta**

**Planta colectada**

**Parte de la planta**

**Uso de la planta**

**Lugar de colecta**  
  
 Pampa Chaco Barbecho Monte

**Cazador**

**Animal cazado**

**Peso del animal**

**Lugar de colecta**  
  
 Pampa Chaco Barbecho Monte

**Sexo**

**Edad**

**Uso del animal**

**Pescador**

**Peces**

**Peso del animal**

**Lugar de colecta**  
  
 Río Arroyo Laguna

**Uso del animal**

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**Nombre del Proyecto:**

**Reducción de la contaminación de mercurio  
mediante el uso de mejores prácticas tecnológicas mineras  
en Ixiamas, Apolo y Pelechuco**

**Ubicación del Proyecto:**

El Parque Nacional y Área Natural de Manejo Integrado (PN ANMI) Madidi es una de las áreas protegidas con mayor biodiversidad en el mundo. Fue creado en 1995, con una extensión de 1,9 millones de hectáreas. Tiene dos áreas protegidas vecinas, el ANMI Apolobamba y la Reserva de la Biosfera Tierra Comunitaria de Origen (TCO) Pílon Lajas. Las localidades elegidas para la ubicación del proyecto se encuentran en las inmediaciones del PN ANMI Madidi, cerca de concesiones mineras legalmente establecidas y de comunidades que realizan explotación minera en menor escala, identificando como zonas de alto interés a las localidades de Ixiamas, Pelechuco y Apolo.

- (i) La primera zona identificada corresponde a la localidad de Ixiamas, es un centro poblado cercano al PN ANMI Madidi ubicado al Noreste. En esta región se han identificado 7 concesiones mineras, es decir, por lo menos 49 personas que participan de este proceso de explotación minera. Ixiamas es uno de los municipios más pobres del departamento de La Paz, cuya riqueza en recursos naturales es importante, tiene aproximadamente 8.890 habitantes<sup>1</sup>, y su principal actividad es la agricultura.
- (ii) La localidad de Pelechuco es la zona con más presencia de concesiones mineras legalmente establecidas, llegando actualmente a 63. Esta localidad tiene una población de 5.230 habitantes<sup>2</sup> y su principal actividad se constituye en la extracción de oro. Pelechuco se encuentra en la Provincia Franz Tamayo, ubicado dentro del ANMI Apolobamba.
- (iii) Apolo es una localidad situada al sur del PN ANMI Madidi tiene una población de 14.203 habitantes<sup>3</sup>, se tiene identificada solamente una concesión minera, su actividad principal es la agricultura y la ganadería. Sin embargo, la explotación minera es una actividad secundaria importante para los pobladores del lugar.

**Antecedentes y Justificación:**

El mercurio es uno de los elementos más tóxicos de la naturaleza, existen fuentes naturales y antropogénicas de emisión del mercurio al medio ambiente que pueden contaminar incluso al hombre<sup>4</sup>: (i) por una parte los suelos que en esta zona presentan contenidos elevados (diez veces más altos que los índices registrados en los países templados y (ii) el lavado de oro que se ha desarrollado de manera perceptible durante los últimos cuarenta años en esta región del mundo<sup>5</sup>; son situaciones preocupantes para los habitantes de esta zona. El mercurio desechado en la atmósfera puede viajar por centenares de kilómetros por el curso de los ríos, hasta ser depositado en zonas alejadas de las fuentes, existiendo una gran variedad de fauna piscícola en los ríos, estos se alimentan de materia orgánica, frutas y sedimentos. el mercurio ingresa al organismo de los peces mediante su alimentación y al organismo humano mediante la alimentación de estos peces provenientes de ríos y lagos contaminados por mercurio.<sup>6</sup>

<sup>1</sup> **CI-Bolivia 2000** Análisis socioeconómico de los asentamientos humanos en el PN ANMI Madidi y Área de Influencia. Informe. La Paz – Bolivia.

<sup>2</sup> *Ibidem* 1

<sup>3</sup> *Ibidem* 1

<sup>4</sup> **Alanoca & Maurice-Bourgoin, 2000.** estudio de la contaminación por mercurio en la cuenca alta del río Tuichi. Informe de trabajo-conservación internacional. p: 37.

<sup>5</sup> **Maurice-Bougoin, 1999.** Ríos Bolivianos contaminados por mercurio. Fiche d'actualité scientifique. N° 95, Junio, pp: 1-3.

<sup>6</sup> *Ibidem* 4

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### Attachment Bolivia-3

En Bolivia se calcula que anualmente el volumen de mercurio desechado es de 30 toneladas métricas (TM), estimación mínima debido al importante número de explotaciones no declaradas<sup>7</sup>. Hoy en día se estima que más de 60.000 personas participan directamente en actividades de extracción de oro, como empleados de 1.200 compañías mineras o miembros de cerca de 300 cooperativas<sup>8</sup>.

Los tributarios andinos de los ríos Beni y Mamoré drenan áreas semiáridas de elevada altitud y áreas de selva húmeda tropical de pie de monte. Las actividades mineras arriba de la cuenca del río Beni, tienen lugar en los ríos Mapiri, Tipuani y K'aka, en esta región, aproximadamente 200 cooperativas extraen alrededor de 100 Kg. de oro/año utilizando 200 Kg. de mercurio, de los cuales 50 %-60 % son directamente desechados al medio ambiente a través de los ríos, suelos y atmósfera<sup>9</sup>, de esta manera, los análisis de agua donde se explota el oro aluvial, no muestran niveles elevados de contaminación, pero si 200 Km río abajo, donde las concentraciones de metal son cinco veces superiores al promedio mundial. Recientes estudios científicos revelan elevadas concentraciones de mercurio en la cuenca del río Beni, en particular en los peces piscívoros, y en las poblaciones que los consumen<sup>10</sup>.

La contaminación por mercurio en el medio ambiente es un problema creciente que concierne particularmente a las regiones tropicales como la cuenca amazónica<sup>11</sup>, los principales problemas identificados debido a niveles altos de contaminación por este metal son:

1. Esta situación implica un grave problema de salud pública en la región con tasas de mercurio cinco veces más elevadas que lo permitido por la OMS<sup>12</sup>.
2. Por ser los peces uno de los alimentos básicos de las poblaciones del lugar, el elevado nivel de mercurio puede traducirse en alteraciones del sistema nervioso, así como en trastornos motrices y oculares<sup>13</sup>.
3. Indirectamente las especies que forman parte de la red alimentaria en este ecosistema, pueden acumular también fuertes cantidades de mercurio a través de una prolongada bioacumulación y biomagnificación<sup>14</sup>.
4. Existe un desconocimiento de las personas involucradas en estos procesos de explotación aurífera y de las poblaciones locales de los posibles riesgos que puede ocasionar a la salud y al ecosistema la contaminación por mercurio, porque el mayor impacto se manifiesta sobre la salud de las personas que no trabajan directamente en estas actividades, pero que se alimentan regularmente de pescado<sup>15</sup>.

Conservación Internacional-Bolivia, organización no gubernamental, cuyo propósito es apoyar estrategias de protección ambiental y de desarrollo sostenible en Bolivia, en particular en el área de influencia del Parque Nacional Madidi, considera el tema de contaminación de mercurio en las riveras del río Beni, como una amenaza a las poblaciones y al medio ambiente. En este sentido como una alternativa de concientización y educación ambiental ha realizado este perfil de proyecto que pretende lograr la capacitación en mejores prácticas de explotación minera, para la reducción de la contaminación por mercurio.

<sup>7</sup> Ibidem 5

<sup>8</sup> Maurice-Bougoin, et.al. 1999 (1). Mercury Pollution in the Upper Beni River, amazonian Basin: Bolivia. Ambio. Vol. 28 N<sup>o</sup> 4, Junio. pp: 302-306.

<sup>9</sup> Maurice-Bougoin, et.al. 1999 (2). Contaminación por mercurio en aguas, peces y cabellos humanos debido a la minería aurífera en la cuenca amazónica boliviana. Memorias del congreso Boliviana de Limnología y Recursos Acuáticos. Rev. bol. de Ecol. 6 pp: 239-246.

<sup>10</sup> Ibidem 4

<sup>11</sup> Ibidem 8

<sup>12</sup> Ibidem 9

<sup>13</sup> Ibidem 4

<sup>14</sup> Ibidem 9

<sup>15</sup> Ibidem 5

**Objetivo General:**

El objetivo general del proyecto es apoyar a reducir la contaminación de mercurio mediante el uso de mejores prácticas tecnológicas mineras, mejorar el nivel de conocimiento de la legislación ambiental y lograr la difusión y réplica por parte de los participantes de los conocimientos aprendidos en el taller.

**Objetivos Específicos:**

**Línea 1: Legislación Ambiental e impacto de la explotación aurífera**

Proveer al grupo meta información a los sobre la legislación ambiental vigente y el impacto del uso masivo del mercurio en la región por la actividad minera, sobre el ecosistema acuático y sobre los habitantes de la cuenca del río Beni.

**Línea 2: Mejores prácticas de explotación aurífera**

Brindar al grupo meta información acerca de las alternativas de uso de mejores técnicas mineras, desde el punto de vista económico y ecológico.

**Línea 3: Difusión de los resultados, conclusiones y recomendaciones del taller**

Difundir con el grupo meta de manera crítica la temática expuesta en el taller en sus grupos sociales, de tal manera de expandir esta información.

**Sostenibilidad del proyecto:**

La continuidad de las iniciativas, se basa en el trabajo conjunto entre los técnicos capacitadores y los beneficiarios. El proyecto crea conciencia y preocupación en los capacitados por utilizar mejores prácticas en la explotación aurífera, y transfiere destrezas y conocimientos.

Para lograr la sostenibilidad del proyecto se deberá continuar con un módulo de seguimiento a los conocimientos aprendidos, apoyando especialmente en la difusión de los resultados del taller. Así mismo, se quiere conocer el nivel actual de conocimientos del grupo meta, para programar otros talleres que amplíen el nivel del logrado de capacitación. En ese sentido, se considera importante el aporte de: los aliados estratégicos, las autoridades y la comunidad en general.

