

Improving the Key Biodiversity Areas Approach for Effective Conservation Planning

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The key biodiversity areas (KBA) approach aims to identify globally important areas for species conservation. Although a similar methodology has been used successfully to identify Important Bird Areas, we have identified five limitations that may apply when considering other taxa: The KBA approach is overly prescriptive in identifying important conservation features, is inflexible when dealing with landscape connectivity, creates errors by applying global criteria without input from local experts, relies on post hoc consideration of implementation opportunities and constraints, and fails to automatically involve implementation agencies in the assessment process. We suggest three modifications to the present approach: (1) Provide training in regional conservation planning for local stakeholders, (2) expand the Alliance for Zero Extinction program to include a broader range of threatened species, and (3) allow local stakeholders to nominate KBAs on the basis of their own regional conservation assessments. These modifications would build on the expertise of those promoting the KBA approach and help maintain the diversity of methods that are needed to conserve biodiversity effectively.

Keywords: systematic conservation assessment, area selection, conservation planning, global priority areas

Unaturally high rates of habitat loss and species extinction have plunged the world into an environmental crisis. Because the resources allocated to stemming this global problem are woefully inadequate (Balmford and Whitten 2003), national and international groups have developed a range of regional- and local-scale conservation assessment approaches—that is, priority-area selection methods—to facilitate the effective deployment of limited resources. These approaches (i.e., operational models), which are remarkably similar (Redford et al. 2003, Knight et al. 2006a), represent an as yet unstated consensus on best

practice in conservation planning. However, recent improvements in databases on global species distribution and land-use pressures have encouraged the development of global-scale assessments that identify priority areas at the local scale. Notably, the key biodiversity areas (KBA) approach (Eken et al. 2004) has recently been advocated as a rapid assessment methodology for identifying local-scale priority conservation areas based solely on global-scale data.

Championed at major conservation events around the world, the KBA approach now has a high international profile, which may have contributed to the impression that

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it provides a complete, packaged conservation planning solution, despite its originators' caution that it should be complemented with regional-scale programs (Eken et al. 2004). We believe that the KBA approach has significant technical limitations that render it unable to identify the most globally important areas for conservation action with a high degree of certainty, and that these limitations need to be addressed before the KBA approach is widely adopted. In this article, we identify five major limitations of the KBA approach and suggest three practical modifications to enhance its effectiveness. Our intention is to initiate a more active dialogue on how the KBA approach can be improved, thereby helping promote a globally integrated approach to effective conservation planning, founded on a nested suite of conservation assessments at global, regional, and, where appropriate, local scales.

We distinguish between conservation assessment and conservation planning. Conservation assessment is a short-term activity for identifying spatially explicit priority areas for conservation action (i.e., priority-area selection). Conservation planning is a long-term process that complements a conservation assessment with a process for collaboratively developing an implementation strategy with relevant stakeholders, who are then better positioned to deliver conservation action (Knight et al. 2006a). We use the term "area" to refer to a local-scale site, and "target" to refer to the amount (i.e., extent or number) of a valued natural feature that serves as a quantified conservation goal.

Key biodiversity areas in context

The KBA program aims to identify areas that contain viable and globally important populations of key species. These sites are defined using four criteria. The first is based on the presence of species classified as vulnerable, endangered, or critically endangered by the IUCN Red List. The second and third criteria identify areas occupied by range-restricted and biome-restricted species, respectively, while the fourth criterion identifies areas, such as roosting or breeding sites, that contain large congregations of individuals of a species as part of their life histories (Eken et al. 2004). Many of these criteria involve applying global thresholds that have yet to be finalized for every taxon, but previous analyses based on bird data have provided definitions for range- and biome-restricted species and for identifying globally significant populations. For example, research from Turkey has suggested that biome-specific KBAs should be areas in which more than 25 percent of the bird species found there are globally confined to a given terrestrial biome (Kılıç and Eken 2004), and global research has defined range-restricted species as those with a range of 50,000 km or less (Stattersfield et al. 1998).

