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National Red Listing Beyond the 2010 Target

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Abstract: *Following creation of the 2010 Biodiversity Target under the Convention on Biological Diversity and adoption of the United Nations Millennium Development Goals, information on status and trends of biodiversity at the national level has become increasingly important to both science and policy. National red lists (NRLs) of threatened species may provide suitable data for reporting on progress toward these goals and for informing national conservation priority setting. This information will also become increasingly important for developing species- and ecosystem-based strategies for climate change adaptation. We conducted a thorough global review of NRLs in 109 countries and analyzed gaps in NRL coverage in terms of geography and taxonomy to determine priority regions and taxonomic groups for further investment. We then examined correlations between the NRL data set and gross domestic product (GDP) and vertebrate species richness. The largest geographic gap was in Oceania, followed by middle Africa, the Caribbean, and western Africa, whereas the largest taxonomic gaps were for invertebrates, fungi, and lichens. The comprehensiveness of NRL coverage within a given country was positively correlated with GDP and negatively correlated with total vertebrate richness and threatened vertebrate richness. This supports the assertion that regions with the greatest and most vulnerable biodiversity receive the least conservation attention and indicates that financial resources may be an integral limitation. To improve coverage of NRLs, we propose a combination of projects that target underrepresented taxa or regions and projects that provide the means for countries to create or update NRLs on their own. We recommend improvements in knowledge transfer within and across regions as a priority for future investment.*

Keywords: 2010 biodiversity target, biodiversity indicators, Convention on Biological Diversity, conservation priorities, gap analysis, Millennium Development Goals, national red lists, regional red lists, threatened species

Listas Rojas Nacionales Más Allá de la Meta 2010

Resumen: *Después de la creación de la Meta 2010 de Biodiversidad bajo la Convención de Diversidad Biológica y la adopción de las Metas de Desarrollo Milenio de las Naciones Unidas, la información sobre el estatus y las tendencias de la biodiversidad a nivel nacional cada vez es más importante para la ciencia y la política. Las listas rojas nacionales (LRNs) de especies amenazadas pueden proporcionar datos adecuados para reportar el progreso hacia esas metas y para informar la definición de prioridades nacionales de conservación. Esta información también será más importante para el desarrollo de estrategias basadas en especies y en ecosistemas para adaptación al cambio climático. Realizamos una minuciosa revisión global de LRNs en 109 países y analizamos las disparidades en la cobertura de LRN en términos de geografía y taxonomía para determinar regiones y grupos taxonómicos prioritarios para inversiones adicionales. Posteriormente examinamos las correlaciones entre los datos de LRN y el producto interno bruto (PIB) y la riqueza de especies de vertebrados. La mayor disparidad geográfica se localizó en Oceanía, seguida por*

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África central, el Caribe y África occidental, mientras que las mayores disparidades taxonómicas fueron para invertebrados, hongos y líquenes. La extensión de la cobertura de LRN en un país determinado se correlacionó positivamente con el PIB y negativamente con la riqueza de vertebrados y el número de especies de vertebrados amenazados. Esto sustenta la afirmación de que regiones con la biodiversidad más rica y vulnerable reciben la menor atención de conservación e indica que los recursos financieros pueden ser una limitante integral. Para mejorar la cobertura de LRNs, proponemos una combinación de proyectos enfocados a taxa o regiones poco representadas con proyectos que proporcionan medios para que los países creen o actualicen LRNs por su cuenta. Recomendamos mejoras en la transferencia de conocimiento dentro y entre regiones como una prioridad para futuras inversiones.