**Descripción del Proyecto:**

En las localidades de Ixiamas, Apolo y Pelechuco se realizará un taller de capacitación en el que se desarrollará la temática de la contaminación de mercurio y el uso de mejores técnicas mineras para el proceso de extracción del oro. Se identificaron estas tres zonas por tener un alto número de concesiones mineras en sus alrededores y dentro de las mismas.

La zona de influencia del Parque Nacional Madidi y sus inmediaciones presentan 73 concesiones mineras legalmente establecidas que están siendo explotadas en los últimos 30 años, pero los desechos de la explotación son indirectamente peligrosos para sus vecinos de la zona norte. De esta manera se puede observar un desconocimiento de las cualidades y peligros del mercurio en áreas que comprenden la zona de río abajo, así como la peligrosidad de este compuesto en las áreas de extracción masiva. Como se conoce en los informes de la OMS y en algunos recientes estudios científicos de Alanoca y Maurice-Bourgoin, la práctica tradicional con mercurio presenta problemas colaterales, debido a los niveles altos de concentración del metal en peces y personas expuestas al contaminante.

### **Mejores prácticas de explotación aurífera**

Actualmente ya se conocen algunas prácticas mejoradas en el uso de mercurio para explotación aurífera que son: la canaleta, el Jig, la mesa concentradora, la espiral, el amalgamador, el hidroseparador, la retorta, el limpiador de mercurio, tecnología alternativa que permite mejores rendimientos y menores niveles de contaminación.

### **Desarrollar un trabajo conjunto con la población local e instituciones relacionadas interesadas en el apoyo a mejores prácticas de explotación aurífera**

#### ***Población Local***

Se quieren realizar tres módulos separados, para cada población un taller, por los costos de tiempo y transporte que implica la asistencia a los talleres por parte de los participantes. Es importante mencionar que los mayores beneficiarios del proyecto serán los comunarios y poblaciones indígenas asentadas en las riveras de los ríos de la cuenca del Río Beni.

#### ***Instituciones potencialmente interesadas (organizadoras y financiadoras)***

- CI-Bolivia, ONG que trabaja en la zona de influencia del parque Nacional Madidi durante los últimos 5 años, coadyuvando en el desarrollo sostenible de la región.
- LIDEMA: Liga de defensa del medio ambiente, institución no gubernamental encargada del cuidado del medio ambiente y los recursos naturales.
- MEDMIN: Programa Manejo Integrado del Medio ambiente en la Pequeña minería, encargada de asistencia y equipamiento.
- SETMIN: Servicio Técnico de Minas, encargado del catastro minero.
- SERNAP: Servicio Nacional de Áreas protegidas, encargado de reglamentar y velar por el cumplimiento de la normativa en Áreas Protegidas en Bolivia.
- SUPERINTENDENCIA DE MINAS: Regulador sectorial.
- HAM LOCALES: Organizaciones gubernamentales representantes de cada sección municipal y que se encargan de normar y hacer cumplir las normas en su municipio.
- WCS: Wildlife Conservation Society ONG que trabaja también en conservación.
- COOPERACIÓN ESPAÑOLA: Organización extranjera, que apoya trabajos para la protección del medio ambiente.

Para un mejor alcance y desarrollo de esta temática es importante la participación de las ONGs presentes en la zona y de organizaciones gubernamentales que están involucradas en mejores prácticas ambientales y de salud pública. (OMS, LIDEMA, SERNAP, SUPERINTENDENCIA DE MINAS, SETMIN, MEDMIN y otras), además de la gente beneficiaria e involucrada con la temática. Finalmente lo que se quiere lograr con la capacitación es que tanto la población local como las instituciones presentes en la zona desarrollen estrategias y actividades conjuntas para encontrar mejores alternativas que vayan de acuerdo con la realidad local.

#### **Difusión de los resultados, conclusiones y recomendaciones del taller.**

Se contará con la participación de trabajadores en concesiones mineras, dirigentes locales, instituciones involucradas en el tema, y comunarios del área afectada y de influencia, para otorgar al taller un carácter amplio de discusión y de efecto multiplicador en la difusión de los resultados,

conclusiones y recomendaciones. Siendo uno de los objetivos principales el difundir esta información para el conocimiento del público en general.

### Metodología /Actividades

- 1 **Gestión de Recursos Financieros:** Búsqueda de financiamiento, incluye algún tipo de contraparte de los municipios involucrados
- 2 **Contratación de Personal:** Para la elaboración del proyecto final y la ejecución del mismo
- 3 **Elaboración del Proyecto:** En base al perfil de proyecto se elaborará un proyecto a nivel final.
- 4 **Listado de concesiones:** Elaborar lista de concesiones y de personas involucradas.
- 5 **Invitaciones y confirmaciones al Taller:** Organización de listas de participantes, invitaciones y confirmaciones
- 6 **Adquisición de Materiales:** Compra y preparación del material
- 7 **Traslado Apolo:** Viaje a Apolo, traslado de equipo
- 8 **Taller Apolo:** Realización del primer taller
- 9 **Traslado a Pelechuco:** Viaje a Pelechuco, traslado de equipo
- 10 **Taller Pelechuco:** Realización del segundo taller
- 11 **Traslado Apolo - La Paz:** Viaje retorno a La Paz
- 12 **Traslado Ixiamas:** Viaje a Ixiamas
- 13 **Taller Ixiamas:** Realización del tercer taller
- 14 **Elaboración de Informe Talleres:** Presentación de los resultados alcanzados a los financiadores

### Programa tentativo para cada uno de los Talleres (Contenidos mínimos)

#### Días 1 y 2 : Legislación ambiental e impacto de la explotación aurífera

- Legislación ambiental
- Ciclo global del mercurio.
- El uso del mercurio en la actividad minera.
- Toxicología del mercurio e índices de exposición recomendados.

#### Día 3 y 4: Mejores prácticas de explotación aurífera

- Dar a conocer alternativas de extracción con diferentes costos económicos
- Alternativas de Tecnologías Minero Ambientales para el oro.
- Seguridad Industrial minera.

#### Día 5: Evaluación del Taller y difusión de los resultados

- Evaluación del taller por parte de los participantes
- Elementos de comunicación para la difusión de lo aprendido en el taller.
- Diseño de una propuesta de difusión de los resultados, conclusiones y recomendaciones del taller.

### Cronograma:

Ver Anexo 1

### Attachment Bolivia-3

**Beneficiarios:**

Se quiere capacitar a las personas: (i) que trabajan en explotaciones mineras formales, (ii) a las personas que trabajan en pequeña escala de manera informal o como actividad secundaria y (iii) representantes de las comunidades aledañas con masiva explotación aurífera.

**Beneficiarios Directos:** Personas que trabajan en la explotación aurífera y población local del área de influencia. Poblaciones, en su mayoría indígenas, asentadas en las riveras del Río Beni. Existen por lo menos 70 concesiones mineras legalmente establecidas, si trabajan al menos cinco personas en cada concesión se beneficiará a 350 personas directamente.

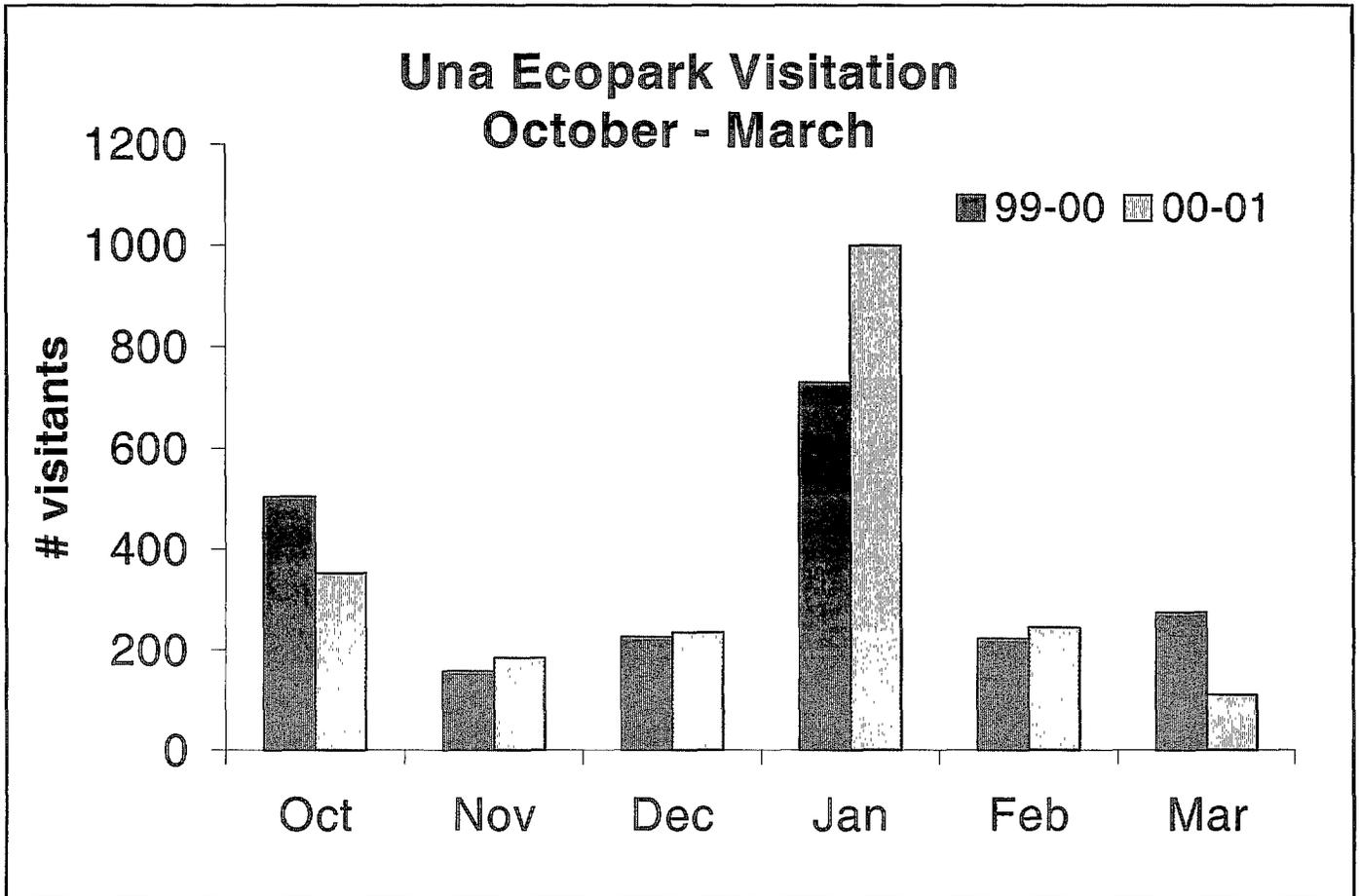
**Beneficiarios Indirectos:** Municipalidades, comunidad científica, sector privado minero e instancias gubernamentales y no gubernamentales. Existen al menos 25.000 personas que viven en los tres municipios, si con los programas de difusión se llega al 5% de las personas, se informará al menos a 1.250 personas.

