A Gap Analysis for South America's Threatened and Endangered Freshwater Species

R. Ayllon, M.L. Thieme, and R. Abell, WWF

Freshwater systems and their species face increasing levels of threat and pressure across the globe. For example, one recent study finds that North America's freshwater systems are losing species at rates comparable to those of tropical forests[1]. Within parts of the developing world, most freshwater species remain poorly documented, making comprehensive analyses of gaps in protection challenging. However, the recent compilation of relatively comprehensive global data sets on amphibians, mammals, and birds permits a coarse gap analysis of these taxonomic groups, which contain a number of freshwater-dependent species[2] [3] [4]. We used these data to evaluate how much coverage South America's protected area system is providing to this subset of Red Listed freshwater species of that region, as a test of what might be possible globally as well as at the country level. This in itself is a coarse estimate, since overlap of protected areas and species does not allow for evaluation of the adequacy of protected area design as it relates to threats to freshwater ecosystems.

Using a Geographic Information System (GIS), we overlaid protected areas (IUCN categories I through VI) from the 2005 World Database of Protected Areas with distribution maps of Vulnerable, Endangered, and Critically Endangered freshwater birds (N=12), mammals (N=11), and amphibians (N=330) from the IUCN Red List. Freshwater species were identified by selecting for that biome in the Red List database. Distribution data were obtained from the Global Amphibian Assessment and from a CD of digital distribution maps of birds and mammals of the Western Hemisphere[5]. We then calculated the percentage of each species' distribution that was covered by protected areas. Additionally, we considered a species that had a majority of its range within one country (>75 per cent) to be endemic to that country, and we calculated the percentage of each country's endemic and threatened freshwater birds, mammals, and amphibians that occurred in protected areas.

Over three-quarters of the Red-listed freshwater bird, mammal, and amphibian species in South America (N=280) have 50 per cent or less of their range covered by protected areas. About one-third (N=130) of the species receive no protection at all and 70 species have more than 50 per cent of their range covered by protected areas (20 species have 100 per cent of their range covered by protected areas). Across South America, birds receive the least amount of protection, and on average all taxa are afforded less than 30 per cent coverage (Figure 1). The standard deviation for each taxonomic group is high, indicating significant variability among species within each. Across countries, there is also a high level of variability in the protected area coverage afforded to country-level endemics. At the lowest end of the spectrum, seven of the countries provide, on average, less than 20 per cent protected area coverage for their endemic species (Figure 2).

It is important to note that the IUCN Red List is by no means comprehensive in terms of its coverage of freshwater species, particularly in places where the freshwater fauna is still poorly known. While this methodology highlights gaps in coverage for some of the most threatened freshwater species within the best-studied groups, it is not intended to represent the full range of freshwater biodiversity or to assess the quality of protection provided by these protected areas. Thus, species that are not threatened and the most numerous freshwater groups (e.g., fish, aquatic plants, and invertebrates), are not covered by this gap analysis and for that reason a habitat classification may be the better option to capture those taxa and to complement this type of analysis (see page ##). However, the results do allow an

initial evaluation of how well the protected area system within individual countries is capturing Red-Listed freshwater bird, mammal, and amphibian species and highlights countries that may need to redouble their efforts in order to protect the most vulnerable and irreplaceable species within the taxonomic groups analyzed.