Palabras Clave: análisis de disparidad, Convención de Diversidad Biológica, especies amenazadas, indicadores de biodiversidad, listas rojas nacionales, meta 2010 de biodiversidad, Metas de Desarrollo Milenio, prioridades de conservación

Introduction

Increasing concerns over the loss of global biodiversity and the associated consequences for human welfare have led to international policy agreements of unprecedented scope. At the World Summit on Sustainable Development in Johannesburg in 2002, 188 nations committed themselves "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional, and national level" (UNEP 2002). This ambitious goal, the 2010 Biodiversity Target, demonstrated the importance government leaders assign to biodiversity loss and their commitment to addressing the issue (Balmford et al. 2005*a*). This target has also been adopted as a means of measuring one of the eight United Nations Millennium Development Goals (ensure environmental sustainability [MDG 7]), such that signatories to the MDGs are also obligated to monitor the changing status of species in their countries (UN 2000).

Since adoption of the 2010 Biodiversity Target, much effort has been directed to development of biodiversity indicators capable of measuring the changing state of nature (e.g., Butchart et al. 2005; Pauly & Watson 2005; Collen et al. 2009*a*). Although indicators are needed for a variety of scales, of particular interest to reporting on the 2010 Biodiversity Target and MDG 7, are country-level indices. A variety of indices exist that may provide country-level figures, such as the Global Forest Resource Assessment and the World Database of Protected Areas (Collen et al. 2008), but few have the widespread geographic coverage capable of capturing the heterogeneity in patterns and associated pressures on species throughout a nation's landscapes.

The Red List Index (RLI) has been developed to monitor trends in the status of threatened species as an indicator of patterns of biodiversity loss throughout a species range (Butchart et al. 2005) and has already been adopted by the Convention on Biological Diversity (CDB) as an indicator to measure progress toward the 2010 Biodiversity Target (UNEP 2006). An RLI may be calculated with two IUCN Red List assessments per species (Butchart et al. 2005, 2007). As designed, the RLI operates on a global scale and yet can be calculated on a national level when data permit. National red lists (NRLs), red data books, or threatened species lists (herein, all these are referred to as NRLs) exist for many countries and could provide fundamental information to document the state of biodiversity and report on trends in biodiversity loss. The global NRL network is rapidly expanding in response to demands of the 2010 Biodiversity Target and MDG 7 and requires innovative tools for developing capacity locally, managing the data generated by national assessors, and integrating it into the global IUCN Red List (Rodríguez 2008).

NRLs provide countries with information of both scientific and political relevance regarding the state of biodiversity within their borders and as such may be a valuable resource for conservation planning. Along with informing country-level indices needed for reporting on the 2010 Biodiversity Target and MDG 7, NRLs may play an integral role in threatened species management by enabling countries to readily determine the conservation status of species within their borders, identify species or ecosystems under greatest threat, and determine the associated conservation measures necessary for their recovery and preservation (Gärdenfors et al. 2001). Such information will likely become increasingly important in development of national-level strategies for species and ecosystem adaptation to climate change. Nevertheless, updated knowledge of the degree of development and policy applications of NRLs throughout the world is incomplete, uncoordinated, and largely disconnected from the global red listing process; therefore, it is difficult to effectively design a strategy for strengthening and expanding the global network of NRLs (Rodríguez et al. 2000; Miller et al. 2007; Rodríguez 2008).

A comprehensive review of NRLs conducted in 1994 found that out of the 225 countries and overseas territories investigated, 61 (27%) had NRLs; Africa had the fewest (UNEP-WCMC 1994). A detailed survey in 2004 found that 36 of the 47 (77%) responding countries had NRLs, although this figure is possibly an overestimate due to reporting bias (Miller et al. 2007). A 2008 analysis of the two NRL data sets listed above still identified Africa as

the region with the fewest NRLs. Other geographic gaps in NRL coverage, or regions with few NRLs, were west Asia, Indonesia, and Papua New Guinea (Collen et al. 2008). The only existing analysis of taxonomic coverage of NRLs, now over 15 years old, showed that unlike the global IUCN Red List (IUCN 2008*a*), plants were the most widely assessed group; 91% of countries that had NRLs included plants in their NRLs (UNEP-WCMC 1994). Birds were the second-most represented group of organisms, followed by mammals, amphibians, and reptiles. Invertebrates and fishes were the most poorly assessed groups, with invertebrates assessed in only 41% of the countries (UNEP-WCMC 1994). Predictably, the groups of species that make up the majority of biodiversity have been highly underrepresented in past national assessments.