**Presupuesto:**

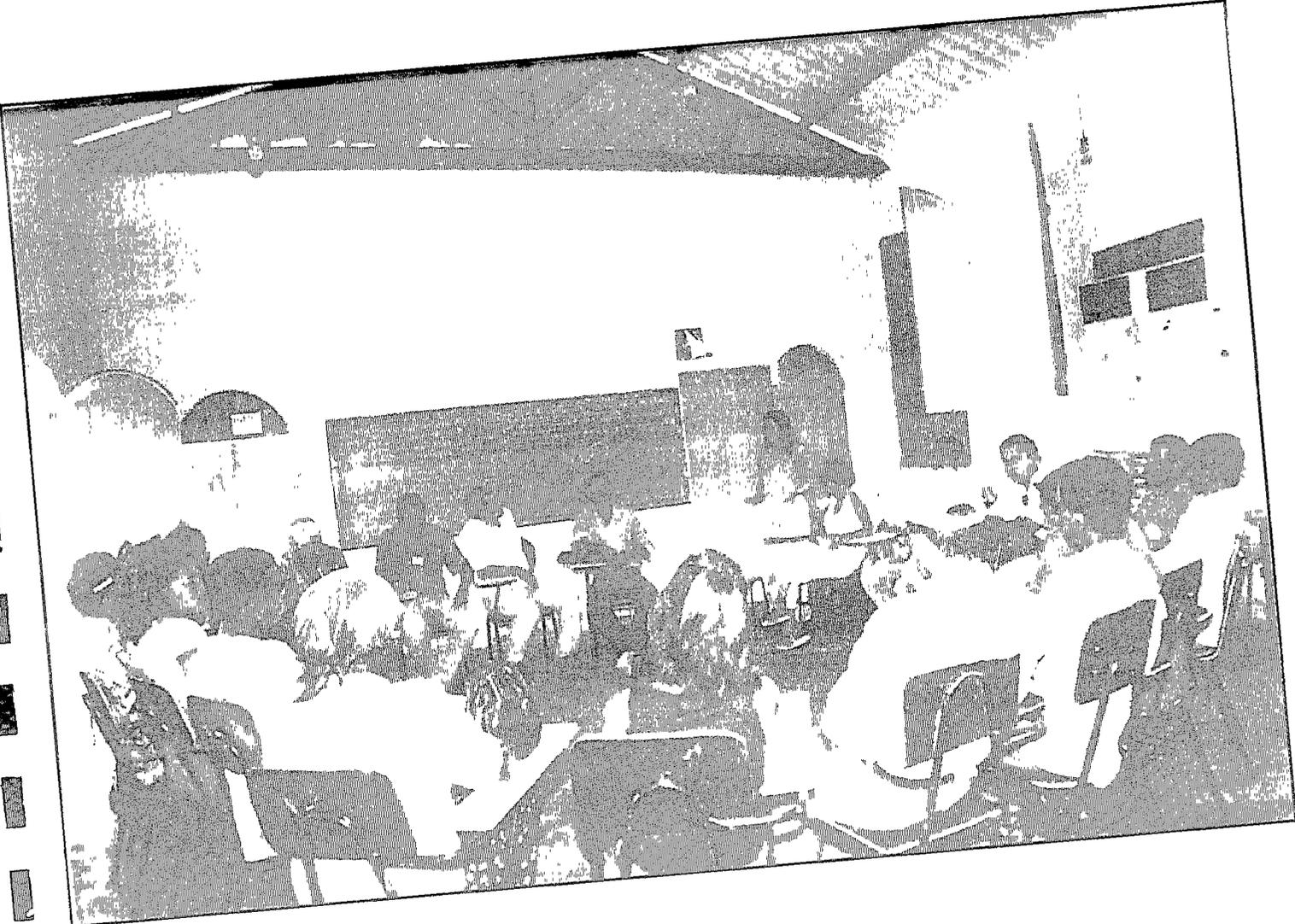
Ver Anexo 2

**Anexo 1**

<i>Cronograma de Actividades para la Realización de los Talleres</i>													
No.	Actividad	Abril				Mayo		Junio		Julio		Agosto	
1	Gestión de Recursos Financieros	XX	XX	XX	XX								
2	Contratación de Personal					XX	XX						
3	Elaboración del Proyecto					XX	XX						
4	Listado de concesiones							XX					
5	Invitaciones y confirmaciones al Taller							XX	XX				
6	Adquisición de Materiales								XX				
7	Taller Apolo									XX			
8	Traslado a Pelechuco										X		
9	Taller Pelechuco										X	X	
10	Traslado Apolo - La Paz											X	
11	Traslado Ixiamas											X	
12	Taller Ixiamas											XX	
13	Elaboración de Informe Talleres												XX XX

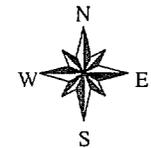
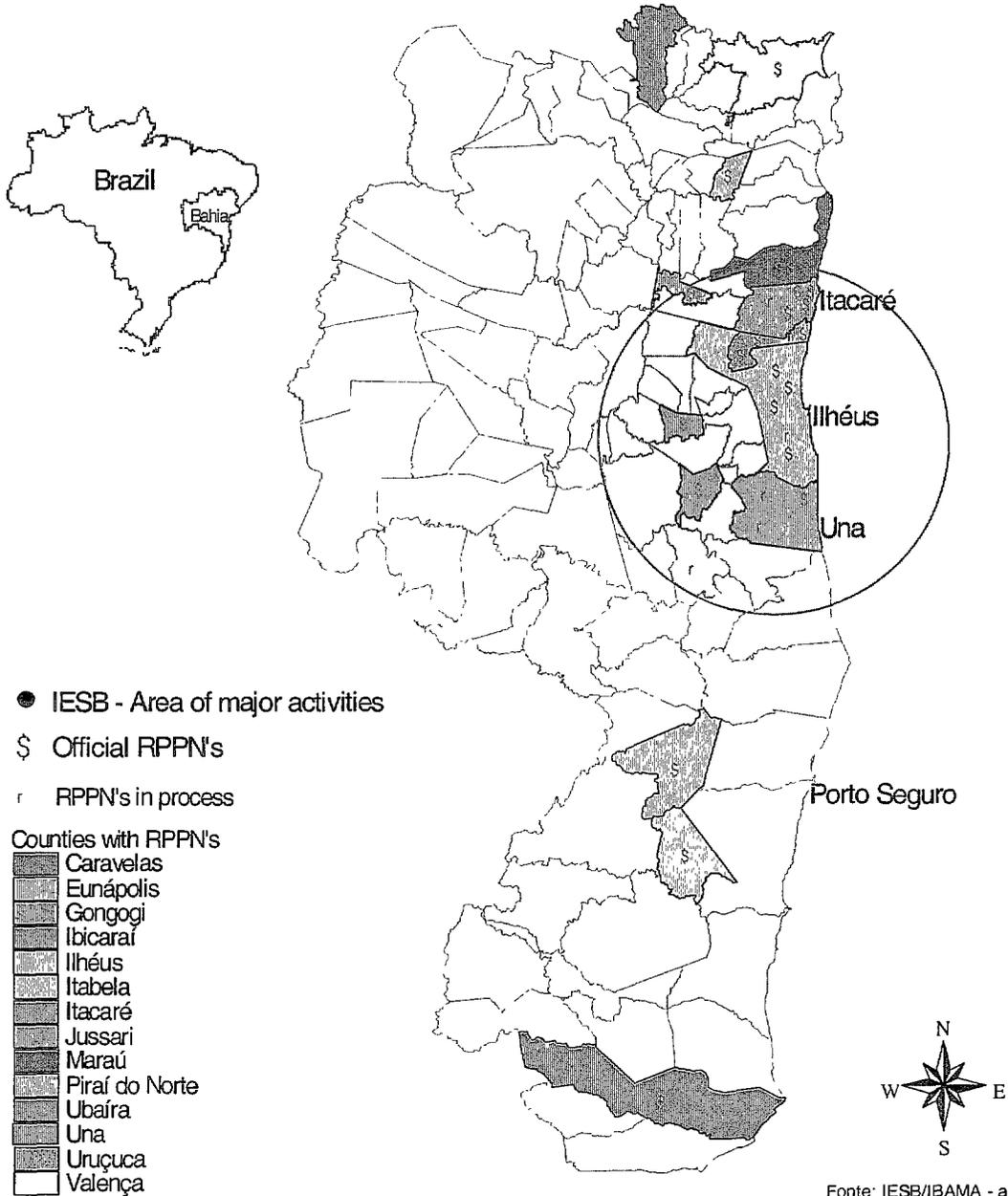


