ASSESSING ANTHROPOGENIC STRESSORS TO GLOBAL FRESHWATER HABITATS AND INLAND FISHERIES

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Freshwater ecosystems are experiencing some of the most rapid and severe declines in biodiversity and habitat alteration on the planet from competing demands for water in agriculture, industry, irrigation, recreation, and human consumption. Freshwater biodiversity conservation and water resource management require replicable, adaptive, efficient, and science-based assessment tools to track rapid changes from human influences, inform management decisions, and prioritize conservation efforts. Yet, many freshwater taxa remain widely data deficient. Inland fisheries, for example, contribute to global food security and poverty alleviation for millions worldwide, yet fish harvest and biodiversity data remain largely disparate and severely deficient in many areas, which makes assessment and management difficult. Such cases with species or extraction data limitations require the creative integration of additional and proxy data sources, including habitat indicators, expert input, and machine learning. The goal of this work was to address those needs by developing a systematic, nested, replicable method to assess the distribution, intensity, and relative influence of human influences and potential threats to inland fisheries and their freshwater habitats. The results of this study contribute three advances in freshwater conservation: (1) provide a baseline assessment, which shows that nearly half of the global inland fisheries catch is under an intermediate level of threat, over one-third is moderately threatened, and nearly 10% is severely threatened; (2) composite threat indices provide a quantifiable indication of the relative level of threats to inland fisheries, useful immediately for tracking progress toward global targets for sustainability and biodiversity conservation (e.g., Sustainable Development Goals, Aichi Biodiversity Targets); and (3) tiered relative importance comparisons provide evidence and decision support for improving the efficiency of future assessments, and the approach enables a more objective narrative around the management of aquatic ecosystems.

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