



SERIE RECURSOS HIDROBIOLÓGICOS
Y PESQUEROS CONTINENTALES
DE COLOMBIA

II. PESQUERÍAS CONTINENTALES DE COLOMBIA:

cuenas del Magdalena-Cauca, Sinú,
Canalete, Atrato, Orinoco, Amazonas
y vertiente del Pacífico



Carlos A. Lasso, Francisco de Paula Gutiérrez, Mónica A. Morales-Betancourt, Edwin Agudelo Córdoba,
Hernando Ramírez-Gil y Rosa E. Ajiaco-Martínez (Editores)



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UNIVERSIDAD DE BOGOTÁ
JORGE TADEO LOZANO



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Sembramos a Colombia por el mundo

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EXECUTIVE SUMMARY

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As part of the Annual Operations Plan (2011) of the Program for Conservation Biology and Biodiversity Use of the Institute for the Investigation of Biological Resources Alexander von Humboldt, we initiated a project to produce a “Diagnostic Analysis of the Freshwater Fisheries of Colombia” which is part of our on-going long term monitoring of the hydrobiological resources of the country. This project involved 25 scientists from 15 institutions, including universities, non-governmental agencies, and institutes of the Ministry of the Environment, Housing and Territorial Development of Colombia (MAVDT).

The report focuses on a diagnostic analysis of the freshwater fisheries of the major drainage basins in Colombia: Magdalena-Cauca, Sinú, Canalete, Atrato, Pacific Coast, Orinoco and Amazon. It also considers the principal characteristics and negative environmental impacts present in each basin. Fishery information includes described species of high commercial value; those harvested by subsistence fishermen; fishing gear and methods used; population of fishermen; history of the

fishery harvest and routes and means of commercialization.

Also included are three case histories related to key topics in Colombian fisheries and food security. The first case considers fishery resources of Colombian reservoirs; the second, fisheries based on introduced or translocated species, with emphasis on tilapias (*Oreochromis niloticus*, *Oreochromis mossambicus* y *Oreochromis spp*) and pacus (*Colossoma macropomum* and *Piaractus brachypomum*), that in many cases have now supplanted native species and become a profitable alternative to declining native species harvests. Lastly, the juvenile goby (Perciformes: Gobiidae), fishery is described for the first time, reporting some aspects of these diadromous fishes found in coastal rivers of Pacific Colombia.

For the Magdalena-Cauca Basin, which is the center of economic development of Colombia, and home to 80% of its people, we describe unresolved historical environmental problems that severely affect the aquatic ecosystem with its hydrobiological resources and undermine attempts

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to manage a sustainable fishery harvest. In 1976 it was estimated that the fishery potential of the basin is somewhere between 80.000 and 120.000 t.year⁻¹, including 26 commercial species of a total of 167 species recorded there. The reduction in documented fishery harvests between 1974 and 2009 is around 85%, with some 30 species now classified with some degree of threat. In the seventies, the basin produced between 77% and 95% of the freshwater fish harvest, and fell from 69% to 19% in 2009 of the entire national harvest. Without a doubt, we can say that our fishery resources are in alarming crisis, and many species will completely disappear from the national harvest.

The ecosystems of the Sinú River drainage are fragmented by urban, agricultural and industrial development as opposed to the Canalete River system which is still in good condition and has few human impacts. In 1989, the Sinú River drainage produced about 2.000 t.year⁻¹. The Canalete River system had however never registered significant fishery harvests. For as long as fishery statistics are available for the Sinú fishery (1997-2002), the average annual catch remained near 1.130 t.year⁻¹, which included 13% subsistence fishing and 87% commercial. However, in 2009 the official statistics recorded a drop to only 242 t.year⁻¹. All fish stocks of the Sinú are now being overharvested because of the indiscriminant use of illegal fishing methods that capture fish below legal size limits.

The Atrato River Basin has not escaped environmental impacts, adverse natural phenomena but is principally affected by the impacts of mining for gold, silver and platinum. Throughout the watershed municipal waste is discharged untreated

directly into the rivers. Sedimentation, wetland drainage projects and deforestation are widespread. Fishery production is markedly seasonal, with most harvests occurring during the first months of the year, when several commercial species make their annual migration. In 2001, the middle sector of the basin produced nearly 5.000 t.year⁻¹. From wetland swamps (65.000 ha) the production is around 1.600 t.year⁻¹ (30.8 kg/ha year⁻¹) that come primarily from migrations that start in the lower Atrato. About 40 species are caught, but only ten are commercially important. Of the total, 27 are strictly freshwater species and 13 are estuarine or marine. As in other freshwater drainages, the condition of the Atrato fishery indicates that fish stocks are at or beyond maximum sustainable yields.