Attachment Brazil-2

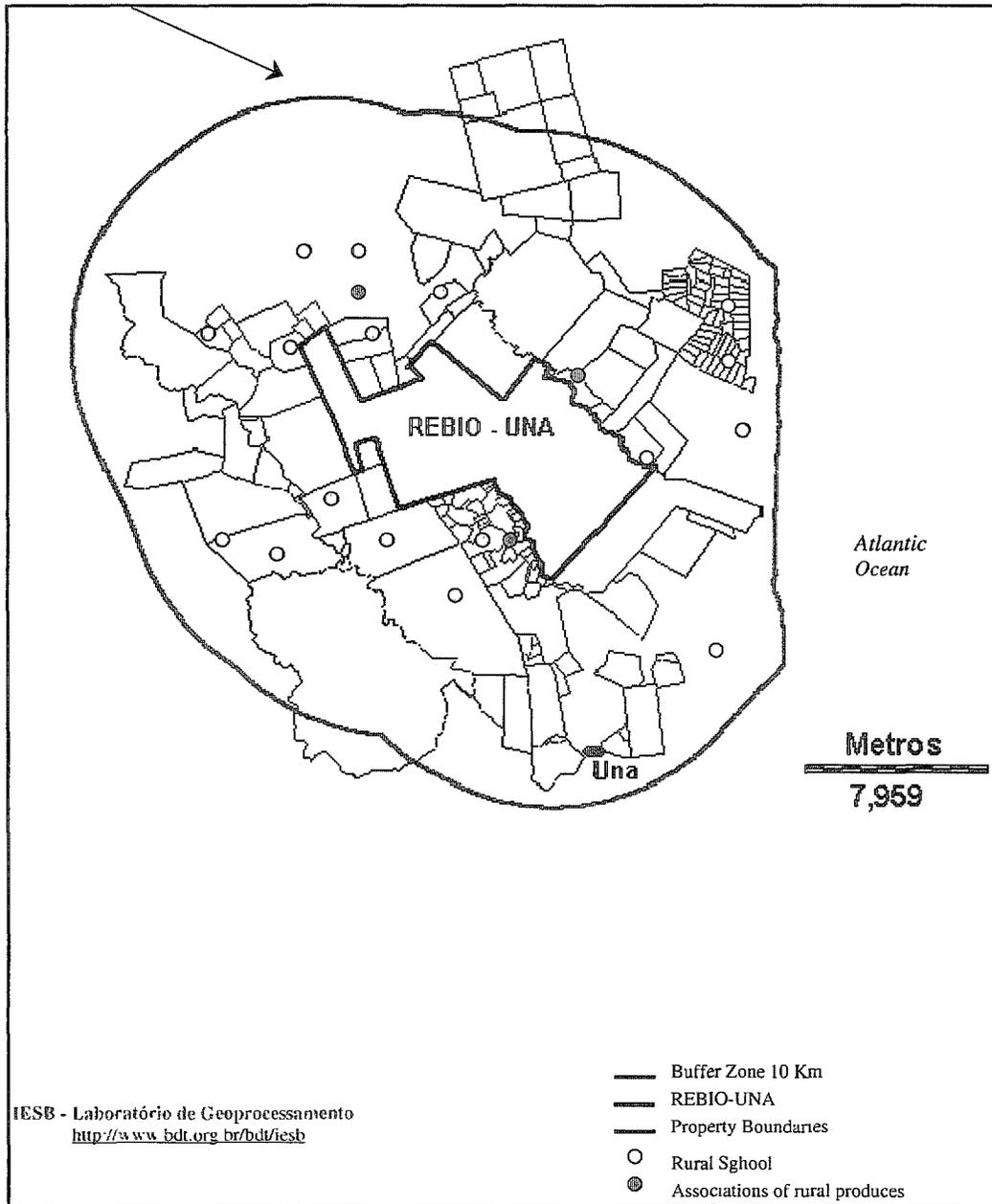


# Protected Areas in Southern Bahia - Brazil

## RPPN's do Sul da Bahia



Attachment Brazil-4



**Introduction**

The Lakekamu Basin is a vast expanse of pristine lowland rainforest with sparsely scattered small villages, settled by four distinct cultural and language groups- the Kunimaipa, the Kamea, the Biaru and the Kivio. The Basin spans across the Gulf, Central, and Morobe provinces and is situated 60km east of Kerema, the urban township of Gulf Province) and 50km SSE of Wau in the Morobe Province, at coordinates 7.7<sup>0</sup>S, 146.8<sup>0</sup>E. . See location map below (Fig1.0).

Climate in the Lakekamu Basin is basically humid with high to moderate temperatures ranging between 21<sup>0</sup>C and 29<sup>0</sup>C. A moderate pattern of 288-mm rainfall is experienced from April to September annually.

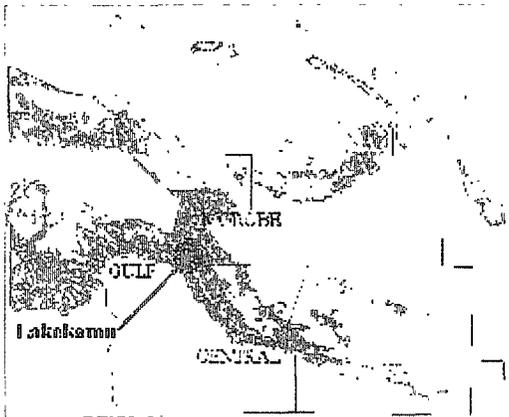


Fig1.0 Map showing the location of Lakekamu Basin on the PNG map.

Supporting about 2,000 residents, this 2,500 square kilometer tract is the largest expanse of unbroken humid forest in the southern watershed of peninsular PNG. It is remarkably rich in wildlife, especially species of large and showy birds and mammals that are threatened elsewhere in PNG. Some of such are: Southern Cassowary, Gurney's eagle lowland wallaby, Southern-crowned pigeon, Blyth's hornbill, palm cockatoo, olive python and Great-billed heron to name a few. This was initially revealed by Dr. Bruce Beehler, then Conservation International's Senior Ecologist for the Asia-Pacific Region. He had visited the basin on several occasions surveying birds and forest ecology between 1978 and 1992. He learnt of the biological significance of the area and recommended it for conservation. The Basin has been designated as “

very high priority” by the 1992 “Conservation Needs Assessment for Papua New Guinea”. Such revelations prompted a series of discussions seeking ways to reserve the biological richness of the area, which eventually lead to this project.

Despite the ecological richness of the area the community is disadvantaged in terms of government services and infrastructural development. The only services in the Basin comprise of two airstrips; two community schools a sub health center and an aid post which are all run down. To make things even worse, the health workers, teachers and patrol officers sent there leave after a few weeks or months because they claim that the place is so remote and there is no incentive nor government support.

In the midst of problems or rather realities, the Lakekamu ICAD project envisions in its activities to facilitate and empower the Basin Community to develop alternative less destructive and ecologically sound enterprises as opposed to large scale logging, oilpalm plantations and mining activities which are currently major threats to the Basin's biodiversity.

The main objective of this project is to promote the conservation of the pristine lowland forests of the Basin and its upland watershed through community awareness programs and local capacity building. The project has been promoting eco- tourism that entails two enterprises, which are mainly:

1. Research/Science Tourism and
2. Adventure Tourism

## Attachment PNG 1

The former is focused on providing support services and research opportunities to field scientists who are attracted to the Basin by its pristine forests, rivers, wildlife population and a Research Station at Ivimka (Fig2.0).

The latter on the other hand includes bush walking, wildlife watching, village lifestyle experiences, rafting down rivers and similar outdoor activities. The main feature of this component is the Famous Bulldog Trail- a spectacular walking track which can take three

to four days on a journey. The walk will take you through the beautiful mountain sceneries, remote communities, uninhabited white-water gorges, war relics from WWII and remarkable wildlife.

This project is a joint initiative of Conservation International (CI) and the Foundation for People and Community Development (FPCD Inc) in collaboration with the local communities. The project was initially funded with a three-year (1995 to 1998) implementations grant of \$US355 487 made available by the United States Agency for International Development (USAID) through US-based NGO, Biodiversity Conservation Network (BCN). The British High Commission provided us with a supplementary fund of K8000 for the project's research facilities. EZE also provided match funding to FPCD.



### **Ivimka Research Station**

The Research Station is two to three hours walk from the nearest airport. It is situated in an area where a great deal of wildlife can be studied or viewed for nature enjoyment. The project partners in 1996 built it at a cost of more than K36, 000.00. The building is 14m x 12m and can accommodate up to 15 persons at any one time. The building contains two large sleeping rooms, a spacious workroom with a large workbench in the center and an open balcony with a beautiful view of the rest of Lakekamu Basin.

Drinking water can be taken from rainwater stored in four 200L drums (800L in total when full). Alternatively, water can be taken from clear, cool flowing streams not very far from the research station. Although it is safe to drink water straight off the streams, as a precautionary measure, boil all stream water before drinking.

### **Adventure Tourism**

The current infrastructure, comprise of a rustic lodge at Kakoro and one at Tekadu. Seven other overnight rest houses in scenic locations are yet to be developed fully but tracks are constantly used by local people and well maintained. Other villages of the Basin are interested in participating in the eco-tourism activities and have pledged to build lodges in their villages during several meetings with the project field staff in 1999.

### **Travelling to the Lakekamu Basin from Port Moresby**

There are two options to get to the Basin. Firstly you can fly Air Niugini to Lae at a cost of K203.10 and then get to Wau via Public Motor Vehicle (PMV) at a cost of K10 or catch a 9.30 am North Coast Aviation flight (on Mondays, Wednesdays and Fridays) at K110.00. On return trips, pick up from Nadzab airport (Lae) can be arranged with Morobe Tours or the Balus Bus Services, which operate officially between the two points. The Lakekamu Staff can cater for accommodation arrangements in Lae and Port Moresby between your travels. Local PMV operators service passengers and travelers between Lae-Bulolo-Wau daily.