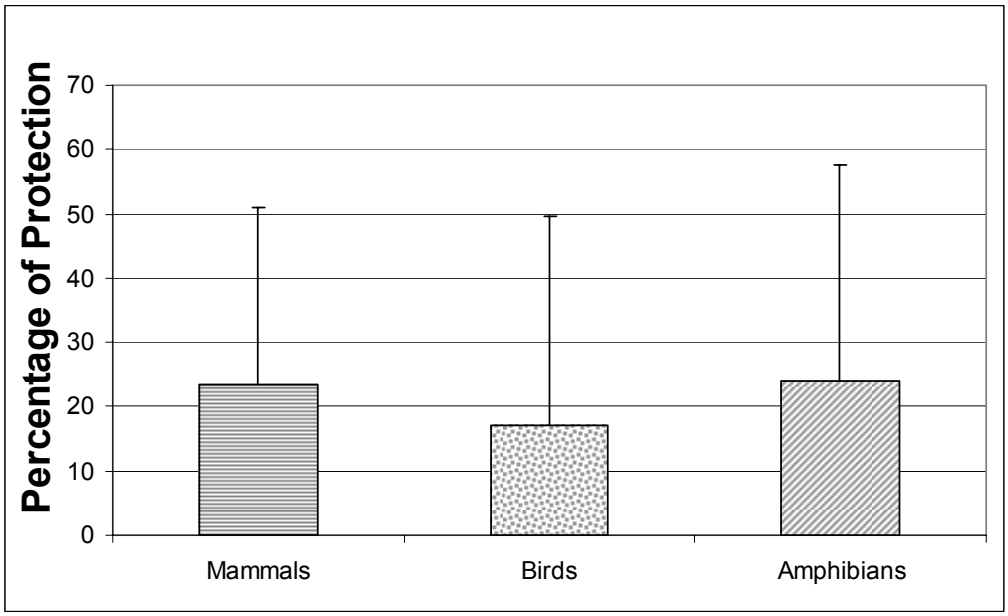

Figure 1: Average percentage and standard deviation of protection by taxa for Red-listed freshwater species

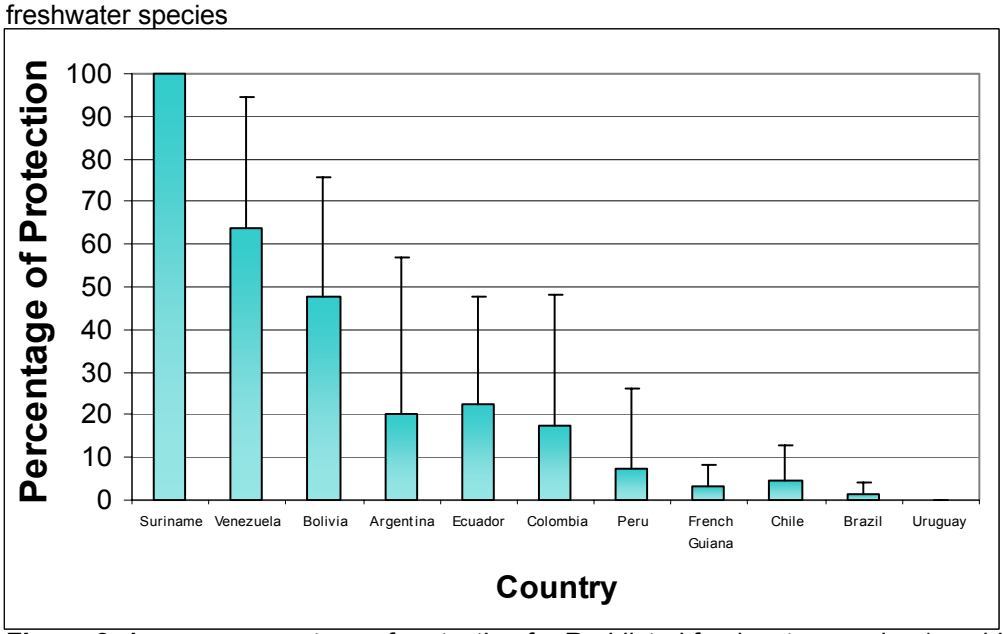

Figure 2: Average percentage of protection for Red-listed freshwater species (amphibians, birds and mammals) by country (standard deviation and number of species (N) also shown)

References

[1] Ricciardi, A and J B Rasmussen (1999); Extinction rates of North American freshwater fauna, *Conservation Biology* **13**(5):1220-1222

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[3] Patterson, B D, G Ceballos, W Sechrest, M F Tognelli, T Brooks, L Luna, P Ortega, I Salazar, and B E Young (2003); *Digital distribution maps of the mammals of the Western Hemisphere*, Version 1.0. NatureServe, Arlington, VA

[4] Ridgely, R S, T F Allnutt, T Brooks, D K McNicol, D W Mehlman, B E Young, and J R Zook (2003); *Digital Distribution Maps of the Birds of the Western Hemisphere*, version 1.0. NatureServe, Arlington, Virginia, USA

[5] Patterson *et al.* (2003); op cit; Ridgley *et al.* 2003 op cit