CHAPTER 7

Revisiting Green Data Species Lists

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Abstract

The management and active enforcement of the increasing number of conservation-related instruments (e.g. the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), The World Conservation Union (IUCN) Red Data Lists and pending invasive species regulations), and the number of listed plant and animal taxa that they are likely to incorporate, are already straining national regulatory, enforcement and border control agencies. Against the backdrop of increasing capacity constraints (financial and logistic) and uncertainty faced by these authorities, we support calls for a radical shift in the traditional approach to the management of threatened species (either Red Data List or CITES listed) and the maintenance of the integrity of biological systems (*viz.* the control of potentially invasive species). This entails the establishment of National Green Data Species Lists (proposed by Imboden 1987 in World Birdwatch 9: 2). The Green List would, be a reciprocal list of species that are not threatened (not Red Data listed), not affected by trade (not CITES listed) or pose little threat of invasion according to importing authorities. This reciprocal list does not require negotiation of new international treaties and will simply piggy-back on existing treaties. In addition, it will shift the 'burden of proof,' including the financial investment required for species Green Data listing, the verification of origins, taxonomic and conservation status determination, from regulating authorities to traders.

Key words: CITES; Green Data Species List; invasive species; IUCN Red Data List

Introduction

Well-known instruments for documenting global taxa losses or threats have existed for over 20 years. For example, the Convention for Trade in Endangered Species (CITES) and IUCN Red Data Lists generated by the World Conservation Union (Baillie and Groombridge 1996) have gained universal acceptance and have been applied across the taxonomic spectrum.

Conservation efforts to slow biodiversity losses have traditionally placed considerable focus on species with few remaining individuals (Flather et al. 1998). Threat-listed species typically have low population numbers and/or restricted distributions and generally appear vulnerable to local or global extinction (Purvis et al. 2000). The rate at which taxa are listed as threatened has accelerated greatly over the last twenty years (Flather et al. 1998). The updated IUCN Red List for 2000 identified over 11 046 plants and animals threatened with extinction, with over 200 new animal taxa added to the critically endangered category (IUCN 2000). Traditionally, the implicit assumption behind the Red Data Listing process for species was “extant unless proven extinct” (Diamond 1987). Consequently, most officially listed endangered taxa were large, well-known charismatic vertebrates. This is in contrast with the majority of small, inconspicuous and poorly surveyed taxa that we now know to be threatened (Mace 1995; Mickleburgh 2000). For most of these taxa, data on systematics, population and conservation status are outdated and/or of insufficient quality. This, in turn, affects the correct assessment of these taxa as IUCN Red Data List categories are based on thresholds of parameters such as distributional range, population size and history (Burgman et al. 1999). For some taxa, such as marine or many invertebrates, these data may never exist (Mace 1995; Mickleburgh 2000) and one would never be able to assess the species. A sensible way to confront this dilemma is to incorporate the precautionary principle into Red Data Listing procedures (Coone 2000; IUCN/SSC Criteria Review Working Group 1999; Mickleburgh 2000), and follow the revised IUCN (2001) protocol of the use of the data deficient category.

Widespread application of the precautionary principle is likely to increase the rapidly growing taxa listed (Flather et al. 1998), and partially re-enforce the feeling of negativity sometimes associated with Red Data Lists (Gigon et al. 2000). One suggested remedy is to implement the proposed Blue List (Gigon et al. 2000). This list forms a subset of existing Red Data Lists, and serves to reinforce public and scientific resolve through the recognition of success stories. On the other hand, the proposed Blue Lists suffer from similar weaknesses to Red Data Lists (see Gigon et al. 2000 for discussion).

Effective regulation of wildlife trade is largely dependent on sound legislation that assists conservation authorities (Bürgener et al. 2001). However, these agencies face budgetary and capacity constraints, inconsistencies in permit issuing procedures and a lack of knowledge about the conservation status of species which further impedes the effective control on wildlife trade.