The other option is to fly directly from Port Moresby to Wau at a cost of K247.00, spend two nights at the Wau Ecology Institute Hostel and then fly into the Basin (Tekadu and/or Kakoro airstrip) at K85.00. Port Moresby to Wau flights are scheduled for 12.00 noon on Mondays, Wednesdays and Fridays while Wau to Tekadu/Kakoro flights are on Wednesdays and Saturdays. Lodging at the Wau Ecology Institute costs K31.00 per person per night (excluding food). While at Wau you can have the chance of visiting the Wau Ecology Institute Insect Ranch and beautiful birds of Paradise in captivity. From the Institute transport can be arranged with the Insect Ranch to get you to the airstrip and to the Basin on a "Norman Islander", piloted by very experienced pilots.

### **Field Assistants and Guides in the Basin**

While in the field, you will be assisted by the field officers, guides and porters to get you to the Research Station or one of the lodges, depending on the purpose of your visit. Two local boys (Clement Peter and Alex Moses) based at the Research Station have been trained in basic field techniques for bird, mammal and plant surveys. They also know how to operate the VHF Radio, record weather and keep financial records of the Research Station. In addition, more than 25 people including Clement and Alex have recently been trained in insect trapping, pinning, drying and packing by an American Entomologist who is setting up a long-term Insect Collecting and Curation Project in the Lakekamu Basin.

These assistants often know the song of a particular bird, food plants of certain insects or the fruiting seasons and medicinal use of particular plants. Their expertise makes doing field work in Lakekamu more than an experience. The field officers can arrange hiring of the right people to work as field assistants and guides. They can also arrange for initial porters and workers to assist. It is advisable not to pay workers without first confirming with project field officers.

### **Essential Field Supplies**

The following list of general things to bring applies to both tourists and researchers coming into the Basin. It is more convenient to wear clothes that are made of cotton. The essential things to bring to the Basin are:

- long pants that are dark or drab colored,
- long sleeve shirts,
- t' shirts,
- socks made of polyester or wool,
- unpadded leather hiking boot (6-12" high)
- pair of old sneakers,
- pair of thongs,
- a hat,
- raincoat,
- cotton sheet,
- sleeping pad,
- sunglasses,
- flash-light, (with extra batteries)
- insect repellent

## Attachment PNG 1

- water drinking tablets
- rubber boots (for researchers)
- sun cream
- first aid kit
- small back pack (better to have two bags than a big one)
- matches
- candles
- mosquito net

### **Nuisance and Dangers**

Papua New Guinea is home to malaria in several forms, and thus visitors are advised to obtain anti-malarial pill in Port Moresby or Lae. A course of medication should be initiated and continued through out the stay. It is generally recommended that this prophylaxis be initiated two weeks before arrival in PNG. The current recommended course is 500mg of Chloroquin and a 250mg dose of Maloprim once a week (taken Sunday and Wednesday respectively). For more information contact the pharmacists in Port Moresby and Lae. Malaria is transmitted from infected mosquitoes, which carry abundant plasmodium. We also recommend that you guard yourself against being bitten by mosquitoes during the evenings (wear repellent or proper clothing). However the likelihood of being bitten by a mosquito while in the bush is low. Other diseases that are common in PNG are dengue fever, typhoid, hepatitis, tetanus, TB, giardiasis, polio, eye infection and diarrhea.

Snakes appear to be common in the forests and grasslands of the Basin. Several people have died from poisonous snakebites in the Basin. The most common poisonous snake is the death adder- a small "sit & wait" predator that often lies coiled on footpaths. These snakes are small in size and strike above the ankle. For this reason all workers, including visitors are recommended to wear leather boots at all times when in the field. Already steps are taken to ensure snakes are absent from the lodging and Station perimeters. Tramping about after dark should be taken with great care. For scientists plan to bring a pair of boots and some socks for each permanent field assistant you hire.

The greatest threat to comfort in the forest is chiggers (bush mites) and leeches. The juvenile instars burrow into the skin of the ankles, groin, and waist, leading to a considerable long-lasting rash by an antibody reaction. The best method to avoid chiggers is to take a strict regimen of bathing, changing of clothes and application of repellents. Beehler recommended the following routine;

1. Before going out apply repellents on ankles, feet, waist and other vulnerable areas.
2. After morning fieldwork, get off all field clothing and bathe with soap.
3. Hang the already worn clothes on the line out in the sun.
4. Put on new set of clothing & socks.

At the end of each afternoon fieldwork, repeat the process. In doing so the tiny instar mites are prevented from reaching your most private and sensitive patches of tender skin.

### **Communication and Emergency**

A VHF radio is operated constantly for contact between FPCD's head office in Port Moresby and the Ivimka Research Station. If there is a need for relaying of any urgent message overseas or home, FPCD will do that on your behalf through our e-mail, fax or even phone depending on the urgency of the matter. Urgent mails can be read to you over the radio. Communication between Kakoro, Tekadu and the research station is now possible with frequencies installed on the government and airstrip radios in Kakoro and Tekadu respectively. A helicopter-landing pad has been made for any emergency cases. Up until now, it has not been used yet. We advice you come to PNG with a full medical health cover.

Attachment PNG 1

For further information contact Conservation International's Papua New Guinea Program Office on the following address:

ATT: Mr. Banak Gamui

Postal: P.O.Box 106, WAIGANI, NCD

Telephone: (675) 323 1532 or 3232353

Facsimile: (675) 325 4234

Email: [ci-moresby@dg.com.pg](mailto:ci-moresby@dg.com.pg)

or

[mewai@datec.com.pg](mailto:mewai@datec.com.pg)

# Tokaut Nius bilong Wide Bay Konsevesen Project

10 December, 2000 - Issue 1

## Tok Hamamas long 'Tokaut Nius' bilong yumi



*Tokaut*, em Nius bilong yumi long Wide Bay Konsevesen Project, insait long East Pomio LLG, Pomio District, East New Britain.

Dispela em nambawan taun long autim nius bilong yumi, na yumi gat bikpela hamamas olsem '*Tokaut*' bai givim yumi tingting long wanem samting i save kamap insait long Wide Bay Konsevesen project.

Tok tenk vu igo long olgeta manmeri husait igivim tingting long kamapim dispela nius '*Tokaut*', long planti wei yupela i halivim:

ol pipol bilong Tiemtop, Klampun, Sampun na olgeta narapela ples na ol wanwan manmeri insait long ol komuniti long Wide Bay; na bikpela tok tenk yu tu igo long:

- Conservation International (CI), na
- East New Britain Sosesel Liksen Komiti (ENBSEK)

Tok amamas igo long yupela olgeta.

### Bai yu painim Wide Bay Konsevesen Project olsem wanem?

Wide Bay em i stap insait long South East Coast insait long East New Britain Provins. Wide Bay Konsevesen project i kamapim tripela ples: Klampun, Tiemtop na Sampun. Ples Tiemtop em i stap antap long maunten, na bai kism olsem 3-pela ten minute ta-ol long lusim ples Sampun na wokabaut igo antap long ples Tiemtop.

Na long ples Klampun, bai kism olsem 4-pela ten na 5-minit na klostu 1-pela hour long lusim ples Tiemtop o Sampun na wokabaut igo long ples Klampun. Biham long yu lusim ples Balus long Bam, Cape Orford (CPI), bai i kism olsem 3-pela hour long wokabaut i go long ples Tiemtop, na 3-pela ten minit antap ken sapos yu laik igo long ples Sampun. Na klostu olsem 4-pela o 5-pela hour long igo long ples Klampun.

Na sapos yu kism speedboat long ples Bam, bai i kism olsem 3-pela ten minit o 4-pela ten na 5-pela minit long igo long ples Sampun. Na sapos long ples Klampun bai kism olsem, 1-pela hour long speedboat.

Na tu vu ken kism speedboat long Kokopo igo long Wide Bay, na dispela yu ken pasim tok wantaim ol papa bilong boat istap long wanwan ples long Wide Bay.

Ples Balus klostu long Wide Bay em Cape Corford (CPI), Islands Nation Air na Airlink, save go long Cape Orford (CPI) long tripela (3-pela) taun long wanpela wik.

### Husait i halivim long kamapim dispela project

• Olgeta Extension Volunteers na Olgeta komuniti bilong Tiemtop, Klampun, Sampun na wanwan lam husait i saposim dispela project, na ol staff bilong ENBSEK na CI

1995 Mr Simon Passigan, Wide Bay Project Co-ordinator, ENBSEK  
Maria McRae, Technical Advisor, ENBSEK  
Mr Benny Addie, Project Assistant (Volunteer)

1997 Elizabeth Kaupun, Wide Bay Project Coordinator  
Benny Addie i Lusum project.

1988 Maria McRae, i lusim project na i go bek long ples bilong em long Canada

1999 Maureen Ewan, Project Officer, CI

2000 Peter Bosip, Field Officer, CI  
Vasita Bill, Admin & Finance Officer, Wide Bay project.

Project Management Team, ENBSEK

- Mrs Landa Passigan, Executive Director, ENBSEK
- Mr. Simon Passigan, Franer, ENBSEK
- Ms Elizabeth Kaupun, Coordinator, Wide Bay Project

Conservation International Administration

- Mr. Garkovina Kula, PNG Program Director
- Mr. Chuck Burg, Melnesia Program Coordinator

66

(1) tumbuna bilong bipo, insait long pasin bilong ples i save gat rot bilong lukatum bus or solwara, wata na olgeta samting insait long em. Nau igat plant kamkain pasin i wok long kamap, w anpela bi-long dispela em Wok Kamap or wok Development.

Long 1989, Mr Peter Vonnie husait i bin stap olsem samatin long Holy Trinity Teachers' College, long Mt. Hagen. Bin kisin wan-pela pas ikain long mama bilong em long ples 'Lentop na lokim em olsem, igat ples bilong kam diwai long ples na bai kam insait long klen gwan bilong ol.

Bel bilong Peter i sui na i bin sore long klen gwan na bus bilong em na i bin gat phant tingting. Dispela em sampela tingting em i bin gat long dispela tam.

- Nogot em na ol klen bilong mi i husan olgeta rait bilong mpela long gwan bilong mpela long pasin bilong tumbuna.

- (2) pikinim bilong bhanam tam bai no map hamamas long mpela long wanan? Ahpela i no lukatum bus long gapela sindana bilong ol long bhanam tam.