The KBA approach aims to identify globally important areas where key species are (a) vulnerable, based on the Red List criterion, and (b) irreplaceable, based on criteria 2, 3, and 4. However, this approach is not suitable for all species. Many species cannot be conserved through area-based conservation alone, and the long-term persistence of KBAs depends also on

implementing regional-scale conservation plans (Eken et al. 2004). Accordingly, the KBA approach should be complemented with regional-scale conservation assessments. Systematic conservation assessments should involve local stakeholders, be target driven, and apply the principles of efficiency (through complementarity), representativeness, retention, and persistence to identify the areas needed to ensure that valued conservation features are preserved in the long term (Margules and Pressey 2000). Systematic conservation assessments should also be set within the context of a broader conservation planning operational model, plan explicitly for the implementation of conservation action, and specifically design products for implementers, so as to ensure their effectiveness (Knight et al. 2006a, 2006b). Interestingly, the KBA approach is similar to the expert mapping exercises that are often used to contribute data to regional conservation assessments (Noss et al. 2002, Rouget et al. 2006), although regional assessments set targets to conserve a region's associated species instead of using thresholds to identify priority areas.

Limitations of the key biodiversity areas methodology

Although proponents of the KBA approach strongly advocate its use, much of its methodology has yet to be finalized and validated. Many of the claims about KBAs are based on the declared success of BirdLife International's Important Bird Areas (IBA) program, as the KBA approach extends the IBA approach to other species (Eken et al. 2004). Unfortunately, the essential characteristics that have defined successful IBA program interventions—extensive data sets, large numbers of highly knowledgeable local experts, significant funding from private individuals, and strong support from local partners and institutions—are generally lacking in regions where the KBA approach could be most usefully applied. Staff in government and other implementing organizations, especially those in developing countries where many KBAs will be located, are probably unaware of the technical limitations of the KBA approach. It is therefore critically important that these limitations be discussed and addressed so that potential implementers can make well-informed decisions on their choice of approach before committing their limited resources.

A prescriptive approach to identifying important conservation features. The majority of KBAs will be identified using lists of species that have been developed centrally by the KBA program. This sole focus on species is at least partly based on the assumption that species are more "real" than ecosystems or other land classes (Brooks et al. 2004). However, the species concept is as much a human construct as the concept of an ecosystem. No agreed definition exists on what exactly constitutes a species (Fitzhugh 2005)—more than 20 species concepts are currently recognized (Mayden 1997). Furthermore, these differences in definition significantly affect the spatial location and extent of priority conservation areas (Peterson and Navarro-Sigüenza 1999). In addition, species data sets are

at least as spatially and temporally flawed and biased as other types of information (Freitag et al. 1998), leading many conservation planners to declare that best-practice conservation assessments should identify irreplaceable sites on the basis of environmental surrogates, such as habitats, complemented with a range of other data, including reliable information on species distribution where available (Noss 1987, Scott and Csuti 1997, Noss et al. 2002, Lombard et al. 2003, Cowling et al. 2004, Higgins et al. 2004, Knight et al. 2006b).

An inflexible approach to dealing with landscape connectivity. The KBA methodology fails to consider how important areas will help maintain ecological persistence within a conservation landscape. Thus, isolated areas containing a focal species will be given KBA status as long as their population size is larger than a particular threshold, whereas areas that are important for connectivity and contain smaller, but still viable, populations of the same species will be ignored. Instead, a “planning for persistence” approach is needed to identify important areas (Cowling 1999), and this typically includes mapping and setting targets for both keystone species (Pressey et al. 2003) and spatial surrogates for environmental processes (e.g., Moritz and Faith 1998, Rouget et al. 2003). This is best undertaken at the regional scale across planning regions identified using environmental criteria, as these facilitate the inclusion of ecological and evolutionary processes, rangewide distribution factors, and population dynamics. Planning for persistence is essential to supporting the environmental processes (e.g., source–sink population dynamics, ecological succession, speciation and evolutionary processes) that maintain the pattern of biodiversity and to minimizing the impacts of climate change (Rouget et al. 2003).

Making errors by applying global criteria without local expert input. It is vitally important to identify those species that are most at risk of extinction. However, identifying local-scale areas for conserving these species using global-scale data sets has the potential to produce significant errors of omission and commission. This is because global-scale analyses may lack the resolution to accurately assess the conservation value of a species in a portion of its range at regional or local scales (Gärdenfors et al. 2001). Thus, the KBA methodology may give inappropriately high priority to areas containing globally threatened species, or range-restricted or biome-restricted species, that are locally or regionally secure. Likewise, it may underprioritize the importance of sites that contain species that are regionally secure but locally threatened (Wilson et al. 2005).

This reliance on a “top-down” approach limits the provision of more accurate local- and regional-scale data by key stakeholders, and is likely to prevent a sense of ownership and commitment to the priority-setting results—a key ingredient for securing effective conservation action on the ground (Knight et al. 2006b). Instead, it is preferable to give local stakeholders greater control over selecting valued conservation features. This would allow them to (a) avoid over-

prioritizing species that are locally secure or only appear to be threatened (or range or biome restricted) because of incomplete data, (b) include keystone, flagship, or economically valued species that are not identified as globally important by the KBA program, and (c) design the spatial configuration (i.e., size, shape, connectivity, and context) of areas to better address issues of ecological persistence.