At present most countries actively attempt to comply with their Red Data List and CITES obligations. However, this requires a certain level of expertise not generally available in the relevant agencies who are often unable to recognise endangered species or products, and/or timeously access appropriate systematic expertise for the control of obscure taxa.

In addition, the threat of invasive taxa necessitates their control which will require another list (Scott 2001). This list may also need to engage the precautionary principle. One-way forward is to develop Green Data Species Lists (as proposed by Imboden 1987). Green Data Species Lists would essentially represent the flip side of the conventional approach of ‘extinct, threatened or harmful unless proven extant, secure or benign’ (Diamond 1987). Taxa ‘Green Listed’ would not be present on Red Data Lists, or in any CITES appendix, or stand any chance of being threat listed in the near future. National Green Data Species Lists would include taxa with recent and certain population data. These taxa would also not be in any danger of becoming threatened under conditions of controlled trade as they form part of a ‘viable population’ as indicated by adequate data or by demonstrated sustainable harvesting regimes. Taxa identified by National Green Data Species Lists would also pose little threat of becoming invasive (see Ruesink et al. 1995).

The “burden of proof” about the conservation, trade status or invasive potential of taxa would be shifted from the regulatory authorities onto the collectors, dealers or importers (as suggested by Ruesink et al. 1995). The responsibility would then reside with them to demonstrate to the permit issuing authorities that specimens in question are included on their National Green list, or alternatively, fund their placement on such a list through appropriate scientific enquiry and the provision of evidence that they are not represented on any appropriate Red Data, CITES or invasive species lists.

Any financial burden will fall with the importing agency, and permits for import will only be issued once the importers have conclusively demonstrated the presence of the taxon on the National Green Data Species List (e.g. DNA testing, conservation status assessment, systematic study etc.) and regulatory authorities are satisfied that the specimens may be imported at little conservation risk. Thus, taxa will be treated "guilty until proven innocent" (Ruesink et al. 1995).

This Green Data Species List system would also restrict the use of the precautionary principle to the scientific lists (Red Data, CITES, etc.) where the principle is most appropriately employed, without escalating the numbers of taxa to be included in the Green Data Species List. If anything, the expected rapid expansion of the Red Data Lists, CITES and other lists will reduce the number of taxa that may be transferred across international boundaries and that are incorporated in National Green Data Species Lists. This approach will also act as an incentive for the establishment of appropriate species restoration programmes, conservation action campaigns as well as promote appropriate population and distribution data acquisition.

In short, the Green Data Species list represents a radical shift in the management approach of vulnerable, threatened and potentially harmful taxa. It will hopefully circumvent the 'old data and data deficiency' problem, shift the financial burden and 'burden of proof' away from stretched regulatory authorities to importers or traders, and restrict the use of the precautionary principle to management regimes where it is most effective.

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CHAPTER 8

Conclusion and a synopsis of the conservation assessment of South African mammals

At the outset of this study, the aims were to understand the value and applicability of various conservation assessment tools for prioritising mammals for conservation action at a regional scale (South Africa) using a variety of techniques and data.

Prioritisation of taxa will always remain an integral part of any conservation action plan. First and most importantly, it is impossible to determine which of the prioritisation methods described in the current study provide the "best" priority assessment system. Without a true and independent measure of prioritising taxa, it can only be possible to compare and consider the results between the various methods, as each method is designed and implemented under different circumstances and has its own specific strengths and weaknesses. The differences among priority ranking systems may be less important than the need for a priority setting process to be undertaken, as well as obtaining a much better understanding of the factors driving species warranting conservation action. By using a variety of techniques (data permitting) as undertaken in the current study, has at the very least, allowed an invaluable insight into the various taxon prioritisation techniques for South African marine and terrestrial mammals.