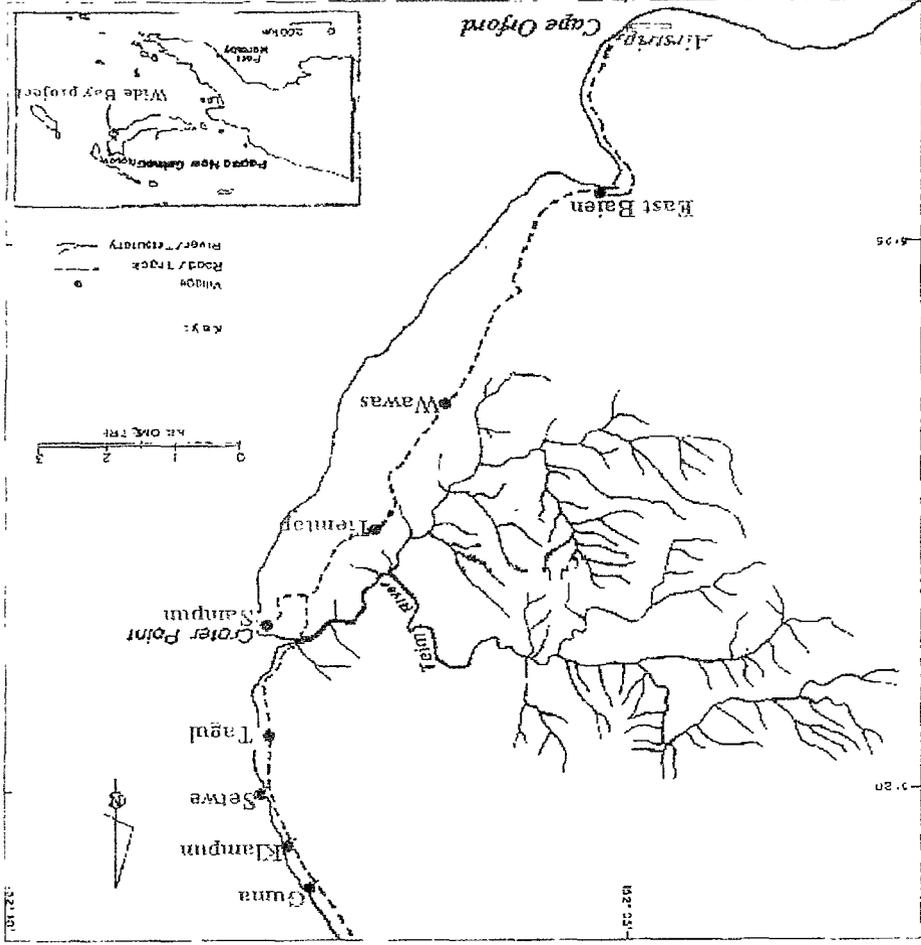
Dispela em i bikpela samting, na Peter w anuan mama bilong em i bin tokok w anuan ol klen tam bilong ol, i go map long 1992.

Peter vet i wok long pamin sampela lain husait igat laik long wokim konsevesen insait long komuniti, na i bin raitim w anpela pas i go long East New Britain Sosial Iksen Komiti (ENBSFK), na askim ol long bhanam long lukatum bus bilong em na ol lain bilong em.

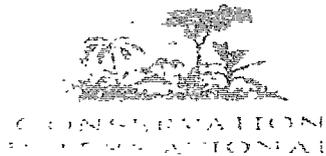
Long dispela tam, Conservation International, i wok long pamin sampela hap insait long Papua New Guinea long nekam wok konsevesen. ENBSFK i gwan dispela tingting bilong Peter long (1) na wok long Wide Bay i kamap long dispela tam, long 1994. ENBSFK na (2) i buag long dispela tam long kamapim konsevesen wok insait long Wide Bay w anuan ol lain komuniti long Lentop, Klampun na Sampun ikain map long dispela tam, 2000.



001



# Tingting gut na lukautim bus bilong yumi



## Conservation International (CI)

CI em wanpela Non-Governmental Organization (NGO), i save stap long United States of America (USA), long Washington, DC. Na igat ol opis long 3-pela 2 kamiti.

Long 1996, CI i opim nupela opis long Papua Niugini, long Port Moresby.

CI i save mekim ol dispela wok.

- Konsevesen long ol diwai, abus na binatang.
- Wok painim aut long ol wancim kam diwai o abus i save stap insait long bus o solwara o pis na hap bilong ol long stap.
- Halivim long givim tingting long kamapim lo o polisi insait long wok long ol kamiti long lukautim ol bus na solwara.
- Na halivim ol manmeri long painim aut o kamapim wok bilong bisnis.
- Halivim ol gavman o lau manmeri long komiti long wok painim aut long kamapim o wokim gutpela plen long ol usum ol samting long bus na solwara.

Na husait wanwan i laik save moa long wok bilong CI ken rait o ring long dispela address.

Conservation International-PNG,  
P.O. BOX 106,  
WAIGANI,  
National Capital District.

Telephone : 323 1532  
Fax: 325 4234  
E-mail: [ci.png@ci.org](mailto:ci.png@ci.org)

## East New Britain Sotel Eksen Komiti (ENBSEK)

ENBSEK em wanpela Non-Governmental Organization (NGO) tu i stap insait long Rabaul yet, long East New Britain. ENBSEK save wok wantaim ol manmeri long komuniti insait long East New Britain long kamapim ol dispela wok:

- Halivim ol manmeri long luksave long rot bilong lukautim bus na solwara bilong ol.
- Lainim ol meri long lukautim na kamapim gutpela sindaun bilong ol yet insait long komuniti.
- Halivim long givim gutpela tingting long ol lain manmeri husait i laikim halivim long ol turangu, long kankain hevri insait long komuniti olsem patim meri, marit i buruk, sindaun ino gutpela long lain papa, mama na pikinini, na tu insait long komuniti.
- Lainim ol manmeri long komuniti long kamapim wok bilong gutpela sindaun insait long ples na tu long komuniti.

Sapos yu laik save moa long wok bilong ENBSEK, yu ken yusim address bilong ol:

East New Britain Sotel Eksen Komiti,  
P.O. BOX 780,  
RABAUL,  
East New Britain province.

Telephone: 982 9279  
Fax: 982 9301  
E-mail: [enbsek@enb.gov.pg](mailto:enbsek@enb.gov.pg)

Taim bilong unkat long Tokaut Nius

Tokaut Nius bai kamap long tupela taim tasol long wanpela yia:  
Wanpela long Jun 10, na narapela long December 10.

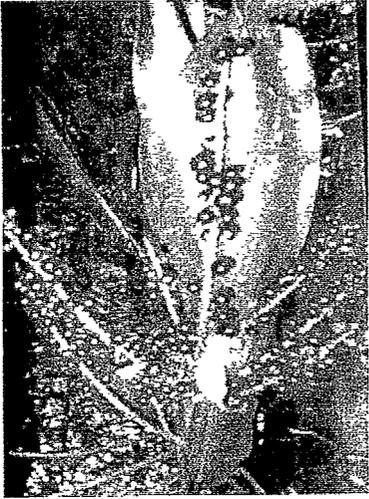
Sapos yu gat sampela tingting long putim insait long dispela nius o yu laik narapela i save long tingting bilong yu, o yu laik halivim dispela Nius long kamap gutpela moa.  
Yu ken rait i kam long dispela address:

The Editor,  
Tokaut Nius bilong Wide Bay Konsevesen Project,  
Conservation International-PNG,  
P.O. Box 106,  
WAIGANI,  
National Capital District.

Telephone: 675-323 1532  
Fax: 675-325 4234  
E-mail: [mewai@datec.com.pg](mailto:mewai@datec.com.pg)

Sampela tingting long bihaunim long rait:  
⇒ Tokaut long tingting bilong mi (yu)  
⇒ Stori or wok bilong lukautim bus  
⇒ Askim na save

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NIUS LONG BIHAIN

Long narapela nius bihain,  
 bai yumi lukluk long wanem  
 ol wok i save kamap long  
 Wide Bay Konsevesen project.



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## Introduction to Rapid Assessment Program (RAP) in Tiemtop, Wide Bay

Our forefathers in the past had their own traditional ways of managing the natural resources for the benefits of future generations. A result of frequent changes does not allow for sustainable management of natural resources.

It was in 1989, when Mr. Peter Vomne was a final year student at the Holy Trinity Teachers in Mount Hagen, when he received a letter from his mother, Mrs. Martina Vomne from Tiemtop village. The letter stated that there is a Logging Concession in the area, and a plan for an extension of the concession into his clan land.

Peter was very much affected by this message, and there were several things that came into his mind including;

- That rights of the community to the natural resources as well as the future generations would be taken away,
- The traditional ways of resource management will not be respected, and eventually lost,
- the children of the future may not be happy with us for not managing the resources for their benefit.

Peter made sure to speak with the Landowner Company, *Balokoma*, that there should not be any extension of logging concession into his clan land. Peter and his mother took up the challenge to speak with the members of their clan, trying to convince his clan members on the importance of keeping their forest intact.

Following this, Peter began to seek assistance from organizations that would assist him to carry out conservation of his clan land, until 1992 when he wrote a letter to East New Britain Sotel Eksen Komiti (ENBSEK). It was at this time when Conservation International (CI) was in contact with ENBSEK, to find areas for conservation work in Papua New Guinea. Following this request, both CI and ENBSEK went into Wide Bay to work with the community to embark on a conservation project. 1994 was the first year of community entry into Tiemtop village by ENBSEK, which later extended to Klampun village.

The project started in Tiemtop village with the Sule clan, (*Peter belongs to Sule clan*) and *Sule clan* extends into Sampun village. In Klampun, the project started with Kair clan and as a result, engaged all extension volunteers from the Kair clan at the initial stage. From the two- (2) clans, it has extended to cover the entire village communities of Klampun, Tiemtop and Sampun, and the projects are seen as village projects rather than clan projects.

Wide Bay project is located within East Pomio LLG, an area with a 1998 population of 5,158. Mengen and Sulka are two of the ethnic groups living in the villages of Tiemtop, Sampun and Klampun.

