**CORRESPONDENCE**

# Put freshwater megafauna on the table before they are eaten to extinction

Megafauna species are intrinsically susceptible to threats owing to their large body size, complex habitat requirements, and late maturity. They are particularly vulnerable to over-exploitation due to human fascination on large-bodied animals (Ripple et al., 2019). Ripple et al. (2019) suggest that we are eating megafauna to extinction in marine, freshwater, and terrestrial ecosystems. We agree with their conclusion but would like to raise the issue that freshwater megafauna are largely underrepresented in their study, as well as in megafauna research during the last few decades (He et al., 2017).

Ripple et al. (2019) define megafauna as all mammals and fishes  $\geq 100$  kg and amphibians, birds, and reptiles  $\geq 40$  kg. At least, 100 extant freshwater megafauna species (i.e., not including subspecies recently suggested as distinct species) would fall under this definition (Table S1). However, 39 (39%) of them are not included in their study. The proportion of unconsidered megafauna species in freshwaters is much higher than those in terrestrial (6%; five out of 83 species; Table S2) or marine (11%; 25 out of 218 species; Table S3) ecosystems. Two factors could have contributed to the underrepresentation of freshwater megafauna: (1) Many megafauna species in freshwaters are poorly studied. Information on their maximum body mass remains unreported, particularly for mega-fishes and mega-reptiles inhabiting the Global South. (2) Even if such data have been reported, they are not integrated in well-known databases that have been used by Ripple et al. (2019).

Ripple et al. (2019) have pointed out that despite being listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) appendices, freshwater megafauna are often illegally harvested for their eggs, meat, and skin. Meanwhile, they are also subject to intense and increasing threats including habitat degra-

ation, dam construction, pollution, and biological invasion (He et al., 2018). However, current conservation actions do not reflect these conditions. For example, the International Union for Conservation of Nature (IUCN) Red List of Threatened Species assessments for 60% of all freshwater megafauna species are either insufficient (i.e., listed as Data Deficient or Not Evaluated) or outdated (i.e., assessments conducted before 2010; IUCN, 2019). In addition, their distribution ranges are poorly covered by protected areas (Carrizo et al., 2017). Consequently, 24% of them have been pushed to the edge of extinction (i.e., listed as Critically Endangered; IUCN, 2019). To halt the current trajectory of megafauna loss in freshwaters, comprehensive conservation and broader management approaches are necessary; initially these must be based on research focusing on their life histories and monitoring of their population abundance and distribution range.

The current situation of freshwater megafauna, being highly threatened but overlooked in research and conservation actions, reflects an urgent but poorly recognized need: the conservation for freshwater biodiversity. Putting the unnoticed plight of freshwater megafauna on the table, for example, through enhanced science communication, will inform the general public and policymakers about the biodiversity crisis in freshwaters. Eventually, decision making will need to explicitly consider conservation for freshwater biodiversity.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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