

# Policy options of the Madeira River Basin

**This section aims to identify feasible policy options that target key components identified in the Causal chain analysis in order to minimise future impacts on the transboundary aquatic environment. Recommended policy options were identified through a pragmatic process that evaluated a wide range of potential policy options proposed by regional experts and key political actors according to a number of criteria that were appropriate for the institutional context, such as political and social acceptability, costs and benefits and capacity for implementation. The policy options presented in the report require additional detailed analysis that is beyond the scope of the GIWA and, as a consequence, they are not formal recommendations to governments but rather contributions to broader policy processes in the region.**

## Definition of the problems

Before undertaking policy analysis it was essential that several of the myths about the Amazon being homogenous, empty, rich and poor were discarded (Torre 1995). The diverse physical and socio-economic aspects of the Amazon Basin ensure that it is far from being an homogeneous basin. For this reason, the present policy analysis was conducted on an important sub-basin, the Madeira River Basin instead of considering the entire Amazon Basin.

### The population and the cities

The Madeira Basin has a population of about five million inhabitants (Table 4), and the majority is concentrated in cities in Bolivia (La Paz, 16%; Cochabamba, 16%; and Santa Cruz de La Sierra, 23%) and Brazil (Porto Velho, 7%). The most important city in the Peruvian portion of the Madeira Basin is Puerto Maldonado, with a population that represents

about 1% of the entire basin. These five cities are key regions for the management of the Madeira Basin, considering their location, political status and economic power.

The history of colonisation in the Andean region is different from the Amazon lowlands. The composition of the present Andes civilisation reflects the original Inca population and the influence of Spanish colonisation. In addition, mining prospectors have also contributed to the make-up of the population in the Madeira Basin. In contrast, the present society of the lowlands is predominantly a result of a recent migration of the Bolivian, Brazilian and Peruvian people into the indigenous territory, which happened more intensively during the Rubber period (Cardoso & Muller 1978, El Comercio 2001).

The population of the lowlands of the Madeira Basin is comprised of several groups of people that are weaving a complex web of ethnic diversity and are developing the local economy and policies. The most ancient group is the indigenous people that belong to several cultures and speak different languages. Settled in many established or non-established reserves, these groups have integrated or interacted with the dominant society to varying degrees. The second group is composed of the first colonisers and the mixed blood groups, known in Brazil as “caboclos”. These people have been living in the region for several generations and have developed a culture and knowledge that sustains a traditional exportation economy since the end of the colonial period (Goulding et al. 1996). They know this region very well and their knowledge is the foundation of the present economic activities, such as timber, fishery and fluvial transportation. The final and most recently established group is comprised of immigrants who have recently come to the region seeking the Amazon richness, mainly gold. Apart from the indigenous people, most colonists arrived in the Amazon region during several economic pulses, such as during the Rubber period at the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> centuries; after the establishment

of the duty free zone in Manaus in 1967; the period of infrastructure development during the 1970s; and following the increase in gold mining in the 1970-1990s (Cardoso & Muller 1978, Goulding et al. 1996, Hanai 1999, Núñez-Barriga & Castañeda-Hurtado 1999). These economic pulses contributed to the development of a diversified local economy, which sustains one of the highest regional rates of population growth in the Madeira Basin.

## **The frontiers and economic blocks**

The inhabitants of the Madeira River Basin share the same water supplies but are separated by political borders such as country, state and county borderlines. Moreover, Peru and Bolivia belong to a separate economic block, the Andean Community (Comunidade Andina 2002), from Brazil, which belongs to the Mercosul (also known as MERCOSUR) economic block (MERCOSUR 2003) (see Likely performance of recommended policies). The value of trade between the Andean Community and the Mercosul has reached almost 6 million USD per year. The main products exported from the Andean Community to the Mercosul are crude oils, petroleum products, natural gas, bananas, unrefined silver and zinc ores, and in return the Mercosul exports vehicles, soybean oil, beans, motor vehicles with piston engines, and hard maize to the Andean Community (Comunidade Andina 2002). Despite the value of formal trade between these countries, an enormous amount of informal trading occurs along the border between these three countries in the Madeira Basin. In addition, the poor communication between major economic centres within the Madeira Basin makes sustaining and managing commercial activities within the region very difficult. For example, in order to fly between Rio Branco, the capital of Acre in Brazil, and Puerto Maldonado, the capital of Madre de Dios in Peru, you would have to fly via São Paulo and Lima. The distance between Rio Branco and Puerto Maldonado would correspond to a flight of less than one hour, but it actually takes more than 24 hours to fly via São Paulo.