Red Data Book and Red List Assessments

Generally, the IUCN Red Lists of threatened taxa play a vital role in setting conservation priorities for taxa at both the global and regional levels (Chapter 2). By ranking taxa according to their extinction risk, the process of planning for biodiversity conservation is considered to be simplified (Burgman 2002). Possingham et al. (2002) noted that Red List assessments for the fauna and flora of South Africa are some of the most complete among African countries. The recent Red List assessment of South African mammals (Friedman & Daly 2004) based on IUCN (2003) criteria, has allowed a review and an analysis of three generations of Red List and Red Data Book assessments that included both marine and terrestrial mammals. This provided an invaluable insight into the characteristics and the nature of the differences between the qualitative Red Data Book categories and the quantitative IUCN Red List assessments. Results from the current study suggest that not only were the 1986 Red Data Book assessments (Smithers 1986) out-dated but that they were also based on limited data. The regional Red List for mammals (Friedmann & Daly 2004) was on the other hand inclusive in that where available, it incorporated as much relevant regional life history and threat information as possible. Compared to the

1986 Red Data Book assessment and categories, the new Red List categories provided a more objective method for the classification of taxa according to their extinction risk.

The current regional Red List assessment for South African mammals identified more mammals to be in the higher threat category than its global counterpart. This supports the previous conclusion that regional Red List assessments may lead to a higher percentage of threatened taxa than global Red List assessments (Gärdenfors et al. 2001). Of particular relevance in the present assessment, however, is the increase in regionally identified Data Deficient mammals. The present study concluded that approximately 18% of South African mammals were Data Deficient, while less than 1% were identified as Data Deficient in the global Red List assessment. The majority of the assessments used category B that relates to the distribution/range size in conjunction with fragmentation, meta-population structure, continuing decline, and extreme fluctuations. This reliance on existing knowledge of the historical distributions and extant range sizes (often regarded as out-dated and inaccurate (Freitag & van Jaarsveld 1995; Rouget et al. 2004)), is disconcerting.

Conservation Prioritisation Techniques

Conservation assessments do not only depend on a taxon's susceptibility to threat (i.e., risk of extinction or Red List assessments), but also the conservation value, irreplaceability of a taxon, and the nature and intensity of the threat itself (Reed 1992; Harcourt & Parks 2003; Hartley & Kunin 2003). In the present study, the inclusion of additional, explicit criteria of threat such as rarity and irreplaceability suggest an improvement in priority and threat assessments (Chapter 3, 4 & 5). With data and time being major constraints during priority assessments, it was essential to utilise components that are up-to-date, easily obtainable, and conducive to yield relevant results and outputs (Dunn et al. 1999; Whiting et al. 2000; Harcourt & Parks 2003).

The availability of the spatial human demographic data, and its associated threats to the environment and particularly to taxa, allowed the incorporation of a proxy into a prioritisation exercise. This allowed some insight into the relationship between human activity measures, mammal richness patterns and biological extinction risks (Harcourt & Parks 2003). The human activity components used in the present study (Chapter 3), suggest a concordance between the three measures of mammal richness measures used despite some difficulties in assigning a single risk value to separate impacts of such measures (Kerr & Currie 1995; Ceballos & Ehlrich 2002; Chertow 2001). The selected human activity measures used in this study correspond to that of mammal richness across South Africa and, to some extent, with endemic as well as threatened mammal richness.

Of particular importance in the present study is that it took cognisance that there may be other potential factors that drive mammal richness patterns in South Africa, such as climate and environmental factors (Andrews & O'Brien 2000; Chown et al. 2003). The inclusion of the six human activity variables suggests complex structuring within and among these variables (McDonald 1991; Liu et al. 2003). The use of the human activity variables in conjunction with the present regional Red List assessments (Friedmann & Daly 2004) provided insights into taxa that are threatened with extinction while also being exposed to high human activity throughout their distributional ranges. The analyses in this study also high-lighted Data Deficient and taxa not deemed to be highly threatened, that are also exposed to high human activity, suggesting that these taxa may need to be re-evaluated not only with reference to their life history traits but also with regard to potential threats that may be posed by human-activities.

