# Freshwater biodiversity has positive impact on global food security

February 24 2016

Girl selling fish in the market at Stung Treng Cambodia, where a high diversity of fish species supports one of the world's greatest inland fisheries. Credit: Dr William Darwall

Inland freshwaters with a greater variety of fish species (biodiversity) have higher-yielding and less variable fisheries according to a new study from the University of Southampton and the International Union for Conservation of Nature (IUCN).

At least two billion people depend directly on inland freshwaters, such as lakes, rivers and wetlands, for the provision of food. However, despite thousands of freshwater species contributing to food security, the relationship between biodiversity and yield remains poorly understood.

Using datasets from the Food and Agriculture Organization of the United Nations (FAO) and IUCN covering 100 countries in Africa, Europe and parts of Asia, researchers from the University of Southampton have conducted the first large-scale test of the impact of freshwater biodiversity on fishery yields and the variability of yield over time.

After taking into account other factors that would be expected to have an effect on yield, such as fishing effort, the size of lakes, and temperature and precipitation, they found that those fisheries with a higher number of species are also producing higher yields. In addition, they showed that in parts of the world where there was a higher number of fish species there was also more stability in the yield year on year. Countries with the strongest relationship included Tanzania, Democratic Republic of Congo, Vietnam and Thailand.

Emma Brooks, Postgraduate Research Student in the University's Centre

for Biological Sciences and lead author of the study, said: "The results suggest that fish biodiversity may deliver benefits for human wellbeing. As such, these results provide a powerful argument for placing biodiversity conservation centrally within fisheries management, particularly in countries with the highest yielding inland fisheries as these also tend to have high freshwater biodiversity."

Dr Felix Eigenbrod, Associate Professor (Spatial Ecology) in the Centre for Biological Sciences and senior author of the study, said: "Our study demonstrates that maintaining healthy freshwater systems that support a wide variety of fish (not just those targeted for fishing) is good not only for freshwater species conservation, but is also critical for food security and livelihoods. This is especially true in developing countries where fisheries provide a major source of protein and micronutrients, are a source of income, and where they are used as a safety net in times of hardship such as when crops fail."

Beyond food security, the researchers say that understanding the degree to which biodiversity underpins freshwater fisheries has particular policy relevance because freshwater systems are of major importance for the conservation of biodiversity. Freshwater habitats are disproportionately species rich given that they cover only 0.8 per cent of the Earth's surface but contain 10 per cent of species described to date and as many as a third of all vertebrates.

Dr Will Darwall, Head of the IUCN's Freshwater Biodiversity Unit and co-author of the study, says: "Inland waters are the most threatened systems globally, with dams, water extraction, pollution and invasive species as well as overharvesting of the fisheries themselves recognised as some of the biggest threats. It is imperative that the relationships we explored should be considered within freshwater and fisheries management; the protection and conservation of species diversity in freshwater systems is a win-win outcome for human food security and

conservation efforts to preserve freshwater ecosystems."

The findings also highlight the urgent need for more data to fully understand and monitor the contribution of biodiversity to inland fisheries globally.

Emma Brooks adds: "There is a lack of data for freshwaters, including a thorough understanding of species compositions and distributions worldwide. Equally, a concentrated effort is required to increase reporting not only of inland fishery yields, but also of fishing efforts. Only by doing this will we be able to fully understand the extent of the role that biodiversity plays in underpinning inland fisheries."

**More information:** Emma Grace Elizabeth Brooks et al. Global evidence of positive impacts of freshwater biodiversity on fishery yields, *Global Ecology and Biogeography* (2016). DOI: 10.1111/geb.12435

Provided by University of Southampton