## **Addressing the Root causes**

Implementing policies that address the four root causes identified in the Madeira Basin would probably be facilitated by the cordial relationship that exists between the three countries that occupy the Basin and by the statement of the Amazon Cooperation Treaty (ACT). On the other hand, the practical distance that splits the population from different countries might be a serious obstacle in the implementation of a basin-wide integrated management plan.

### **Root cause 1: Governance failures**

Failures in governance are probably one of the most important root causes within the Madeira Basin. At present, there is no commission or authoritative body that has been established to discuss and address

problems occurring in the Madeira Basin, despite the existence of such commissions in other areas of the countries, particularly in the Titicaca Lake region or for a number of rivers in the Northeast and Southeast regions of Brazil.

Pollution is probably the most obvious GIWA concern that requires international management. The increased propagation of pollution downstream, particularly from mining, affects all lowlands of the Madeira Basin, the lower Amazon River and also the estuary and the North Brazil Shelf Large Marine Ecosystem (LME 17).

### **Root cause 2: Market and policy failures**

Policies and regulation of each country should help minimise the economic distortions by promoting the use of natural resources in a sustainable way. The common directives to achieve the sustainable development of the Amazon region must be discussed within the scope of the ACT. However, the correction of the economic distortions will be more effective when the two economic blocks develop mechanisms to consolidate a basin-wide management plan for the entire Madeira Basin.

Habitat and community modification is the GIWA concern that is influenced most by the unregulated development of an economy that maintains the perception of inexhaustible supplies of natural resources. The expansion of agriculture is primarily responsible for the deforestation of large areas and the resulting habitat modification it causes.

### **Root cause 3: Lack of knowledge**

The local government could easily raise awareness of the public of best land use practices. The establishment and implementation of training and environmental education programmes would help minimise both pollution and habitat modification in the Madeira Basin.

### **Root cause 4: Poverty**

Poverty is a large-scale problem throughout the Amazon Basin. Alleviation of poverty in the Madeira Basin is probably the largest challenge for the administration and can only be achieved if a holistic approach is adopted, that involves all levels of government, addresses and root causes.

# Construction of the policy options

## Information system on water resources in the Madeira River Basin

Information is the key to implementing appropriate actions that aim to achieve sustainable use of water resources. Therefore, governments and agencies charged with the regulation of water resources must be well informed about the ecology, economy, socio-economy, hydrology, meteorology, agriculture and other important aspects related to the use of water and land in the Basin. The objectives of an information system could be achieved in three ways: (i) research, to obtain more and new information; (ii) search and collate existing information; and (iii) dissemination of information to the target audiences.

The purpose of this project is to integrate the different countries and stakeholders that support research, databases and social organisations of interest in the field of water resources and environment issues in the Madeira Basin. Research aiming at the sustainable use of water resources will reinforce the basic information required for the elaboration of a basin-wide management plan. Also, the implementation of a decentralised information system based on the principle of the "Clearing-House Mechanism" will provide greater flexibility in seeking, collecting, compiling and disseminating data on the Basin. The "Clearing-House Mechanism" is a facilitation system in which the Focal point, in this case the Brazilian Ministry of the Environment, does not necessarily have a centralised data base, but acts as a portal to the web-pages that have the information. The system acts as a web in which all points interact with each other. The main function of the Focal point is to standardise the information that will be available via the Internet. This should improve and make easier the process of management, monitoring and enforcement of the public and private actions in this basin, decision-making, as well as increasing and contributing to further knowledge dissemination on the Madeira Basin. All interventions that have an impact on the Basin, especially mineral prospecting and mining, agriculture and deforestation, would be involved.

This project will represent a first step in establishing an integrated basin-wide management programme involving the three countries. This action complies with ACT directives and will be the foundation of the constitution of a Commission or International Committee for the management of the Madeira River Basin.