Yu and Dobson (2000) reported that many mammals show a tendency towards rarity. However, rarity varies both in space and time because the identification of conservation priorities for taxa at risk of extinction is usually determined by rarity and vulnerability. Therefore, the questions that arise are how to incorporate additional biological, irreplaceability, and threat variables, and how these should be used to develop an appropriate methodology for the conservation prioritisation of taxa (Ferrar 1991; Pressey et al. 1993).

Consequently, three key components, namely, vulnerability, irreplaceability, and threat (Pressey et al. 1994; Noss et al. 2002; Harcourt & Parks 2003), were included into a regional priority scoring (RPS) technique (Chapter 4). Each of the three components was based on available data, such as: 1) the IUCN Red List assessments and regional occupancy as measures of vulnerability; 2) relative endemism and taxonomic distinctiveness as measures of irreplaceability; and 3) relative body mass and human density as measures of threat. The RPS scores obtained in the two assessments differed significantly, resulting in a broad range of mammals being highlighted as of conservation importance in South Africa. Both RPS techniques (RPS_{01} & RPS_{02},) however, consistently identified 13 mammals as of high conservation priority, with 12 species highlighted by the regional Red List as being threatened.

The RPS technique is regarded as a relational approach where the conservation importance of taxa is derived from a broad suite of relevant and informative data (Freitag & van Jaarsveld 1997; Mills et al. 2001; Reyers 2004). Unlike the IUCN Red List assessment for example, the RPS technique as used in the present study not only incorporated measures based solely on rarity and related to the risk of extinction but also to irreplaceability and threat. This approach was considered an appropriate conservation priority assessment tool that could be applied world-wide using the minimal available data.

Generally, there are a range of quantifiable biological measures that could function as alternatives when there is limited population and life history data that may prevent relevant prioritization assessments. However, many of these alternative measures are problematic to apply, either conceptually or in practise, therefore, preventing their incorporation in objective priority-setting exercises (Gärdenfors 1996; Mehlman et al. 2004). For example, although the incorporation of phylogenetic diversity in conservation priority assessments has been considered to be of critical importance in priority-setting, its incorporation is often precluded because of the general lack of comprehensive and inclusive phylogenies (Polasky et al. 2001). As a result, this has led to a search for alternative measures for identifying taxonomically distinct taxa (Polasky et al. 2001; Rodrigues & Gaston 2002).

The analyses in the present study (Chapter 5), suggest that a "simple" measure of taxonomic distinctiveness (TD) may function as a surrogate measure for the more data-intensive measures of phylogenetic diversity (PD), such as the node-based (PD_{NODE}; Vane-Wright et al. 1991; Posadas et al. 2001) and the branch length based (PD_{BRANCH}; Bininda-Emonds et al. 1999) measures of phylogenetic diversity. Each of these PD (PD_{NODE} and PD_{BRANCH}) and TD measures used in the present study (Chapter 4) seem to reflect the evolutionary history of taxa under consideration that focused on the Chiroptera and the Carnivora (as case study groups). Similar to the other RPS components (Chapter 4; Freitag & van Jaarsveld 1997; Mills et al. 2001; Reyers 2004), the TD measure is considered to be a logistically simple and feasible option when setting regional conservation priorities.

The last two sections of this study (Chapters 6 & 7) were essentially related to the development of a more theoretical framework that dealt with several shortcomings highlighted by the preceding parts of the study. First, the concept of an Orange List (Chapter 6) was proposed due to the critical need to assess and record the conservation importance of stable, rare, and taxa of special concern that are often disregarded in conservation exercises, due to the nature of the new Red List categories and criteria. However, these taxa are often very rare (either small stable populations, severely sparsely distributed, or fragmented populations). In addition, such taxa are frequently under severe threat, such as hybridisation and medicinal use, and should, therefore, be regarded as "….*of high national importance or of high conservation value*" (South African National Environmental Management: Biodiversity Act 2004).