A post hoc consideration of implementation issues. Conservation assessment results can be significantly affected by the inclusion of data on implementation opportunities and constraints. This has been demonstrated using socioeconomic data on land acquisition and implementation costs (Ando et al. 1998, Polasky et al. 2001, Pence et al. 2003, Wilson et al. 2006), but broader information on land-use pressures, ecosystem services, and landowner willingness to participate in conservation activities is also likely to affect results (Winter et al. 2005). Moreover, successful planning exercises should be guided by a model of landscape management that represents a regional-scale community vision for achieving conservation and sustainable development goals (Lochner et al. 2003, Knight et al. 2006a), such as conservation corridors (Sanderson et al. 2003, Rouget et al. 2006). Such a model should mirror the characteristics of the planning region in identifying the root causes of environmental decline, the formulation of an optimal suite of conservation instruments (e.g., protected areas, legislation, incentives), and the relevant institutions necessary for effectively implementing conservation (Young et al. 1996). A conservation assessment guided by a landscape management model, and complemented by an implementation strategy, better ensures an effective conservation planning initiative (Knight et al. 2006a, 2006b).

Ineffective involvement of implementation agencies. Local stakeholders are the best sources of information on conservation opportunities, constraints, and costs, and acquiring that information from them promotes the inclusion of relevant implementation organizations (Cowling et al. 2004). However, this process should be one of a suite of explicit mechanisms for stakeholder collaboration (Lochner et al. 2003, Knight et al. 2006b). In contrast, the identification of KBAs is based entirely on a limited set of biological data, and implementation agencies are approached only after areas have been selected. The successful implementation of some IBAs shows that a post hoc approach to implementation can be effective, but this success is most likely the result of existing strong local-scale support for bird conservation coupled with strong international financial support, a combination lacking for many other taxa in most regions of the world. The KBA approach is not unusual in failing to include stakeholders as an explicit part of an operational model for conservation planning (i.e., an explicit, reviewable planning approach). Many other operational models also predominantly focus on the technical tasks of conservation assessment (Knight et al. 2006a), which increases the likelihood of their efforts being ignored by implementation agencies.

Discussion and recommendations

The KBA program aims to “provide the universe of sites significant for conservation, to which complementarity-based methods for reserve selection can then applied” (Eken et al. 2004). We are certain that many of these sites will have high conservation value, but we also think it likely that many KBAs would not be identified as priorities in subsequent regional-scale conservation assessments. This is because the KBA methodology fails to include data on a range of important conservation features and implementation issues, and does not explicitly incorporate local knowledge. In short, the KBA approach promotes an overly simple answer to a very difficult question. Moreover, the effectiveness of the KBA program may be further hampered by a lack of local stakeholder involvement in the process, which risks initiating conservation programs that are donor driven and unsustainable.

Nonetheless, it could be argued that identifying some incorrect sites is a price worth paying, given that many species are threatened with extinction and action is needed now. However, the IUCN Red List shows that a number of range-restricted, biome-restricted, and congregating species in assessed taxa are not thought to be at risk of extinction. For example, 44.8 percent of the mammal species that have had their ranges mapped and would be defined as being range restricted are not threatened (table 1). (This calculation excludes data on the 1446 mammal species with unknown range sizes.) The KBA criterion for range-restricted species assumes that species with a geographic range of 50,000 km² or less are of conservation importance, and range size is considered a useful threat surrogate for taxa that have not been assessed by the Red List. These results, however, show that the KBA approach will overvalue the conservation importance of many species. Thus, it seems unwise to use a “quick and dirty” methodology to identify areas for these species, especially when there may be alternative areas that also incorporate other important natural features, address spatial configuration issues affecting ecological persistence, and have stronger stakeholder support for implementation.

However, advocates of the KBA approach have a wealth of conservation expertise and a proven record of implementing conservation projects on the ground (Eken et al. 2004,

Bennun et al. 2005), and we believe it is important for the KBA program to continue to harness this experience and knowledge. Moreover, the KBA approach is up and running, and we also believe it would be better to adapt the current system than to initiate a new program. We suggest that past success with the KBA approach could be replicated more broadly by modifying the program in the following ways.

Provide training in regional-scale conservation planning for stakeholders.