## Contributions to the development of an International Commission for the Madeira River Basin

The establishment of an International Commission for the Madeira River Basin is essential in order to coordinate and implement remedial actions in order to ensure the sustainable use of water resources in the future. Unfortunately, there are at present, no plans for the establishment of such a commission. Bolivia, Peru and Brazil have not implemented an integrated large-scale action to address environmental problems associated with aquatic resources, as has been done in relation to the drug trafficking problem. To date, each country has developed its own mechanisms and projects designed to ensure the sustainable use of water resources. Brazil is developing a large-scale programme for the Protection of the Brazilian Rainforests (PPG7), which is a joint initiative of the Brazilian Civil Society and the Brazilian Government and is supported by the international community (PROVARZEA 2003). Peru and Bolivia have established national reserves and Peru gave concessions for private reserves in the Madre de Dios headwaters. The first conservation concession was awarded to ACA (Amazon Conservation Association) for the conservation of the lower Los Amigos watershed in Madre de Dios (Amazon Conservation Association 2003).

This project aims to survey the legal rules and managerial organisations in the countries and states of the Madeira Basin. The second phase of the project will identify the stakeholders in the Madeira Basin and propose a schedule to establish an International Commission for this basin.

## Training and environmental education programme

Permanent training and educational strategies must be developed and implemented among the population, particularly regarding best land use practices, the non-polluting techniques for gold exploitation, the basic sanitation procedures essential for maintaining water quality and appropriate use. Also, the legal provisions that limit interventions in water sources and other environmental protection zones should be explained.

## Sustainable development programme for fishing activities

Although the fish stocks within the Madeira Basin are potentially one of its greatest economic assets, present management of these resources is inadequate resulting in the unsustainable exploitation of the most valuable stocks. The broad habitat use of the big migratory catfish which spawns in the upper reaches of Amazonian rivers in the Andes and uses the estuary and the lowlands as a nursery zone (Barthem & Goulding 1997) perfectly illustrates the need for integrated management in this basin.

This project aims to align fisheries projects and organisations in order to achieve sustainable fishing practices and exploitation of unidentified opportunities. It encourages different countries to adopt compatible regulations for the management of the same stock. In addition, it will endeavour to raise awareness among fishermen and stakeholder of how their activities depend on the continued health of the Basin, transforming them into some of the main agents to monitor and enforce the interventions designed to promote sustainable fishing maintenance of fish stocks in the Madeira Basin.

## Identification of the recommended policy options

Each of the four projects presented above were developed to address each of the root causes identified by the causal chain analysis. However, the projects are not equally feasible, require different budgets and will yield results over different temporal scales. For example, the benefits of the establishment of an International Commission for the Madeira Basin will only become evident in the long-term, despite its extreme importance for the consolidation and implementation of an integrated policy regulating management of aquatic resources in the Basin. Similarly, the establishment and implementation of training and environmental education programmes will promote the long-term sustainability of practices such as fishing and farming but will not yield immediate benefits. Therefore, the most promising project aims to gather and disseminate information and to integrate the programme for fisheries management in the Madeira Basin.

Brazil, Bolivia and Peru each possess research programmes and database systems to monitor and develop actions to promote the sustainable use of water resources. Unfortunately, these programmes are not integrated and, because of budgetary limitations, are implemented only on a limited geographic scale. An initiative of the Civil Society of the three countries, involving universities, research centres and local environmental institutions, together with the governments of each country and, if possible, supported by the international community could focus investigations to find solutions to environmental problems for the priority concerns identified in the Madeira Basin.

In the Amazon Basin, some efforts have been made to consolidate regulations into an integrated management strategy for fishing in this region, primarily to manage the big migratory catfish. The management of fisheries along the Amazon River have been discussed in fora involving participants from Peru, Colombia and Brazil and could be expanded to include the Madeira Basin.

The options recommended above will contribute to the development of an international commission and the implementation of a training and environmental education programme. The consolidation of a fishery management programme will involve training and education of the target public, as well as meetings and workshops with the governmental fisheries institutions of each country. The same must happen with the implementation of the proposed information system. Thus, these projects are based on the same foundation: integration and exchange of information.

## Likely performance of recommended policies

### Information system for the management of aquatic resources

#### Effectiveness

Brazil, Bolivia and Peru have designated governmental institutions to gather information and develop policies for the regulation of water resources. The National Water Agency (Agência Nacional de Água – ANA) in Brazil, the National Service of Meteorology (Servicio Nacional de Meteorología – SENAMHI) in Bolivia, and the National Service of Meteorology and Hydrology (Servicio Nacional de Meteorología e Hidrología – SENAMHI) in Peru have similar functions related to the information system.