As reports on the 2010 Biodiversity Target are due imminently, the focus of the conservation community must now shift beyond the target and build on the investment in biodiversity monitoring that has occurred over the past decade. Although many countries may struggle to report on the 2010 Biodiversity Target due to lack of available data or financial resources, there is still the opportunity to mobilize this global interest in biodiversity loss and ensure that countries are able to effectively report on the MDGs in 2015. With momentum surrounding the 2010 Biodiversity Target, this is the ideal time to address gaps in national conservation planning. There is a great potential for building on existing programs to develop new NRLs in countries that lack them. We analyzed the current coverage of NRLs to determine regions and taxonomic groups that will be priorities in the future. We looked at gross domestic product (GDP) and vertebrate species richness in relation to existing NRLs as a means of exploring the economic and biological context of the current gaps in NRL coverage. We then described current and required efforts within the conservation community that either may directly lead to new NRLs or may create improved conditions under which countries can initiate the development of their own programs. With this coordinated global effort, the existence of an NRL in each country by the time the MDGs are due for reporting is a plausible goal.

Methods

We conducted a thorough review of the literature for 195 countries and collated details of the most recent NRLs in the 109 countries that had such lists. In as many cases as possible, we corresponded with the authors and gathered copies of the documents to examine their contents. Nevertheless, when this was not possible, we relied on cited literature to obtain the required information on a given NRL. We considered all countries recognized by the United Nations and the CBD, but excluded all overseas territories. Although in most situations the author was from a government department, academic institution, or national nongovernmental organization (NGO), there were several instances where the list was developed by a regional NGO based in a neighboring country. For each NRL, we recorded information on the groups of organisms assessed and the year each group was assessed (see Supporting Information). We recorded whether the species assessed were vertebrates, invertebrates, vascular plants, nonvascular plants, or fungi and lichens. For vertebrates, we also recorded class. We included in the analysis all NRLs, regardless of the criteria used to develop them (e.g., IUCN Red List Categories and Criteria [IUCN 2001], an adaptation of IUCN criteria, or another system altogether), because it was often difficult to determine or define the criteria used and criteria were not necessarily relevant to the NRL's application to national conservation planning.

We aggregated countries into regional and subregional groupings (UN 2008) and calculated the proportion of countries within each region and subregion that had at least one NRL and the proportion with up-to-date NRLs (defined as <10 years old, as is accepted for global IUCN Red List assessments [IUCN 2009]). We determined the coverage of taxonomic groups by calculating the percentage of countries with NRLs that had assessed the given taxonomic group. We then created distribution maps of countries with NRLs for each taxonomic group and differentiated between recent lists and those that were outdated. All maps were created in ArcGIS 9.2 (ESRI 2007).

Last, we summed the number of taxonomic groups covered by NRLs in a given country within our five taxonomic divisions and assigned an integer value between 0 and 5. This value was intended to be an indicator of the prevalence of NRLs as conservation tools within the given country. We then calculated Spearman correlations between these data and 2007 GDP (World Bank 2008), country-level vertebrate species richness, and country-level threatened vertebrate richness (Lee & Jetz 2008).

