Policy brief

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Alleviating stress on freshwater biodiversity

Key points

- Freshwater ecosystems provide habitats for an enormous amount of biodiversity and are at the same time not sufficiently protected from human induced pressures.
- The main drivers causing changes in the EU's freshwater ecosystems and their services are the expanding modification of rivers for hydropower generation, the massive water abstraction in the Mediterranean and the fast spread of alien species. These are to some extent a result of misled or incoherent policies.
- Better policy alignment and priority setting and the involvement of regional and local stakeholders in the creation of water management plans can alleviate pressures on freshwater ecosystems and biodiversity.

"Decline of freshwater biodiversity is exceeding that of other systems mainly because human pressures on freshwater ecosystems have increased tremendously over the last century."

(Dudgeon et al., 2006)

Why freshwater biodiversity?

Freshwater ecosystems comprise rivers, lakes, ponds, other wetlands and groundwater. These ecosystems provide enormous biodiversity and essential ecosystem services. At the same time, the decline of freshwater biodiversity exceeds that of marine and terrestrial ecosystems mainly because human pressures on freshwater ecosystem have increased tremendously over the last century. In fact, 41% of all animals listed by the 2000 IUCN Red List are living in aquatic environment. This alarming figure leads to two conclusions:

- First, freshwater ecosystems have been severely neglected in recent conservation activities and suffer from detrimental developments resulting from inconsistent policy objectives.
- Second, there is a strong need for action both for policy makers, planners and other stakeholders to reverse this alarming trend and to protect freshwater biodiversity in the long-term.

Main stressors of freshwater ecosystems

Freshwater ecosystems are continuously under stress due to human induced factors. The most critical impacts can be linked to the increasing exploration of rivers and streams for the generation of hydropower, the massive abstraction of water especially in southern Europe and the almost uncontrolled spread of alien species. Additional stressors include pollution (such as pesticide loading from agriculture) and

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BioFresh

BioFresh is an EU-funded international project that runs from 2009-2014. It aims to build a global information platform for scientists and ecosystem managers with access to all available databases describing the distribution, status and trends of global freshwater biodiversity.

www.freshwaterbiodiversity.eu

@biofreshproject

Contact email:
freshwaterbiodiversity@igb-berlin.de

This policy brief was written by Timo Kaphengst and Jörg Freyhof. The views expressed are the authors' and do not necessarily reflect the view of BioFresh partners or the European Commission.

disturbances from land use changes. Global warming, shifts in precipitation and nitrogen deposition further affect freshwaters. These stressors seldom act alone, but instead often occur in parallel within a given ecosystem.

Ecological science has also unveiled that not only human induced stressors determine the biodiversity of freshwater ecosystems. In addition, a variety of natural drivers such as dispersal ability, lake area, water chemistry, nutrients level as well as regional factors (e.g. geology, history and climate) are responsible for the species richness and the structure or freshwater communities.

Research gaps and uncertainties

Although little is known about the distribution or even numbers of freshwater species, it is clear that freshwater biodiversity provides essential ecosystem services in the EU. While drivers and stressors of freshwater biodiversity and their services at local and regional level are well-known by now, there is still insufficient knowledge on how to use freshwater resources and ecosystem services in a sustainable way, taking biodiversity into account. For example, there is a lack of concepts on how to mitigate the negative effects of dams or to eradicate alien species. Moreover, limited data is available about long-term dynamics and the interplay with global pressures such as climate change. While scientists are recommended to expand their activities to more neglected ecosystems like those in the Mediterranean, globally representative datasets need to be correlated to provide a more comprehensive picture of freshwater biodiversity.

What does this all mean for policy-making?

While addressed in EU biodiversity policy, mainly through the Habitat Directive, conservation concepts and activities have mostly failed for freshwater ecosystems. At the same time, human induced pressures also driven by new policy objectives such as the expansion of hydropower as a result of targets in renewable energies have increased. It is a matter of coherence between biodiversity, water, agriculture, energy and other policies to determine whether freshwater biodiversity will be able to deliver its services in the future or not.

Therefore, policy makers have to regard freshwater biodiversity as a cross-cutting and multilevel policy issue. For the design and implementation of management plans that alleviate pressures on freshwater biodiversity, national, regional and local authorities and stakeholders have to be brought together.

Last but not least, more research and funding is needed to understand how innovative conservation concepts might mitigate and balance the needs of all actors to avoid a further loss of freshwater ecosystem services.

Source:

Stendera et al. (2012). Drivers and stressors of freshwater biodiversity patterns across different ecosystems and scales: a review. *Hydrobiologia* 696:1-28.