The Orange List concept was originally developed for plants and could also be applied to other taxa because its methodology conforms to the criteria and methodology of the Red List (IUCN 2001), which have been applied across a large range of taxonomic groups. It may only be through the rigorous implementation of this technique that it will be established whether the concept is pertinent for the identification of taxa that require anticipatory conservation planning actions to prevent possible extinction or to prevent them from threatened populations in the near future (Caughley 1994).

Related to the Orange List is the concept of a Green Data Species List (Chapter 7). This concept represents a radical conceptual departure from the traditional approach to the management of threatened species (i.e., Red Data or CITES Lists) and the protection of the integrity of biodiversity (i.e., the control of potentially invasive species). The Green data Species List concept presents an approach that can resolve the logistical and financial constraints forced on national regulatory, enforcement and border control agencies, especially in the milieu of limited conservation funding and the inevitable decline in efficiency. This approach places the burden of proof firmly in the hands of the importer of biological materials.

Conservation Priorities for South African Mammals

The various prioritisation and assessment techniques investigated in the current study suggest that small mammals require immediate conservation attention. Based on the IUCN Red List assessment (Friedmann & Daly 2004), the Order Insectivora dominated the list of threatened mammals. Including a measure of threat through incorporating human activity (Chapter 3) also highlighted the Order Insectivora to be of great conservation importance but also reaffirmed the suggestion that many of the smaller mammals are highly threatened by extinction due to human-induced threats. Subsequent RPS assessments (Chapter 4) also identified numerous taxa from the Orders Insectivora, Rodentia, as well as the Chiroptera as priorities for conservation intervention.

Consequently, additional information and conservation action is therefore urgently required for the smaller, less charismatic, and lesser-known carnivores, rodents, and bats in South Africa. Insectivores, bats, and rodents have been reported to be internationally under-represented in conservation policies with most taxa from these Orders having already become extinct (Ceballos & Brown 1995; Yu & Dobson 2000). Nevertheless, the larger mammals within the Orders Carnivora, Perissodactyla, and Artiodactyla still receive disproportionately greater research and conservation funding attention (Amori & Gippoliti 2000; Polishchuk 2002).

Future recommendations

The proposed five-year interval between successive Red List assessments as proposed by IUCN (2001) is imperative. It is anticipated that the identification of threatened and priority taxa in this study may be useful, not only in drawing research and conservation attention to these taxa, but also to influence and foster a better understanding of the causes and reasons why certain taxa face an extinction risk, and most importantly also to focus on their declining and threatened habitats (Ferrar 1991; Possingham et al. 2002). Furthermore a better understanding towards the effect of human demographics on the extent of threat to mammals as well as their habitats is crucial. Comprehensive and up-to-date taxonomic classification is also imperative for inclusion into conservation planning, and relevant attention should be granted to meet future requirements. The main setback during this study was the lack of basic biological, population and most importantly up-to-date representative distribution data. Not only is the distribution data most of the time spatially and temporally incorrect, but also the current resolution of distribution data (quarter degree square) are highly undesirable. Relevant steps to circumvent this deficiency are urgently required, as it impacts not only on single species conservation strategies, but severely hampers national conservation planning actions (Rouget et al. 2004).

Conclusion

It is essential that researchers, conservationist, and developers refrain from using the Red List and similar priority assessments as an automatic assessment of conservation status of taxa. The use of prioritisation or assessment techniques is not only dependant on the information used but also the purpose for which the technique was developed, and merely represents a starting point from which conservation actions and subsequent conservation status should be derived (Possingham et al. 2002). However, the greatest challenge is still the implementation of conservation assessments and actions to reach the intended targets where they can be effective.

The techniques utilized in this study offered insights into the factors that affect taxa warranting conservation interventions. They also allow for the inclusion of more relevant information on prioritisation to be fed into any "*protected species of high national importance or of high conservation value*" (South African National Environmental Management: Biodiversity Act 2004) assessment exercise. It is also anticipated that this study has assisted in identifying priority taxa for conservation action in South Africa, and contributed to techniques for identifying taxa before they become listed as endangered in regional or global Red List assessment processes.

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