Results

Geographic and Taxonomic Gaps in NRL Coverage

There were several evident gaps in NRL coverage. Although northern and middle Africa formed the most visible data gap in the distribution map (Fig. 1a), Oceania had the fewest NRLs (Table 1). The only countries in Oceania with NRLs were Australia and New Zealand; thus, 88% of the region's island states were without NRLs (Table 2). Africa had the second-fewest NRLs; however, there were subregional differences. Only 11% and 19% of the nations in middle Africa and western Africa, respectively, had NRLs, whereas 100% of the nations in southern Africa had lists (Table 2). Angola was the only middle African country with an NRL, whereas Cape Verde, Gambia, and

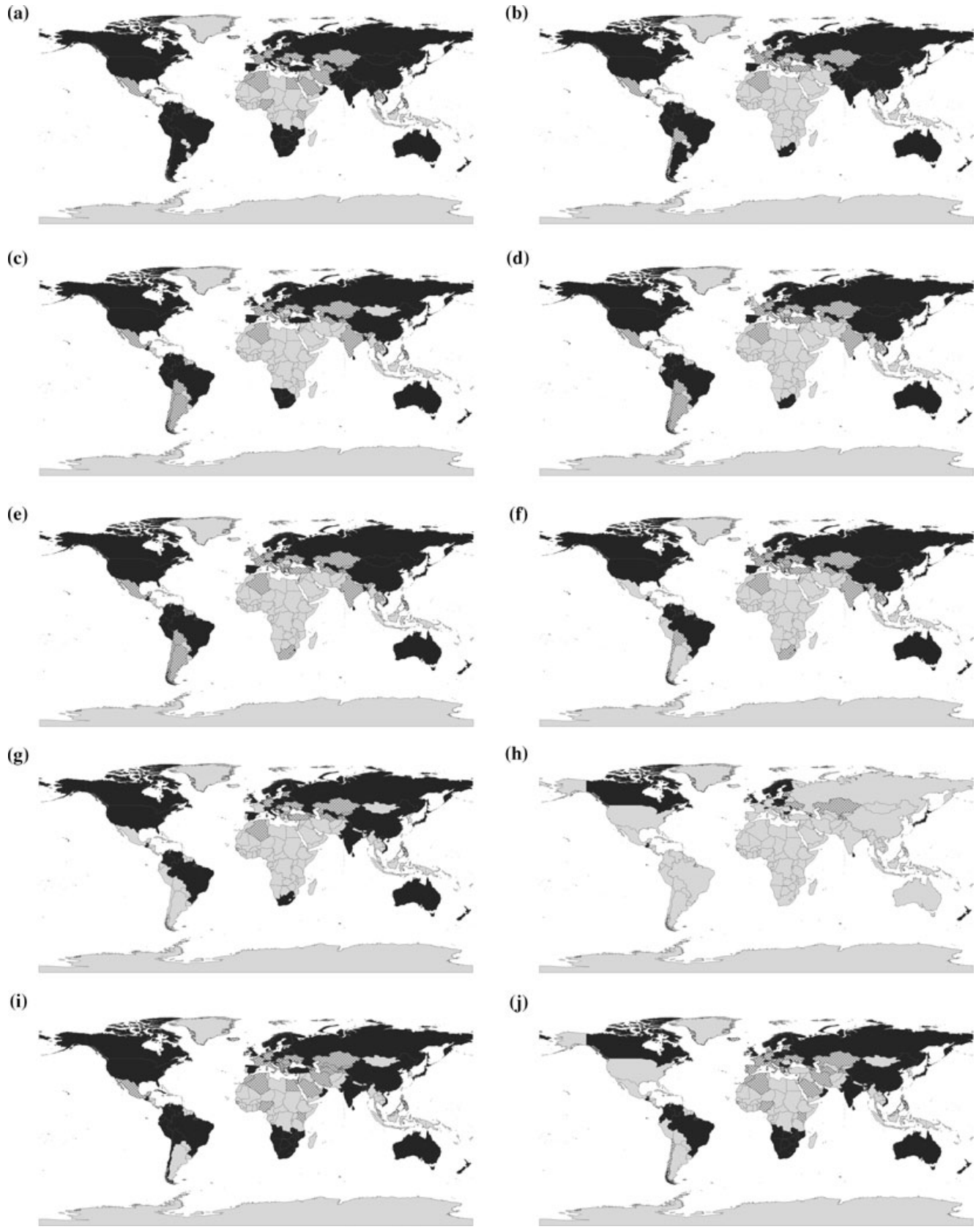

Figure 1. Distribution of (a) countries with at least one national red list (NRL) and distribution of countries with NRLs that cover (b) mammals, (c) birds, (d) amphibians, (e) reptiles, (f) fishes, (g) invertebrates, (h) fungi and lichen, (i) vascular plants, and (j) nonvascular plants (hatched, lists ≥10 years old; solid, <10 years old).

Table 1. Proportion of countries, by region, with national red lists (NRLs).

	Total number of countries	*Number of countries with an NRL (%)*	*Number of countries with an up-to-date NRL (%)*
Africa	53	19 (36)	10 (19)
Asia	47	32 (68)	21 (45)
Europe	44	39 (89)	25 (57)
Latin America and the Caribbean	33	15 (45)	10 (30)
North America	2	2 (100)	2 (100)
Oceania	16	2 (13)	2 (13)
Total	195	109 (56)	70 (36)

Nigeria formed the western African cohort of NRL countries. Distinct subregional trends were also evident in Latin America and the Caribbean. The Caribbean had the lowest coverage of NRLs in the region (Table 2). In the Caribbean, only Cuba and Jamaica had NRLs.

