Perspectives in Ecology and Conservation 21 (2023) 263–264

ABECO ASSOCIAÇÃO BRASILEIRA DE CIÊNCIA ECOLÓGICA E CONSERVAÇÃO

Perspectives in ecology and conservation

Supported by Instituto Tecnológico Vale and CEPAN

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Key Biodiversity Areas are proving useful for spatial planning if the criteria are applied correctly

Key Biodiversity Area (KBAs) are sites of significance for the global persistence of biodiversity, identified nationally using criteria and thresholds developed through extensive consultation and testing (IUCN, 2016). KBAs currently cover 8.01% of the terrestrial and 2.49% of the marine surface of the earth, but Farooq et al. (2023) predicted that comprehensive application of the criteria would lead to a blanket coverage of KBAs across the world. Their analysis employed rasterised terrestrial species' range data from the IUCN Red List of Threatened species for 64,110 species to identify grid cells that could potentially qualify as KBAs based on the occurrence of one or more species, using the thresholds under KBA criterion A1 (threatened species), and B1 (geographically restricted species). Unfortunately, their analysis has several shortcomings that mean that their conclusion is not warranted.

Firstly, while Farooq et al. (2023) correctly note that their results are highly sensitive to spatial scale, the smallest cells they used (625 km^2) are 4.7 times larger than the median size of existing terrestrial KBAs (133.3 km^2) and the largest cells (10,000 km^2) are 75.2 times larger. Given that larger areas are more likely to contain a larger proportion of the population of a species, and therefore exceed the relevant KBA criterion thresholds, it is unsurprising that the authors found that a large percentage of the world (between 26 and 68% of cells) might qualify as KBAs under this approach.

Secondly, KBAs are not grid cells, but sites with delineated boundaries. The KBA Standard (IUCN, 2016) and KBA Guidelines (KBA Standards and Appeals Committee, 2022) are clear that KBA '*delineation is not complete until boundary refinement has been considered to yield a manageable site*'. Few of the grid cells identified as potential KBAs by Farooq et al. would qualify in their entirety as a single manageable unit, while individual sites within these cells are much less likely to meet the relevant thresholds to qualify as a KBA. Manageability therefore typically constrains the size of KBAs. This does not render KBA identification un-objective or irreproducible. Rather it applies both natural science (species/ecosystem that trigger KBA status) and social science (delineation of boundaries based on grain and configuration of land use) into real-world practical application. The fact that most KBAs are far smaller than the grid cells used by Farooq et al. does not imply that assessors apply "*stricter KBA criteria in terms of an upper limit and the number of triggering species*". Rather, they are applying the criteria as defined, including consideration of manageability.

Identifying KBAs as manageable sites builds on four decades of experience in identifying Important Bird and Biodiversity Areas in virtually all countries worldwide (Donald et al., 2019), as well as considerable experience in identifying Important Plant Areas (Smith and Smith, 2004; Darbyshire et al., 2017), Alliance for Zero Extinction sites (Ricketts et al., 2005), and similar approaches. These have all proven useful in informing spatial and conservation planning, and have not generated networks that cover so much land as to be unhelpful for setting priorities.

Thirdly, the authors applied only one component of the relevant KBA criteria, despite stating incorrectly that they identified cells that '*fulfill the biological criteria for being designated a KBA*'. Sites only qualify as KBAs under criterion A1 and B1 if the presence of the relevant species are confirmed (with recent in situ data) *and* if they contain a minimum specified number of reproductive units. Farooq et al. did not consider confirmed occurrence or reproductive units, simply overlaps with range maps. Many of the cells they identified as potential KBAs would not meet these requirements, because many species are absent from parts of their range owing to fine-scale habitat requirements or as a consequence of exploitation, invasive species, pollution, or other threats.

Perhaps the strongest evidence that disproves their findings comes from practitioners who have applied the KBA criteria in the field. Both Mozambique and South Africa recently made comprehensive national KBA assessments using data on multiple taxonomic groups. These two countries have high levels of species richness and endemism yet neither has resulted in blanket coverage of the land with KBAs, despite the predictions by Farooq et al. (2023).

Mozambique's national KBA analysis included seven taxonomic groups: amphibians, birds, freshwater and marine fish, butterflies, marine and terrestrial mammals, plants and reptiles. These species were assessed under KBA criteria A, B and D, and at an initial stage identified 44 potential KBAs based on range, point locality and population size data. The analysis followed the KBA guidelines fully, screening these potential sites using recent data to account for the number of reproductive units of each trigger species, and engaging with experts and stakeholders to delineate the site boundaries. The final Mozambique KBA assessment resulted in 29 KBAs for 180 trigger species, covering 17% of the land and 1% of the sea.

South Africa's KBA assessment included species data from comprehensive national assessments of eight taxonomic groups: amphibians, birds, butterflies, dragonflies, freshwater fish, mammals, plants, and reptiles. From these, 6,539 potential trigger species were identified. The South African assessment applied all five KBA criteria (A-E). An initial scoping, similar to Farooq et al. (2023), but using a 10 × 10 km grid, identified 41% of the terrestrial area of the country as potentially containing KBAs. After confirming presence and minimum reproductive units of trigger species, as well as accounting for manageability, the final network of sites covers 30% of the area of this country.

Scoping of KBAs, as used in both these assessments, was useful for identifying general patterns where KBAs might be identified.

https://doi.org/10.1016/j.pecon.2023.07.001

Scoping is also useful when applied to specific sites to identify species that might potentially trigger KBA status for further investigation. A scoping tool has been developed by the Key Biodiversity Area Secretariat that is currently being tested for its accuracy. However, it is only the first step in the process of identifying KBAs.

The criteria for identifying KBAs are clearly outlined in the KBA Standard (IUCN, 2016) and KBA Guidelines (KBA Standards and Appeals Committee, 2022). By failing to apply all of the components of the criteria, it is unsurprising that Farooq et al. generated results that are not meaningful. We remain confident that KBAs provide a useful tool to identify sites of significance for biodiversity, which can be incorporated by governments, NGOs, academia, businesses, and others into planning and policies to halt and reverse the loss of biodiversity (Dudley et al., 2014).

Funding

We could acknowledge the KBA Partnership as funders: The KBA Partnership contributed to the salaries of the lead author and one co-author in writing this article.

Declaration of interests

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests.

Andy Plumptre and Daniele Baisero are employed by the KBA Partnership to lead the KBA Programme.

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Available online6 September 2023