Six Guiding principles for Gap Analysis

Whatever the precise details of methodology used, gap analyses should be driven by a series of scientific, social and political principles.

1. **Representation**: ***Choose focal biodiversity across biological scales (species and ecosystems) and biological realms (terrestrial, freshwater, and marine) for use in the gap analysis to capture the full array of biodiversity in the protected area system***. The goal of full representation, as identified in the *Programme of Work*, is to have representative samples of all species and ecosystems within the protected area network, at a sufficient scale to ensure their long term persistence. This principle is at the core of the commitments within the Convention on Biological Diversity, Protected areas can only ever cover a small part of the whole; the key to a successful gap analysis is to identify shortfall in protection and thus to help to ensure that protected areas are located in the optimal places to capture as much sensitive biodiversity in need of protection as possible.

2. **Redundancy**: ***include sufficient examples of species and ecosystems within a protected area network to capture genetic variation and protect against unexpected losses***. All species and ecosystems remain under varying degrees of threat as a result of direct human pressures and/or natural stochastic events. A strong protected area network will therefore include additional sites to provide, wherever possible, some measure of insurance against losses elsewhere[1]. Furthermore, biodiversity elements exhibit genetic or compositional variation that ensures evolutionary potential and is necessary for conserving those species in the long-term. This variation *within* a single species or ecosystem needs to be captured through conservation where applicable of more than one occurrence of that biodiversity element. These occurrences should ideally be selected across the ecological distribution of the species or ecosystem to ensure capture of that genetic and compositional variation. In places where the ecosystem is already degraded, protected area networks need to include space for restoration and therefore be established in places that are currently of low conservation value, but where there is a realistic chance of such values being regained through the passive effects of time or more active management interventions[2].

3. **Resilience**: ***design protected area systems to withstand stresses and changes***. Resilience involves maintaining or recreating viable ecosystems by enlarging or connecting protected areas. Small protected areas surrounded by radically altered habitat are often of limited value. Recognition of this has created increased interest in protected areas as *networks*, with core areas joined by sympathetically-managed land and water providing routes or stopping off places for migratory species, buffering of protected areas against outside pressures and an opportunity for resident species to interbreed with more distant populations. Gap analysis and protected area planning are aimed as much as possible at a holistic system of protection, where necessary crossing national boundaries. This is particularly critical when designing protected areas for aquatic biodiversity. The need for resilience is increased because major climate changes now seem almost inevitable and will have serious impacts on terrestrial[3] and marine[4] protected areas. Additionally, the effects of climate change on agricultural landscapes means that protected areas will be under increased human pressure and may require active intervention. Ecological systems and species will shift with changing climates and therefore foresight and planning for networks

will be required to allow this movement over time. In some cases boundaries may have to be extended, for instance to include a broader range of landscape gradients, or new protected areas established[5].

4. **Different types of gaps**: ***analyse representation gaps, ecological gaps and management gaps in the analysis***. Different types of gaps affect protected areas, and all should be considered to strengthen a protected area system and close the ecological gaps that remain within it. *Representation gaps* refer to species, ecosystems and ecological processes that are missed entirely by the protected area system; Ecological gaps relate to biodiversity that exists within protected areas but with insufficient quality or quantity to provide long term protection; while management gaps refer to situations where protected areas exist but are failing to provide adequate protection either because they have the wrong management objectives or because they are managed poorly. All three of these gaps need to be considered by the analysis to strengthen the protected area system.

5. **A participatory approach**: ***collaborate with key stakeholders in making decisions about protected areas***. The CBD *Programme of Work* emphasises the need for participation in selecting protected areas, in particular by communities, including indigenous and traditional peoples, directly affected by protected area creation and has agreed that: "any resettlement of indigenous communities as a consequence of the establishment or management of protected areas will only take place with their prior informed consent that may be given according to national legislation and applicable international obligations"[6]. On the other hand, Article 6 of Convention (169) of the International Labour Organization, concerning Indigenous and Tribal Peoples in Independent Countries, emphasizes that Governments shall "(a) Consult the peoples concerned, through appropriate procedures and in particular through their representative institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly"[7]. Such stipulations pose added challenges to protected area agencies. Trade offs between social, economic and environmental quantities and qualities are often essential at the level of the landscape / seascape and are acceptable if overall values are maintained within the broader area. This means that the pure science of identifying the best sites for protected areas will need to be integrated into the political reality of what is possible, what can be achieved quickly and what opportunities exist. While the whole point of a gap analysis is to bring science to the fore in conservation decision-making, final decisions are not only made through science and scientists will be working in partnership with many other stakeholders in designing the protected area network.

6. **An iterative process**: ***review and improve the gap analysis as knowledge grows and environmental conditions change***. While the CBD is promoting a gap analysis as a single exercise, to be completed against a short time-scale, in many cases all the information necessary to make informed choices will simply not be available by that deadline; some countries still have many years of research to undertake before have anything like a comprehensive picture of their biological diversity. The gap analysis should therefore not be seen as a once and only exercise but as an hypothesis that provides a series of maps and guidelines that may have to be revised and improved as time passes and we learn more.

References

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[4] Soto, C (2002); The potential impacts of global climate change on marine protected areas, *Reviews in Fish Biology and Fisheries* **11:** 181–195
[5] Hansen, L J, J L Biringer and J R Hoffman (2003); Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems, WWF, Washington DC
[6] Programme of Work on Protected Areas of the CBD (2004); paragraph 2.2.5
[7] International Labour Organization, Convention 169, Article 6.1 (a).