The most poorly represented taxonomic groups in NRLs were invertebrates and fungi and lichens (Fig. 1b–j, Table 3). Although invertebrates constitute approximately 75% of described global biodiversity in terms of species numbers (IUCN 2008*a*), only 53% of countries with NRLs had assessed taxa within this speciose group. Central America, the Caribbean, southern South America, Africa, central Asia, Southeast Asia, and Oceania had major gaps in invertebrate NRLs (for specific countries see Supporting Information). Plants are also generally underrepresented in biodiversity data sets (Pereira & Cooper 2006; Collen et al. 2008); however, vascular and nonvascular plants were the most assessed taxonomic group in NRLs (Figs 1i, j; Table 3). Thus, vascular and nonvascular plants had been assessed by 88% and 76% of countries with NRLs, respectively, although not always comprehensively, in comparison with an average across all vertebrate groups of 67%. Mammals, birds, and amphibians, which are data rich in comparison with the other taxonomic groups and have been assessed comprehensively by IUCN at the global level (Stuart et al. 2004; BirdLife International 2008; Schipper et al. 2008), had been assessed on 72%, 72%, and 64% of NRLs, respectively (Table 3).

Table 2. Proportion of countries with national red lists (NRLs) in Africa, Latin America and the Caribbean, and Oceania, organized by subregion.

	Total number of countries	*Number of countries with a NRL (%)*	*Number of countries with an up-to-date NRL (%)*
Africa			
northern Africa	6	3 (50)	0 (0)
western Africa	16	3 (19)	0 (0)
eastern Africa	17	7 (41)	4 (24)
middle Africa	9	1 (11)	1 (11)
southern Africa	5	5 (100)	5 (100)
Latin America and the Caribbean			
Caribbean	13	2 (15)	1 (8)
Central America	8	4 (50)	1 (13)
South America	12	9 (75)	8 (67)
Oceania			
Australia and New Zealand	2	2 (100)	2 (100)
Melanesia	4	0 (0)	0 (0)
Micronesia	5	0 (0)	0 (0)
Polynesia	5	0 (0)	0 (0)

Table 3. Coverage of national red lists (NRLs) broken down by taxonomic group.

