



## Mismatch between protected areas and freshwater biodiversity

*“Our analysis indicates that individual freshwater groups are significantly better surrogates for birds, mammals, and amphibians than vice versa.”*

William R.T. Darwall et al.

### Key points

- Conservation research and management have been focusing on species groups that are poor surrogates for patterns of both richness and threats for many freshwater groups;
- Results from Africa show the protected area network underrepresents freshwater species;
- Centres of freshwater species richness in Africa coincide with areas of high rural poverty – conservation action in these areas might maximise benefits to conservation and people's livelihoods.

### Study overview

New research conducted by members of the BioFresh consortium shows conservation planning efforts focused on birds and mammals may miss critical habitat for freshwater biodiversity. Focus on birds and mammals, as opposed to freshwater species, could miss the mark, as these better-known species might not act as surrogates for conservation purposes. While coarse-scale analysis shows that important freshwater and terrestrial species habitat generally overlaps, analysis at finer scales shows there is less overlap than previously thought. Analysis of new data from the African continent shows the protected areas network does not adequately cover freshwater species biodiversity to the same extent as terrestrial species. These findings have implications for planning as relates to development projects (e.g. dams) and designation of new protected areas, as well as setting targets to halt the loss of biodiversity and meet the goals of the Millennium Ecosystem Assessment.

### Why protect freshwater biodiversity?

Species living in freshwaters contribute to vital ecosystem services, ranging from food and energy to water purification and recreation. While freshwater ecosystems cover less than one percent of the Earth, they host more than ten percent of all known species. At the same time, freshwaters are threatened globally. Given the disproportionate amount of global biodiversity found in freshwater ecosystems, targeted protection of freshwater biodiversity is critical to meet objectives as agreed in



This policy brief summarises the findings of the paper: *“Implications of bias in conservation research and investment for freshwater species”* by William R.T. Darwall et al. in the journal *Conservation Letters* 4: 474-482, 2011.

## 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.

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the Convention on Biological Diversity (CBD). In particular, Target 11 of the CBD aims to ensure that “... at least 17 percent of terrestrial and inland water areas, ... are conserved through effectively and equitably managed, ecologically representative and well connected systems of PAs [protected areas] and other effective area-based conservation measures, and integrated into the wider landscapes ...” and Target 12 requires that by 2020 ... the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.”

## Lessons from the African case study

The study examined range maps for 4,203 freshwater species and previously available maps for 3,521 bird, mammal and amphibian species across the African continent according to river catchments. The new data on freshwater species included all known species of fish, crabs, molluscs, dragonflies and damselflies. These range maps were overlaid with the African protected areas network as identified by The World Database on Protected Areas in 2010, maps of infant mortality rates in the year 2000 from the United Nations Food and Agriculture Organization (UN FAO), and a database of proposed dams from International Rivers from 2010. Key lessons from this analysis are:

- (1) Groups that have been the focus of most conservation research in the past are poor surrogates for patterns of both richness and threat for many freshwater groups, such that the existing protected areas network underrepresents freshwater species;
- (2) Areas of highest species richness and threat are congruent with areas where reliance on ecosystem services by humans and pressures placed on freshwater ecosystems are high;
- (3) Given the scale of planned development of water resources across Africa, the rewards from intervention at this relatively early stage are potentially huge and could represent an opportunity for Africa to avoid significant economic costs of eventual restoration of inland waters incurred in many other parts of the world.

## Multi-scale freshwater conservation planning

Two key questions identified by the BioFresh consortium are: (1) How do we assess, map and value freshwater-related ecosystem services? and (2) How do we incorporate freshwater species conservation planning into integrated catchment and water management? This river sub-catchment-scale analysis conducted for Africa shows that assessing, mapping and valuing freshwater species requires empirical data about freshwater species specifically, rather than relying on birds and mammals to act as surrogates for conservation planning purposes. Furthermore, multi-scale conservation planning is essential when considering new development projects, e.g. dams, to ensure species richness and diversity is not sacrificed at the expense of short-sighted water management.

**Source:** Darwall, W. R. T., Holland, R. A., Smith, K. G., Allen, D., Brooks, E. G. E., Katarya, V., Pollock, C. M., Shi, Y., Clausnitzer, V., Cumberlidge, N., Cattelod, A., Dijkstra, K.-D. B., Diop, M. D., Garcia, N., Seddon, M. B., Skelton, P. H., Snoeks, J., Tweddle, D. and Vié, J.-C. (2011), *Implications of bias in conservation research and investment for freshwater species. Conservation Letters*, 4: 474–482. doi: 10.1111/j.1755-263X.2011.00202.x