

Earth and Space

Rethinking priorities in conservation planning to tackle the biodiversity crisis

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ABSTRACT

Freshwater ecosystems are the most threatened in the world yet hardly considered in conservation planning. We show that current conservation efforts focused on terrestrial biodiversity do not guarantee protection for freshwater species. However, the solution is not far away: integrated terrestrial-freshwater conservation substantially improves freshwater protection without undermining terrestrial species



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Freshwater ecosystems cover a tiny portion of the Earth surface yet host an outstanding biodiversity. About one tenth of all known species inhabit rivers, streams, lakes, ponds, or floodplains. They are also essential to human well-being providing us with food, clean water, and leisure. Freshwater ecosystems are also the most threatened in the world, even more than terrestrial and marine equivalents. Habitat loss and degradation, over-exploitation and over-fishing, pollution, dam building, the introduction of non-native species, and climate change are among the main pressures.

Even though populations of freshwater vertebrates have plummeted more than twice the fall of terrestrial and marine vertebrates over the last 50 years, terrestrial ecosystems gain much more attention in conservation initiatives than freshwater ecosystems. That is the reason why tackling the freshwater biodiversity crisis requires urgent attention and rethinking of current conservation projects.

Biodiversity conservation initiatives are usually centered on the creation of protected areas (e.g. nature reserves, national parks), but can also involve the restoration of forests and rivers, or management

of endangered populations. An important step in putting such initiatives into practice is prioritizing territories. This is because it is unlikely, and economically impossible, to protect all lands and rivers of interest. Therefore, it is key to select a few strategic places (i.e. priority areas for conservation) where we can conserve as much biodiversity as possible. However, the selection of priority areas for conservation mostly focuses on protecting species that live on land, following the assumption that freshwater species will be protected incidentally.

The Amazon River basin is the largest and most biodiverse in the world and is under constant intensive pressure from deforestation and agriculture expansion. The study, undertaken by the Sustainable Amazon Network – a research collaboration involving scientists from Brazil, Europe, USA and Australia – looked at how well freshwater species are protected through conservation efforts that prioritize areas focusing on terrestrial species, and how freshwater protection can be improved.

In our work, we studied almost a hundred small streams, multiple plots of forest, and more than fifteen-thousand species in the Brazilian Amazon, including: fish, dragonflies, mayflies, stoneflies and caddisflies, and land species represented by plants, birds, and dung beetles. We found that land-based

conservation initiatives are likely to protect just 20% of the freshwater species that would have been protected through freshwater-focused conservation campaigns.

Next, we investigated if conservation actions, that address both freshwater and land species, can enhance freshwater protection. Through integrated planning that incorporates information on both freshwater and terrestrial species, we found that protection of freshwater species can be increased by up to 600% with no reduction in terrestrial species protection. This presents a great opportunity for conservation, where protection for one species group does not harm the others and does not cause significant funding increases.

With our work, we have proved that we cannot take the conservation of freshwater biodiversity for granted. To address the freshwater biodiversity crisis, freshwater ecosystems need to be at the center of conservation planning. Conservation strategies that think across ecosystems and habitats can provide substantially improved outcomes compared to more narrowly focused efforts. The importance of these findings spans beyond the Amazon River basin and can be used as a guide to identify priority areas elsewhere.