	Number of NRLs	*Percentage of existing NRLs*[a]	*Total number of species in group*	*Percentage of described biodiversity*[b]
Mammals	79	72	5488	0.33
Birds	78	72	9990	0.61
Amphibians	70	64	6347	0.39
Reptiles	71	65	8734	0.53
Fishes	69	63	30,700	1.87
Invertebrates	58	53	1,232,384	75.18
Vascular plants	96	88	272,468	16.62
Nonvascular plants	83	76	26,038	1.59
Fungi and lichen	30	28	47,000	2.87

[a] *Calculated from 109 countries with at least one NRL.*
[b] *Percentage of global biodiversity figures are in terms of number of described species. Species richness data from IUCN (2008a).*

Correlations with GDP and Species Richness

The comprehensiveness of NRL coverage within a given nation, as measured by the number of taxonomic groups assessed, was significantly and positively correlated with GDP (Table 4). This suggests that creation of NRLs may be partially contingent on available financial resources within a given country. Furthermore, taxonomic coverage of NRLs for a given nation was negatively correlated with total vertebrate richness and threatened vertebrate richness for that country, indicating that the countries with the highest biodiversity and the most threatened biodiversity indeed had significantly fewer NRLs.

Discussion

Gaps in NRL Coverage

The geographical bias in conservation attention, including biodiversity data collection, has been well documented (e.g., Balmford et al. 2005*b*; Green et al. 2005;

Table 4. Correlations (r-values) between number of of national red lists (NRLs), gross domestic product (GDP), and species richness.

	Number of NRLs	*GDP*	*Total number of vertebrates*	*Number of threatened vertebrates*
Number of NRLs	1.000	0.596[a]	−0.239[b]	−0.199[c]
GDP	0.596[a]	1.000	0.006	0.111
Total number of vertebrates	−0.239[b]	0.006	1.000	0.840[a]
Number of threatened vertebrates	−0.199[c]	0.111	0.840[a]	1.000

[a] $p < 0.001$.
[b] $p < 0.01$.
[c] $p < 0.05$.

Mace et al. 2005). Despite high species diversity in the tropics, this region remains understudied and underrepresented in biodiversity data. Past studies have highlighted Africa, Asia, and South America as having large gaps in data on biodiversity status and trends (MA 2005; Collen et al. 2008). In this analysis, however, western and middle Africa, Oceania, and the Caribbean had the fewest NRLs and may have been overlooked in past studies. Subregional analyses revealed great heterogeneity in NRL coverage, which may have been masked at larger spatial scales. This heterogeneity may be an asset because it may allow for specific countries within each region to take a leading role in guiding the development of NRLs in neighboring countries.

The underrepresented taxa in conservation science and policy are plants and invertebrates (Balmford 2005*b*; Pereira & Cooper 2006; Collen et al. 2008); however, our results indicate plants actually have been well accounted for in NRLs. Although plants are unarguably underrepresented in the global IUCN Red List (see IUCN 2008*a*), global plant assessments have been bottom-up in that they have been organized primarily by countries that developed plant NRLs, whereas the animal assessments have been a top-down process led by specialist groups (J. Smart, personal communication). This supports our contention that NRLs can be major contributors to the global red listing process.

The prominence of plants in national assessments may be due to priorities of local conservation practitioners, policy makers, and the public. When using the IUCN method, red listing at any scale is a process of determining extinction risk only, not setting conservation priorities (e.g., Mace & Lande 1991; Gärdenfors et al. 2001; Miller et al. 2006). Nonetheless, the species groups that nations choose to assess for an NRL are frequently influenced by cultural priorities, and many NRLs are designed to reflect both extinction risk and conservation priorities (Miller et al. 2007).

Finally, although invertebrates are a difficult group to assess because they are speciose, inconspicuous, and often data poor, many countries have succeeded in assessing samples of comparatively data-rich invertebrate groups, such as butterflies and damselflies, dragonflies, grasshoppers, and mollusks (e.g., Gonseth & Monnerat 2002; Głowaciński et al. 2002; Kålås et al. 2006). This process is being replicated at a global level by assessing a representative sample of various invertebrate groups for contribution to the sampled RLI (Baillie et al. 2008; Clausnitzer et al. 2009; Cumberlidge et al. 2009).