The implementation of an integrated information system might improve the predictions of flood and the establishment of systems for pollution control. Also, the scientific community of these countries could work in association with the information system to develop joint projects within the field of aquatic sciences. The relationship between the intensity of flood and fish migration, the size of deforested area in the headwaters and the degree of degradation of the valley floodplain vegetation, are examples of the need for research focused on finding solutions to the priorities identified in the Basin.

The impact of this project will depend on the quality of information incorporated into the information system. In order to ensure that information derived from this system is accurate and can be used to plan economic development and environmental conservation, strict quality controls of the data must be implemented. However, to ensure the usefulness of the system, the information must also be widely available.

### **Efficiency**

In general, tangible benefits of collating and disseminating information are more obvious in the long-term and are often overshadowed by the short-term expense involved in developing the information system. Nevertheless, such a system would ensure consistency of governmental and private planning in the region and would facilitate detailed preliminary evaluation of infrastructure development projects such as the construction of hydroelectric power plants, and would also ensure effective monitoring of the impacts of such projects after completion.

### **Equity**

The information system is more directly related to the government agencies and researchers. They will analyse the information more frequently than the general public. However, the results of these analyses will help the population that live along the river to evaluate the water quality and the environmental conditions in order to project future plans.

### **Political feasibility**

Information is power. The integration of an information system has advantages in terms of improving the understanding of the aquatic system. It will help the governments of the three countries to develop a basin-wide management plan for this region. Furthermore, it will assist in the identification of the main activities that lead to profound environmental impacts on the aquatic system. At present, it is very difficult to assess the damage caused by a specific economic sector or company. This anonymous situation could be advantageous to those who could make a discrete opposition to the project.

### **Implementation capacity**

The financial resources are limited in each country. Brazil has some hydrological stations and research projects in the aquatic system of the Madeira, Mamoré and Guaporé rivers. Peru has some research projects but does not have hydrological stations in the Madre de Dios River. Bolivia possesses some research projects and few hydrological stations in the Mamoré, Itenez, Beni and Madre de Dios rivers. Nevertheless, it is considered that there is implementation capacity in these countries.

## **Sustainable development programme for fishing activities**

### **Effectiveness**

The low price of fish is responsible for the low cost of animal protein in areas of the Madeira Basin where cattle farms are not abundant. Also, the fishery is responsible for thousands of direct or indirect jobs. The adequate management of the fish stock has a greater socio-economic importance than economic importance in that region.

The management of the fishery in each country is implemented by three agencies: the Brazilian Institute of Environment (IBAMA), the Centre for Fisheries Development (CENDEPESCA) in Bolivia, and the Ministry of Fisheries (MINPES) in Peru (Barthem et al. 1995). The effectiveness of this project has a wide scope considering the fact that the big migratory catfish spawn in the Andes headwaters and grow in the estuary and in the Lower Amazon. The protection of the spawning areas of these species is essential for the fishery in the entire Amazon Basin.

### **Efficiency**

The cost-benefit relationship is favourable, considering that the economic feedback is relatively fast, and the results would be visible in a short to medium-term. Nevertheless, the complexity of the population dynamics of these stocks ensures that it is very difficult to predict in a short time the consequences of a mitigatory action with the momentary fish abundance. The benefits should be the prevention of a collapse of the fishery activity.

### **Equity**

The development programme for fishing activities will directly affect the professional and subsistence fishermen, as well as the consumer market in the largest cities.

### **Political feasibility**

The number of conflicts between fishermen has increased during the last few decades. The necessity of implementing a fishing ordinance has been perceived by the professional fishermen and also by the people who live along the river margins. Brazil has more experience in the management of conflicts between fishermen and in the implementation of fishing restrictions. In some cases, it is impossible to find a reasonable solution to the conflict and it is necessary to make a decision that could be unfavourable for one party. If this is done, the political feasibility of the project can be threatened. However, if the decision is not taken, the conflict may intensify and become uncontrollable, potentially threatening the project once again.

### **Implementation capacity**

Although the financial resources are limited in the three countries, there is sufficient expertise to implement this project in each country, particularly in Brazil and Peru.