Subsistence gardening is an everyday activity of the people, and the average garden area per family is about half a hectare, cultivated in a scattered manner. According to the area's matrilineal social traditions, women own the land, and the elders of a woman's clan distribute the land accordingly. About 40% of the land in Pomio District are very rugged, and, due to a sparse population, mountain slopes and valleys are rarely touched.

With Commercial agriculture in East Pomio, cacao occupies about 378,801 ha. coconut 76,600 ha., and vanilla 1742 ha. and oranges 2720 ha. of land. The area receives an annual rainfall of 5000 mm, while the total annual rainfall for Pomio District is 25,900 mm (1999, *Pomio District Development Plan for 2000-2004, Volume 1*).

The communities of Wide Bay participate in copra production as a major economic activity, while cacao as a minor activity in the area. A major problem that hinders the cocoa and copra

### Attachment PNG-3

production is the irregular travel of cargo ships into the area to transport the products into Rabaul where the depots are situated. The communities wait for cargo ships up to 3-5 months at a minimum to transfer copra into Rabaul for sale.

Conservation International and its partner NGO, ENBSEK, work with the communities of Tiemtop, Sampun and Klampun villages. These communities have two distinctive ethnic groups of Mungen and Sulka; Mungen covers Tiemtop and Sampun villages, while *Sulka* covers Klampun village. The population in each village Tiemtop, Sampun and Klampun consist of about 100, 200 and 400 people respectively. There are 2 primary schools in the area, Sampun is one and Guma is the other but a Top-up with the Government Reforms which accommodates students up to Grade 8, who then pursue higher grades at Palmalmal to the west coast within the Jacquinot Bay. An Aidpost is situated in Sampun and a Health Center in Guma Catholic Mission Station. Guma Catholic station is a mini-town for the community, which accommodates, a Primary School, a Health Center, a PNGBC Agency and a Shop, all operated by the Catholic Church. On average, more than 70% of the population have access to some formal education upto at least grade 6 level. About 80% of the population communicate in *Tok Pisin* as the major language of communication.

The dominant church group in the area is the Catholic, which covers 80% of the population in East Pomio District, including the 3 communities, then followed by Seventh Day Adventist (SDA), and others (Pentecostals, etc.).

The project aims to promote conservation of the forests and explore alternatives to the large-scale timber harvesting that has devastated the forests owned by neighboring communities. Therefore, both CI and ENBSEK have been working with the communities to promote this through Environmental Awareness and Community Capacity building, Biological Surveys and developing small-scale enterprises. The greatest strength of this project is that it originated from the communities themselves, and receives continuous support and commitment from the community.

The set-up of Conservation Extension volunteers has helped in awareness raising on environmental issues, in the communities in the absence of project staff, and occasionally report on the issues that arise in the community. This was then followed-on with set-up of Conservation Committees in Tiemtop/Sampun consisting of 23 members and Klampun with 34 members. The conservation committees are the basis for community capacity building who are responsible for the day-to-day management of the project.

## TIEMTOP WMA CONSERVATION COMMITTEE MEMBERS AND RULES

CLAN	COMMITTEE MEMBERS
Sule 1	Maktman, Riete
Sule 2	Maio, Chris Kolgelin
Vgar1	Paupa, Felix
Vgar2	Tevamlie, Mivulo
Soai	Riete, Adam
Guop	Leo, Q. Simon
Matrao	Thomas K, Teipkokal
Letun	Lulu, Paul Saikoen
Mgolpkun	Raimon, Gelmais
Kaboing	Opman, Otto
Glem	Jenny, Patrick S.
Kaimun	Otto, Lukas
Lungaen	Oswal, Bernadette
	Martin Teipkokal
	Thomas Adam

## RULES

- ❖ The Teimtop Conservation Area is established to protect the wildlife and environment of the Mengen ethic groups in the Teimtop from disturbance and destruction. It will be managed according to the following rules which apply to all Mengen people within the area and to all others entering upon the area.
- ❖ The rules for Teimtop Conservation Area have been written by the community of Teimtop based on customary knowledge as well as concerns to ensure suitable development. These laws are made under the Fauna ( Protection and Control) Act chapter 154 of Papua New Guinea revised Laws.

## 1. Interpretation

In these rules unless the contrary intentions appears:

“ **Animal**” – means a member of a species included in the definition of “fain” or a part of such animal.

“ **Area**” – means Teimtop Conservation Area

“ **Committee**” – means Teimtop Conservation Area committee

“ **Fauna**” – means any species included in the animal Kingdom whether native, introduced or imported, but does not include humans

“ **Land**” – includes land covered by water and waters with the jurisdiction of the Teimtop Conservation Area whose boundary is described in section 1.

“ **Land Group**” – means a group of people given the authority by custom to make important decisions about their land without having to refer to any other group.

“ **Masalai Place**” – means that portion of land as defined by committees as a domain of forest spirits.

“ **Rules**” – means these rules

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**“Taking or Killing”** – means hunting, shooting, poisoning, netting, extracting, mining, snaring spearing, pursuing, taking, disturbing or injuring.

### 2. **Applicability of Rules**

Unless expressly stated in any law or enactment, this rule has the effect of a law and shall apply to restrict, prohibit and protected exploitation, abuse and destruction of flora, fauna, cultural sites and any natural resources within the Teimtop Conservation Area.

### 3. **Recognition of Customary Rights**

The traditional and customary rights of the people Teimtop and neighbouring villages or hamlets within the area are acknowledged and recognised.

### 4. **Committee Operation**

- 1.1 Annual review – The committee shall meet annually to review the rules of the WMA and to confirm membership of the committee. Changes to rules or committee membership may only be made with the signed agreement of an adequate numbers of committee members.
- 1.2 Changes of Rules – Rules may only be added, remove or altered at the annual review meeting or at special meetings of the committee convened by the committee chairpersons. Changes may only be accepted if agreed to and signed by adequate number of the committee members.
- 1.3 Changes of Committee Membership – Committee members may only be replaced upon the agreement of adult male and female members of the land group. Such changes shall be confirmed at the Annual Review meeting or at special meetings of the committee. Chairpersons shall be chosen by each Land Group to convene meetings of members of the committee and to ensure proper coporations of the committees.
- 1.3.1 Addressing mattes arising under rules\_- Matters arising under the rules shall be addressed by the relevant village committees. Significant issues may be brought to the full Conservation Area Committee.

### **Prohibition and Exclusion of Others**

All other persons, either Papua New Guineas or aliens of another country or nationality, who have no customary and traditional claim or right over the fauna, flora and other natural resources within the conservation are area are prohibited from entering the area to take, kill, disturb, injure, extract or harvest the fauna, flora or other natural resources without the consent of the Teimtop conservation committee.

### **Restriction on Access to certain areas**

- 6.1 Land Group Control – Land groups who have had the continuous use of a piece or parcel of land within the area shall continue to use the land for such purposes to the exclusion of any other person or group.
- 6.2 Places define by the committee or its members as masalai places may be entered into only by permission of the spokesperson of the land group orb which the masalai place is found , Customary restrictions. Such as avoidance of noises must be respected. It is forbidden to take or kill animals in any masalai places within the area.
- 6.3. Accompanied Entry - Visitors may only enter the area accompanied by a guide appointed by the committee for guiding services.

### 7. **Restrictions on clearance or cutting**

## Attachment PNG-4

7.1. Hunting Grounds – Clearing of forest, cutting of trees, buttresses in Land used for hunting is not allowed.

7.2 Gardening  
Clearance of forest for gardens may only take place in place demarcated on land use map and away from river banks.

7.3. Masalai Places – It is forbidden to clear forest in any masalai places within the area.

### 8. Time Limitation

Rotation of Hunting Areas\_– According to Traditionally accepted practice, certain portions or parcels of land will not be designated off limits to hunting for periods of between six months and two years. These areas are designated to provide breeding refuges for hunted species.

### 9. Taking Restrictions

9.1 Catch limits – Hunters may only take that number of animals as agreed in consultation with the family group prior to engaging in a hunting expedition.  
This restriction may only be lifted for preparations for special occasions.

9.2 Undersize and nursing animals- Nursing female and immature animals may not be taken or killed.

9.3 Megapodes – Female or nesting megapodes may not be taken or killed.

9.4 Old wild pigs – Old wild pigs should not be taken or killed in accordance with traditionally accepted methods.

### 10. Prohibitions and Restrictions of each method

10.1 Methods – No visitors shall take, kill injure or harvest fauna, flora or other natural resources within the area by using: a) short gun, b) dynamite or other types of explosives, c) other dangerous substances or chemicals which are harmful to the environment.

10.2 Short gun use – No person shall take, kill injure or harvest a pig, cassowary with child, bird of paradise, etc with a short gun or rifle.

10.3 Dogs are not allowed in the conservation area.

### 11. Waste Management

11.1 Defecation – Person defecating in forest areas must bury faeces in a hole preferably between the buttresses of a tree.

11.2 Animal wastes – No carcasses body parts or waste products from hunted animals are to be left on any land in accordance with traditionally accepted methods.

### 12. DEVELOPMENT

12.1 Small Scale Development – only small development activities that do not damage the environment and which provide significant control to landowners will be permitted in the area.

12.2 Rotation of portable sawmill areas – Portable sawmill areas – Portable sawmill are only to be used in one specified area of a river tributary each year. The sawmill must be moved to a new area every year.

12.3 Mining – Unauthorised excavation, exploration, mining, drilling or prospecting shall not be conducted or undertaken within the area.

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13. **Penalties** – Penalties of these rules shall be set by for breach. A meeting of the committee and can be found in Annex.....

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**KLAMPUN WMA CONSERVATION COMMITTEE AND RULES**

The Klampun Conservation Committee has the task of creating, maintaining and ensuring the enforcement of the Rules of the Wildlife Management Area in its capacity as representatives of certain parts of the Sulka people of Klampun village.