There is inevitably a suite of factors driving these gaps in NRL coverage; however, our results reveal that among the most important considerations are the availability and accessibility of financial resources (Table 4). Furthermore, these results support the assertion that it is the regions with the highest biodiversity and most threatened species that are in greatest need of national red listing (Table 4). Improving a nation's financial situation is a task far beyond the reach of the conservation community alone. Yet, with the mandate of conserving global biodiversity, the international conservation community instead can, and should, focus on assisting these less wealthy countries with the transfer of both funds and knowledge regarding national conservation assessments.

Importance of Filling the NRL Gaps

NRLs are useful tools for conservation (Collar 1996; Lamoureux et al. 2003; Rodrigues et al. 2006) and can contribute directly to processes such as national-level evaluation of the 2010 Biodiversity Target and MDG 7 and consequently their absence in certain countries may hinder the conservation of species and ecosystems. It is important to work to fill these gaps for political and scientific reasons. The taxonomic gaps we identified here echo what has been reported widely in the conservation literature: that the organisms that make up the majority of biodiversity and are critical to healthy ecosystem functioning are highly understudied, poorly known, and inadequately addressed in conservation assessments (e.g., Clark & May 2002; Mace et al. 2005; Pereira & Cooper 2006). The geographic gaps in NRL coverage are also in agreement with past studies on biodiversity data (Balmford et al. 2005*b*; Mace et al. 2005; Collen et al. 2008) in that the areas with little conservation investment coincide with regions of high species richness. Facilitating the creation of NRLs in these priority regions may help document, monitor, and conserve highly important pools of global biodiversity.

NRLs may assist in both increasing knowledge regarding the loss of national biodiversity and reporting to the relevant international bodies. On the basis of the global RLI (Butchart et al. 2005, 2007), a national RLI of change may be created when extinction-risk status information is available for an entire taxonomic group for at least two points in time. By giving an indication of whether the conservation status of the given group is improving or worsening, a national RLI calculated with two data points may provide information on the effectiveness of current conservation measures (e.g., Quayle et al. 2007) and as such would be ideal for reporting on the 2010 Biodiversity Target and MDG 7.

Nonetheless, our review indicates that few nations have sufficient data to complete a national RLI, which is unsurprising given the enormity of the task of assessing an entire taxonomic group multiple times. The Swedish Species Information Centre, ArtDatabanken, has evaluated 20,000 Swedish species in its 2000, 2005 (Gärdenfors 2000, 2005), and 2010 red lists (ArtDatabanken 2009), such that a national RLI could be calculated for comprehensively assessed groups. Yet, in order make the assessments truly comparative, former assessments would need to be revisited to accommodate new knowledge and changes in interpretations of the criteria, a process that is both time intensive and costly. One solution to these challenges may be to create a national sampled RLI with a more manageable subset of species, as demonstrated by the global sampled RLI (Baillie et al. 2008; Collen et al. 2009*b*).

NRLs may also contribute to improving understanding of patterns of global biodiversity loss. Species that are endemic to a country should have the same national and global red list category (Gärdenfors et al. 2001); thus, assessing species nationally that are not on the IUCN Red List or have not been assessed recently allows the addition of new information to the IUCN Red List. Although species that are not endemic to a given country may not have their status information translated directly to the IUCN Red List, the population, distribution, and threat information collected at the national level is valuable for global assessments. Therefore, focusing efforts on increasing the quality and quantity of NRLs may transcend national borders and be helpful to conservation practitioners and policy makers interested in the status of species throughout their range. Furthermore, although the IUCN Red List focuses on the status of the entire range and population of a species, national-level assessments often cover only part of a range or population and therefore can provide valuable information about what is happening to species in different parts of their range.

