

Freshwater Fish Habitat Science and Management: A Global Perspective

Preface

Freshwater resources are under increasing pressure throughout the world as the human population continues to grow along with per capita water demand for a variety of uses. Increased human usage inevitably leads to degradation of freshwater habitats and negative impacts on their biota, especially their fish faunas. Freshwater fish are both an important resource and a key indicator. Freshwater fishes provide significant fishery resources for many countries supporting subsistence, commercial and recreational fisheries. The diversity, abundance and health of freshwater fish assemblages also provide highly visible indications of the health of freshwater ecosystems. The purpose of this special issue has been to gather overviews of freshwater fish habitat science and management in a globally representative set of countries. Taken together these overviews provide a sense of the common issues and priorities emerging worldwide.

The countries included in this special issue represent several qualities including size, development, fishery emphasis, and climate (Figure 1). The size of areas spans from the large with Amazonia (a partial amalgam of several countries) and India to small island countries like New Zealand and Japan. Human population densities vary from low in New Zealand and Amazonia to high in Japan and India. The fish priorities tend to spread along a fishery to recreation/conservation axis. In Greece, conservation is a high priority while in India food fishery development is a priority. In Canada, Finland and to a large extent Amazonia, food, commercial and recreational fisheries are the first priority. The climates range from arctic-temperate in Finland and Canada, through temperate-subtropical in India, Japan, and New Zealand, to tropical in Amazonia.

Across the nine papers in this special issue, there are several recurring themes:

- Habitat destruction, alteration and degradation have been extensive as human populations and activities have expanded, especially in the last half-century.
- Exotic species, invading and introduced, are a major concern, disrupting ecosystems and fisheries, and threatening native species.
- Freshwater fisheries whether for food, commerce or recreation provide a primary rationale for better ecosystem management. Further development of fisheries is still achievable without compromising ecosystem objectives.
- Freshwater fish biodiversity is facing tremendous pressures and many species are considered to be at risk. Fish species at risk are gaining more attention now, due in part to the international convention on biodiversity.
- Responsibility for freshwater fish habitat is often spread among many agencies and laws are often ineffectively enforced.
- Growing public concern for natural ecosystems has lead to greater efforts to conserve and restore freshwater ecosystems.

Freshwater fish habitat science is an emerging discipline and has begun to gain recognition and resources. In this set of papers the following knowledge gaps were identified:

- The habitat requirements of most members of each country's fish fauna are poorly known. Investments in the taxonomy, biogeography, and ecology needed to understand the fish and their linkages to habitat features have been insufficient to keep pace with the issues and questions arising.
- Ecological assessment of mitigative and compensation actions are rarely conducted, making it difficult to improve best management practices. Human development activities tend to be given the benefit of any doubt in assessments although the growing application of the precautionary principle should lead to a shift in the future.
- Larger-scale experimental studies of habitat perturbations are still the exemption although it is well known that extrapolation from small-scale studies to the real world is difficult.
- The need for larger-scale planning, e.g., watersheds, has been recognized if fishery, conservation, and multiple use objectives are to be sustainable. The science to support that scale of thinking is nascent.

A larger sampling of global diversity would have been desirable but time and space limitations prevailed. It is hoped that further assessments of freshwater fish and fish habitat science can be undertaken in the future to increase international awareness and collaboration. Given the size and diversity of freshwater science efforts in places such as the United States and the European Union, there is the potential for special issues devoted exclusively to those areas and others.

The commonalities in this set of papers provide a basis of hope for the future. There is a common recognition that much harm has been done to fish habitats often because of a mixture of ignorance and a preoccupation with socio-economic development. Public awareness and concern for fish and their habitats are increasing as efforts to generate the necessary scientific knowledge and data are being expanded. There is also the common recognition that conservation and restoration planning activities need to consider larger, whole ecosystem scales both spatially and temporally. There is the common recognition that humans are part of the ecosystems where they live, and that keeping humans healthy depends on keeping the ecosystems healthy. This is especially true for freshwaters as there is no substitute for either humans or fishes.

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List of Figures:

Figure 1. Global map showing the countries and regions covered in this review of freshwater fish habitat science and management.