The Pacific slope region has an area of 76.500 km² and includes more than 200 short rivers with high flow caused by very high precipitation (9000 mm.year⁻¹). These coastal areas and river drainages are highly polluted. Fish species recorded there now total 38, 21 freshwater and 17 of marine origin but that occupy freshwaters for significant parts of their life cycles. No fishery records have been kept for this region, and the little information available is as disperse as the local communities of the region. A data collection system should be installed to gather data on the diverse subsistence fisheries, to be able to assess local fish stocks and implement measures to ensure their protection.

In the Amazon Basin about 88 species are eaten locally, but the commercial fishery exploits fewer than 30 species. These species however (mostly pimelodid catfishes and a few characiforms) determine the socio-economic dynamics not only of Co-



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Colombian fishing communities but also those of neighboring countries. Since most harvested fish stocks are shared by several countries, international standards governing these fisheries are needed to avoid conflicts and foment reasonable resource management. Among necessary strategies we suggest: i) a trinational fishing zone among Colombia, Peru and Brasil to manage the harvest of migratory pimelodid catfishes, characiforms and osteoglossids; ii) agreements among local communities to establish rules for management of the subsistence fishing as well as other commercial species, to be applied along the rivers of Andean origin that flow into the Amazon.

For the Orinoco Basin we present information on the fishery for human consumption, discriminating the principal water bodies where fishing occurs, as well as a characterization of their physical and chemical properties. In this region, about 2.458 people participate in fishing and catch per unit effort values estimated for different rivers range from 60 kg/UFE/day to 6 kg/UFE/day. From 1995 to 2009, records indicate that annual harvests varied between 7.742 t.year⁻¹ and 1.024 t.year⁻¹. A total of 68 species were recorded. Serious threats to the local biodiversity and especially the commercial fish species were detected, due to human activity in the region the most serious of which is the significant deforestation of natural vegetation that has been replaced by crops.

Reservoirs in Colombia store a little more than 15 Mm³ of water and generate about 8987 MW of electrical energy. These have in the majority been constructed in drainages of the Magdalena-Cauca Basin, at altitudes from 9 to 2000 m a.s.l. They are home to 77 species of fishes, of which nine

are exotic, and three are translocated. The presence of the non indigenous species, together with the altitude and age of the reservoir seem to determine the quality and quantity of existing fish stocks present. The fishery production for Colombian reservoirs falls within the range of values available for other similar South American reservoirs. However, in almost every case, the construction of Colombian dams and resultant reservoirs has caused a total blockage of fish migrations, reducing the populations of fishes that migrate between lowlands and highlands to reproduce or feed. In general, the fishing activities in reservoirs are mostly subsistence fishing; production is affected by changes in water levels that characterize this sort of ecosystem. Species captured are usually small and of low economic value. About 64% of the reservoirs constructed have affected their drainage system and as a consequence, the human communities that exploited river fishes. Although the impact is difficult to quantify these changes because studies of conditions prior to dam construction and of the new conditions after construction are lacking for almost all (98%) of reservoirs currently in operation.

With respect to the exotic species introduced or native species translocated a panorama of current conditions is shown for the following exotic families: Centrarchidae (bass and sunfish), Cichlidae (tilapias), Cyprinidae (carp), Osphronemidae (gouramies), Pangasiidae (pangasid catfishes) and Salmonidae (trout and salmon) and the translocated species of the families Arapaimidae (arapaima), Prochilodontidae (bocachicos), Characidae (yamus), Cichlidae (peacock bass, yellow perch) and Serrasalminidae (pacu). In this way, using existing information available, it was pos-

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sible to show that both the tilapias (silver and red) and the pacus (white and black) now are harvested by local fisheries from natural waters where they had never been previously established. The current conditions of these species was considered, including their distribution, inclusion in fishery statistics, management and impacts.

The last case study refers to the goby fishery established on the Pacific coast of Colombia. This study shows how post-larvae of species of the genus *Sicydium* sustain a fishery harvest of varying importance throughout the region. This activity is very poorly documented in Colombia in spite of its importance and intensity in some communities. In the north, this type of fishing

occurs at the mouths of the principal coastal rivers (Valle, Juradó and Jurubirá) and concentrates on the capture of juvenile *Sicydium*. Towards the south, harvests occur not only near the mouths, but also in higher portions of the drainages such as San Isidro in the Calima River, San Antonio in the Yurumanguí River and San Isidro in the Cajambre River, where indigenous communities of African origin exploit the migrations of the gobies as well as *Macrobrachium* shrimps. At this time, no records of the rivers, number of people participating, volumes harvested, fishing effort, or seasonality of this fishery are available. Such information is critically required to make sustainable management possible.