

Journal of Fish Biology (2016)

doi:10.1111/jfb.12867, available online at wileyonlinelibrary.com

The conservation of aquatic ecosystems of the Orinoco River basin

A. MACHADO-ALLISON*

Laboratorio de Ictiología, Instituto de Zoología y Ecología Tropical UCV, Caracas 1041-A, Venezuela

Key words: Colombia; conservation; development; illegal exploitation; pollution; Venezuela.

Only recently (in the last 20 years) has the worldwide interest in guaranteeing animal protein sources, good air and water quality entered the agenda of international symposia. In this respect, the conservation of still undisturbed natural habitats in South America is of the utmost importance.

The Orinoco River basin encompasses territories within Colombia and Venezuela, and is an extensive hydrographic network that is a product of a heterogeneous geologic history and a highly diverse landscape. Few areas on earth can be compared with it in terms of natural diversity. Its continental aquatic environments range from high temperate lagoons and cold-water rivers in the Andes, to mighty rivers in the Llanos and typical black (acidic) rivers in the Guiana Shield (morichales) that together with extensive floodplains create one of the most important wetlands in South America.

This continental aquatic ecosystem is considered to be of high natural and economic value. The Orinoco River basin has >1000 species. In addition, there are hundreds of species of resident and migratory birds, reptiles and mammals.

Wealth can be measured by ecosystem productivity, biodiversity or services provided by hydrological processes. The historical fish landings from this basin are of the order of 75 000 t year⁻¹. Both fish diversity and production are due to heterogeneous habitats and rich flooded areas that form nurseries. Recent data from Venezuela (Machado-Allison & Bottini, 2010; Machado-Allison, 2013) have, however, shown a significant drop of at least 50%; the fishes are of extreme importance for human populations along the Orinoco River basin, both for food and generation of income.

In spite of the high dependency upon such ecosystem services, there is an overwhelming pressure on aquatic ecosystems of the Orinoco River basin. They are permanently in danger of degradation or complete loss; no consideration is given or knowledge is gathered on their importance or associated environmental services to human populations. The situation is worsening in the face of the accelerated construction of dams, canals and dredging, contamination [pollution from domestic effluents (*e.g.* detergents), crops

Author to whom correspondence should be addressed. Tel.: +58 212 3724702; email: machado.allison@gmail.com

(e.g. herbicides), mining (e.g. mercury) and industries (e.g. oxygen-consuming effluents)], deforestation for agricultural, industrial or urban purposes, intensive removal of fishes and reptiles and the introduction of foreign (exotic) species (Machado-Allison, 2005; Lasso *et al.*, 2011).

It is ingenuous to think that, in the future, the countries that share this heritage can grow without inflicting some damage on the ecosystems and to the aquatic flora and fauna. What can still be done is the prevention of further and unnecessary damage through measures, which ensure conservation, recovery and sustainability. Nevertheless, in spite of the efforts from both countries through research, capacity building and publishing of results, including recommendations (Lasso *et al.*, 2011), there are still social, economic and political factors which seriously threaten aquatic conservation in the Orinoquia. Once more, it is important to call the World's attention to them: (1) possibility of the development of an oil industry (Orinoco Bituminous Belt) without the necessary control or non-existing environmental effect studies; (2) recent closure of the Ministry of the Environment in Venezuela; (3) illegal invasion of properties dedicated to the conservation of special habitats and wildlife in Venezuela; (4) loss of professionals by Venezuela due to emigrations of scientist and technicians to other countries; (5) application of poor conservationist policy in Venezuela, as established in the call Plan of the Homeland (Plan de la Patria), in which political fidelity is privileged to the detriment of the environment and (6) uncontrolled mining.

References

- Lasso, C., Rial, A., Matallana, C., Ramírez, W., Señaris, J. C., Díaz-Pulido, A., Corzo, G. & Machado-Allison, A. (2011). *Biodiversidad de la Cuenca del Orinoco; II. Áreas prioritarias para la conservación y uso sostenible*. Bogotá, DC: I.I.A.H., M. A., WWF.
- Machado-Allison, A. (2005). *Los Peces del Llano de Venezuela: un ensayo sobre su Historia Natural*, 3ra edn. Caracas: Consejo Desarrollo Científico y Humanístico (Universidad Central de Venezuela), Editorial Torino.
- Machado-Allison, A. (2013). Estado actual de la pesca continental en Venezuela: sus problemas y vinculación con la Seguridad Alimentaria y Desarrollo Sostenible. *Boletín de la Academia de Ciencias Físicas, Matemáticas y Naturales LXXIII*, 9–33.
- Machado-Allison, A. & Bottini, B. (2010). Especies de la pesquería continental venezolana: un recurso natural en peligro. Nota Académica. *Boletín de la Academia de Ciencias Físicas, Matemáticas y Naturales LXX*, 59–75.