The committee is comprised of one representative of each land group in the area as well as one further person in the village who will act as chairman. Conservation committee members have been appointed through discussion among all male and female adult members of each Land Group. The WMA Chairperson will rotate annually through each Land Group. The appointee will be decided by a meeting of all committee members. Unless misconduct by the chairperson, a special meeting will be called by the Executive to discuss the fate of the chair.

Decision on changes in the rules and committee composition will be made by the entire committee in discussion with the Land Group they represent. Decisions on matters relating to the enforcement or interpretation of rule can be undertaken by members of the committees on a Land Group basis.

**Foundation Committee Members**

Clan Representatives	Name
Kair	Valentine Tauha (vice) ,Betty Tap
SOS	Henry Paru, Maria Pamngeingel
Masoa	Kwenteip Kaspar, Cecilia Pamengkop
Luagan	Joe Kasoni, Martina Kmuang
Srip	Peter Patre, Jacinta Kekenut
Gelmon	John Kolkalkie, Josephine Vei
Kvar	Leo Pamle, Hilda Mikie
	Pogan & John Waltelpnuo (vice)
Special Committee	Title
Patrick Kaupun	Guesthouse Manager
John Kouval	Training Center Manager
Steven Kusa	Training Center Manager
Lusia Mngaimar	Mess Supervisor
Junior Lotanga	Secretary
Nobert Matgone	Treasurer
Rosina Mutkane	Assistant Secretary
Joe Tosip	Assistant Mess Supervisor

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<b>Trustee</b>	<b>Title</b>
Peter Sisi	-
Raphael Rolphun	Assist. Guesthouse Manager
Vincent Kaupun	-
Peter Patre	-
<b>LLG Committee Representative</b>	
Lucas Kadi	Village Councillor
Martin Kasoni	-
Josephine Vei	Women's representative
Patrick Litau	Village recorder
Ietus Manglol	-
Isidor Nanda	-
Petrus Kowatpuo	-

**RULES**

The Klampun WMA is established to protect the wild life and environment of the sulka ethnic groups in the Klampun village from disturbance and destruction. It will be manage according to the following Rules which apply to all Sulka people within the area and to all others entering upon the area.

The Rules for Klampun Conservation Area has been written by the committees of Klampun village in consultation with the community members based on customary knowledge as well as concerns to ensure suitable development. These laws are made under the Fauna [Protection and Control] Act Chapter 154 of Papua New Guinea revised Laws.

**1. INTERPRETATION**

In these rules unless the contrary intention appears:

"**Animals**" - means a member of a species included in the definition of "fauna" or a part or product of such animal.

"**Area**" - means Klampun Conservation Area.

"**Committee**" - means Klampun Conservation Area Committee.

"**Cultural Sites**" - means original settlement of the ancestors of Klampun village.

"**Customs and Traditions**" - means Sulka people of Klampun's way of life.

"**Fauna**" - means any species included in the animal kingdom, whether native, introduced or imported, but does not include humans.

"**Land**" includes land covered by water and water s within the jurisdiction of Klampun Wildlife Management Area whose boundary is described in section 1.

"**Land Group**" - means a group of people given the authority by custom to make important decisions about their Land without having to refer to other group.

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" **Masalai Place** "- means the portion of land as defined by the committee as a domain of forest spirits .

" **Rules**" - means this rules.

"**Sea**" - means seas within the Klampun village.

" **Taking or Killing**" - means hunting. Shooting, killing, poisoning, netting, extracting, mining, disturbing or injuring.

### 2. APPLICABILITY OF RULES

Unless expressly stated in any law or enactment, this Rule has the effect of law and shall apply to restrict, prohibit and protect exploitation, abuse and destruction of fauna. Flora, cultural sites and any natural resources within Klampun WildLife Management Area.

### 3. RECOGNITION OF CUSTOMARY RIGHTS.

The traditional and customary rights of the people of Klampun and neighboring villages or hamlets within the area are acknowledged and recognized.

- Uphold our traditional customs, belief, norms and practices of the Sulka people of Klampun village.

### 4. COMMITTEE OPERATION

- 4.1 Annual review** - The committee shall meet annually with the community to review the rules of the WMA and confirm membership of the committee. Changes to rules or committee membership may only be made with the signed agreement of an adequate number of committee members.
- 4.2 Changes of rules** - Rules may only be added, removed or altered at the annual convened by the committee chairperson. Changes may only be accepted if agreed to and signed by an adequate number of committee members.
- 4.3 Changes of committee membership** - Committee members may only be replaced upon an agreement of adult, male and female members of the Land Group. Such changes shall be confirmed at the annual review meeting or at special meetings of the committee. Chairperson shall be chosen by committee members to convene meetings of members of the committee and to ensure proper operations of the committee.
- 4.4 Addressing matters arising under rules** - Matters arising under the rules shall be addressed by the relevant Land group committees. Significant issues may be brought to the full WMA committees

### 5. PROHIBITION AND EXCLUSION OF OTHERS

All other persons, either Papua New Guineans or aliens of other country or nationality, who have no customary and traditional claim of right over the fauna, flora, and other natural resources within the conservation area are prohibited from entering the area to take, kill, disturb, injure, extract or harvest the fauna, flora other natural resources without the consent of the Klampun conservation committee.

### 6. RESTRICTION ON ACCESS TO CERTAIN AREAS

- 6.1 Land group control** - Land groups who have had the continuous use piece or parcel of land within the area shall continue to use the land for such purpose to the exclusion of any person or group.
- 6.2 Masalai Place** - Places defined by the committee or its members as Masalai places may be entered into only by permission of the spokesperson of the land group on which the masalai place is found. Customary restrictions, such as avoidance of noise, must be respected. It is forbidden to take or kill animals in any masalai places within the area.
- 6.3 Accompanies entry** - Visitors may only enter the area accompanied by a guide appointed by the committees. Fees may be levied by the committee for guiding services.

## 7. RESTRICTIONS ON CLEARANCE OR CUTTING

- 7.1 **Hunting grounds** - Clearing of forest, cutting of trees, cutting of tree buttresses in land use for hunting is not allowed.
- 7.2 **Gardening** - Clearance of forest for gardens may only take place on land demarcated for gardening and 50 meters away from big streams/riversides and 20 meters away from small streams/riversides..
- 7.3 **Masalai Places** - It is forbidden to clear forest in any masalai places within the area.

## 8. TIME LIMITATIONS

- 8.1 **Rotation of hunting areas** - According to traditionally accepted practices, certain portions or parcels of land would be designated off limits to hunting for periods of between six months to and two years. These areas are designated to provide breeding refuge for hunted species.
- 8.2 **Rotation of fishing areas** - No using of diving glasses to fish and collect Karviet, smol, klak, Ngumou, etc. at all times whilst fishing using hooks is not restricted.

## 9. TAKING RESTRICTIONS

- 9.1 **Catch limits** - Hunters may only take /kill that number of animals as agreed in consultations with the Family group prior to engaging in a hunting expedition. This restriction may only be lifted for preparations for special occasions. However, there is no limit to the number of fish and pigs caught.
- 9.2 **Undersized and Nursing animals** - Nursing females and immature animals may not be taken or killed.
- 9.3 **Megapodes** - Female or nesting megapodes may not be taken or killed
- 9.4 **Small fish** - are not allowed to be caught and eaten.

## 10. PROHIBITIONS AND RESTRICTIONS ON CERTAIN METHODS

10.1 **Methods** - No visitors shall take, kill, injure or harvest fauna, flora or other natural resources within

The area by using.

- a. short-gun or a firearm;
- b. dynamite or other types of explosives;
- c. gill nets; or
- d. Other dangerous substances or chemicals which are harmful to the environment.

10.2 **Short-gun use** - No person shall take, kill, injure, or harvest a pig, cassowary with child, bird with a shotgun or rifle.

10.3 **Burning on river or stream edge** - No person shall light fires in grass or bushes on the edge of rivers in the area so as to protect the habitat of fish and prawns.

10.4 **Diving goggles** - is not allowed to fish at all times.

10.5 **Sea shores/beaches** - Cutting trees and burning bushes along the beach is prohibited.

## 11. WASTE MANAGEMENT

11.1 - **Defecation** - Person defecating in forest areas must bury faeces in a hole preferably between the buttresses of a tree

11.2. **Animal Wastes** - No carcasses, body parts or waste products from hunted animals are to be left on any land in accordance with the traditionally accepted methods

## Attachment PNG-5

**11.3 Domestic Waste** - plastic are to be burnt whilst empty cans, batteries, etc. are to be dumped into rubbish holes.

**11.4 Domesticated animals'** waste should be buried by responsible owners and pigs should be fenced.

**11.5** All households (Maxin) should have dug toilets and rubbish holes.

## 12. DEVELOPMENT

12.1 Small-scale development - Only small activities that do not damage the environment and which provide significant control to Landowners will be permitted in the area.

## 13. PENALTIES

13.1 Penalties for breach of these rules shall be set by a meeting of the committee and can be found in Annex.....

Rule No.	Penalties/Fees(PNG Kina)- @0.35 for USD
5.	K20.00
6.1	K20.00
6.2	K10.00
6.3	K20.00
7.1	K5.00
7.2	K15.00
7.3	K5.00
8.1	K20.00
8.2	K20.00
9.2	K2.00
9.3	K10.00
9.4	K5.00
10.1	K20.00
10.2	K20.00
10.3	K15.00
10.4	K20.00
10.5	K15.00
11.2	K5.00
11.3	K5.00
11.4	K10.00
11.5	K5.00

**Klumpun Conservation Area Development Plan includes;**

- 1 Wokabout Sawmill
- 2 Tradestore
- 3 Bakery
- 4 Joinery & Construction workshop
- 5 Rice Farming
- 6 Butterfly farming
- 7 Fisheries
- 8 Poultry
- 9 Piggery

Attachment PNG-5

- 10 Cocoa & Copra buying
- 11 Marketing garden produce
- 12 Sewing
- 13 Carving
- 14 Cultural House (Museum)
- 15 Speed boat
- 16 Screen Printing
- 17 Kerosine & benzins
- 18 Eco-tourism

*M*