



THE DESTRUCTION OF FRESHWATER HABITATS: THE CASE OF THE AMAZON BASIN

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INTRODUCTION

GIWA Objectives in the Amazon

The aim of the Global International Water Assessment (GIWA) is to produce a comprehensive and integrated global assessment of sixty-six international waterways, their ecological status, and the causes of their environmental problems. In addition, GIWA also focuses on key issues and problems facing aquatic environments in water courses that are shared between countries.

OBJECTIVE

The objective of the GIWA Amazon project (sub-region 40b) is to gather available information on the region in order to make a comprehensive and integrated global assessment of the international waters.

MATERIAL AND METHODS

The methodology employed allows comparisons of the conditions of the basins under different stages of environmental degradation. Despite differences between basins and their histories, it is possible to identify patterns of habitat degradation and, consequently, remedial and mitigating actions.

GIWA assessment

In July 2001, the GIWA Workshop for Scaling and Scoping brought together 20 specialists to discuss and analyze the Assessment Protocol for the Amazon (sub-region 40b). As a result of this meeting, the Scaling and Scoping GIWA methodology was divided into three main parts: Geographic Scaling, Impact Scoping, and Future Conditions. The workshop considered 22 predefined issues and their related environmental and socio-economic impacts which were grouped into five principal areas of concern: Freshwater Shortage, Pollution, Habitat and Community Modification,

Unsustainable Exploitation of Fisheries and Other Living Resources, and Global Change

RESULTS AND DISCUSSION

The group of experts considered Habitat and Community Modification and Pollution as the two largest concerns due to the effects of the last 30 years of economic and social development in the Amazon region. The main individual threats to the basin were identified as: mining (especially gold mining), hydroelectric dams, agriculture, and cattle-raising.

The environmental impacts caused by gold mining usually depend on the scale of the activity. Formal mining is conducted by mining companies and is usually more mechanized, which causes more intense and punctual environmental disturbances. Small or medium scale mining (known locally as *garimpos*) are scattered over the entire Amazon Basin and explore alluvial gold deposits. The large-scale environmental effects of *garimpo* activity are deforestation and siltation, occurring over vast extents of small forest-covered streams. The social effects are increases in infectious diseases (such as malaria) and mercury contamination of soils, waters, air, and human beings. The impacts of mercury contamination can be far-reaching and therefore have the potential of affecting not only the populations of the *garimpo* sites but other, more removed groups as well (Hanai 1999, Núñez-Barriga 1999).

Hydroelectric dam building is a governmental enterprise that aims to supply electric power to industries and large urban centers. The Tucuruí dam, on the Tocantins River, and the Balbina dam, on the Uatumã River, created the two largest artificial lakes in the Amazon Basin. The environmental impact of these lakes may be understood considering the time-scale. The short-term environmental impact is the permanent flooding of the forest and an increase in the

biological demand of oxygen, which has negative consequences for both aquatic and non-aquatic biota.

Agriculture and cattle-raising activities are scattered over the entire Amazon Basin, but the negative consequences, such as deforestation and erosion, are more visible along the major roads and the main rivers. The replacement of the forest by cultivated fields and pastures has a large impact on small streams and floodplains, leading to habitat destruction or modification. Flooded forests along the Amazon River are cut for the extension of natural grass fields used as pastures. Floodplain deforestation affects commercial fish populations because this habitat is used by fish for foraging and refuge. However, the specific consequence of deforestation for fish populations is not fully understood due to the difficulty of separating the adverse effects of deforestation and of intensive fishing.

The enormity of the Amazon Basin had attracted the attention of the international community including the governments of countries well beyond the immediate geographical region. The discussion has focused on the apparent antagonism between development and conservation. Governmental agencies and non-governmental organizations have undertaken serious investigations in order to develop appropriate technology to be employed under the specific conditions found in the Amazon Basin and have also identified representative areas of the Amazon biome to be protected.

CONCLUSION

The paradigm is to preserve the remaining natural environment, to maintain the sustainable use of natural resources (such as timber and fisheries), and also to increase the efficiency of production in intensively utilized areas (like soybean plantations and mining sites), while minimizing environmental impacts. The regulation of these two forces, development and preservation, could be determined by the economic value of the ecological functions and socio-economic value of goods and services provided by natural and semi-natural ecosystems (Farber *et al* 2002; Groot *et al* 2002).

REFERENCES

Farber, S. C., Costanza, R. and Wilson, M.A. 2002. Economic and ecological concepts for valuing ecosystem services. *Ecological Economics*: 41: 375–392.

Groot, R. S., Wilson, M. A. and Boumans, R. M. J. 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics*: 41: 393–408

Hanai, M., 1999. Formal and garimpo gold mining and the environment in Brazil. **Mining and the Environment: Case Studies from the Americas - Chapter 5**. IDRC: <http://www.idrc.ca/books/focus/828/chapter5.html>

Núñez-Barriga, A., 1999. Environmental management in a heterogeneous mining industry: The case of Peru. **Mining and the Environment: Case Studies from the Americas. Chapter 4**. IDRC: <http://www.idrc.ca/books/focus/828/chapter4.html>