Most of the KBA limitations that we have identified clearly point to the importance of establishing conservation planning capacity in priority regions. Time and expertise are available to train people in the techniques of regional conservation assessments (Smith et al. 2006), to put processes in place that effectively mainstream these techniques into existing implementing organizations, and to build the formal and informal institutions essential for effective implementation. This training should address both long-term academic processes (e.g., doctoral studies) and ongoing internal capacity building within implementing organizations (e.g., government departments, nongovernmental organizations). South Africa is an excellent example of a country that only recently embraced regional conservation planning through close collaborations with Australian researchers, but which is now considered a world leader in the field (Balmford 2003), having adopted the approach as a mainstay of formal conservation activities (Driver et al. 2004) and identified guidelines for best practice (e.g., Knight et al. 2006b).

Expand the Alliance for Zero Extinction program. Putting conservation planning decisions in the hands of local stakeholders by building capacity is vital, but doing so has two important limitations. First, this training process takes months, and some species at imminent risk of extinction need rapid conservation interventions. Second, devolving control may result in some globally vulnerable species being overlooked. Hence, there remains a strong need for global-scale conservation assessments. We suggest that such a system should build on the success of the Alliance for Zero Extinction (AZE) program, which has been developed by a broad group of

Table 1. Data on range-restricted and non-range-restricted mammal species on the IUCN Red List.

IUCN Red List category	Number of species		
	Range data available	Range < 50,000 km ²	Range > 50,000 km ²
Least concern (LC)	2480	303	2177
Near threatened (NT)	536	151	385
Conservation dependent (CD) and vulnerable (VU)	555	264	291
Endangered (EN)	296	180	116
Critically endangered (CR)	128	115	13
Total not threatened (LC + NT)	3016	454	2562
Total threatened (CD + VU + EN + CR)	979	559	420
Total species	3995	1013	2982
Percentage not threatened	75.5	44.8	85.9

Source: IUCN 2004, Cardillo et al. 2005.

international conservation groups (Ricketts et al. 2006) to identify and safeguard “key sites where species are in imminent danger of disappearing” (www.zeroextinction.org). AZE areas are a subset of KBAs and use a similar methodology to target areas containing the only known populations of highly threatened species. AZE areas are, therefore, unquestionably irreplaceable, regardless of local or regional stakeholders’ values for these species, and will be priorities regardless of whether they are assessed at regional or global scales. Thus, the AZE program could be expanded to include highly threatened species found in more than one area.

Adapt the key biodiversity areas program to increase local stakeholder input. Several internationally recognized priority-area schemes, such as the World Heritage Sites program, allow local stakeholders to nominate areas for inclusion that they consider important on the basis of globally defined criteria. We suggest that KBAs could be modified to adopt a similar approach, so that stakeholders could nominate areas in the context of regional-scale conservation assessment and planning programs. KBA status could then be used to market these areas for ecotourism, as occurs with World Heritage Sites and some IBAs, and could allow access to any relevant KBA funding. Such funding could be targeted at areas that are not eligible for AZE status but are seen as globally important for other reasons (for example, because they are stopovers along bird migration corridors). This modified system would facilitate the “bottom-up” approach that is endorsed by the KBA program, whose support and funding for building regional capacity throughout global priority areas will be essential for securing these areas of global importance.

Conclusions

Conservation planning initiatives are under way at a range of scales and locations, and we firmly believe that this diversity is a strength, as the development of alternative approaches allows comparisons of effectiveness and counters the development of a conservation planning orthodoxy (Knight et al. 2006a). Each approach has a specific role to play if global-scale conservation planning is to be effective. This requires that conservation assessments be integrated across global, regional, and local scales. However, integration will be successful only if individual projects are collaboratively refined and implemented so as to complement each other and avoid duplication of effort, which is now so common (Mace et al. 2000). Every conservation planning program, including those we have undertaken ourselves, has limitations and even failures (Pierce et al. 2005, Knight 2006). Thus, documenting experiences and distilling lessons is an essential component of any effective process, and this is one reason why effective global-scale programs require extensive collaboration with a wide range of stakeholders. We have made initial suggestions on how the limitations of the KBA approach could be resolved, and we are eager to participate in the dialogue and collaboration that is required to take the KBA approach forward.

Acknowledgments

Suggestions from three anonymous reviewers and E. Foster significantly improved earlier versions of the manuscript. Kate Jones kindly provided the mammal range and threat data from the PanTHERIA database. R. J. S. would like to thank the Darwin Initiative for the Survival of Species for their support.

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doi:10.1641/B570309

Include this information when citing this material.