Addressing Gaps in National Red List Coverage

Given the relevance of NRLs to national and global conservation science and policy, it is important that efforts be initiated to address gaps in NRL coverage. A multidimensional approach is needed in which some projects target specific taxonomic groups and countries for new NRLs and other projects create the conditions suitable for countries to initiate their own NRL (Rodríguez 2008). European assessments for selected invertebrate taxa (dragonflies, butterflies, saproxylic beetles, and mollusks) are scheduled to be completed by 2010 (IUCN 2008*b*), and a red list of the insular Caribbean is being compiled (IUCN 2008*c*). These projects will start to bridge both the taxonomic and geographical gaps.

Meanwhile, to increase the sustainability of NRL programs worldwide, projects that provide the means for countries to create or update NRLs on their own may be particularly effective. To be successful, however, such programs would have to address several key challenges. First, the quantity and sustainability of funding are major constraints. All future efforts to improve and encourage national red listing need to be as financially efficient as possible in order to maximize funds that are available. Second, there is a problem with knowledge transfer. Guidelines on the application of the IUCN Categories and Criteria at the national level are available (IUCN 2003; Miller et al. 2007), but additional information on the general process of creating an NRL, such as dealing with taxonomy, databases, and peer review, are not readily available. Consequently, those interested in creating new NRLs may struggle to find answers that may be crucial to the successful development of their projects. It is also difficult to evaluate the extinction risk of species within one country without knowing the status of those species in neighboring regions, and therefore creating a mechanism to facilitate sharing of knowledge among neighboring regions is of high priority.

Finally, the most daunting challenge for NRLs and their widespread acceptance is quality control. Many countries have their own categories and criteria system, which may be analogous to the IUCN system but are inherently difficult to compare (de Grammont & Cuarón 2006; Miller et al. 2007). Even countries that do use the IUCN Red List Categories and Criteria (IUCN 2001) and IUCN Regional Guidelines (IUCN 2003) may have different interpretations of relative extinction risk as well as data of different quality and quantity. Although it is the consistency of the criteria that matters for robust in-country analysis, there are nonetheless benefits to using a standard system such as the IUCN Categories and Criteria: results that may be universally understood and interpreted and data that may be compared across regions.

Knowledge transfer may be improved by collating existing data and gathering the current national red listing community. Amalgamating and making available all data and reports will allow for those creating new programs to reference these past efforts as a guide, and providing the infrastructure for assessors to better communicate with each other and the relevant audiences will

further assist in sharing of valuable expertise. Our results show that there are many countries with strong NRL programs that have been in existence for many years and cover many taxa. The individuals involved hold a great wealth of knowledge, ranging from how to conduct a national-level red list assessment to how to work with the respective national government to ensure that the findings are of use to policy makers. Bringing together those currently involved in national red listing would allow for the exchange of ideas and experiences and for experts to mentor the development of new programs (Miller et al. 2007). One effort to centralize NRL information as a means of helping to expand coverage was presented at the IV IUCN World Conservation Congress (Zamin et al. 2008) and uses a centralized website as a focal point for the national red listing community (www.nationalredlist.org). This may contribute to knowledge transfer by providing a catalogue of NRL assessments and full reports, a directory for contact points in each region, and a discussion forum for exchanging ideas.

Focusing efforts at the regional level may be a particularly effective and cost-efficient mechanism for increasing NRL coverage. Creating a red list for a specific region, such as the Southern African Plant Red Data List (Golding 2002) or the Red List of South Asian Primates (Molur et al. 2003), may provide a cost-effective means for assessing a large number of species in a given area. The species may be found in multiple nations within the region, such that information collected for one assessment may help inform an assessment in a neighboring country. Furthermore, it may be useful to create regional red list working groups; an amalgamation of those involved in national red listing within a given region could serve as an advisory board to those creating new lists or updating existing ones. This could serve the same function as the NRL network hosted at the website discussed above but operate at a more local level because participants sharing borders may have similar cultural backgrounds and may be able to meet at a centralized location rather than in an online discussion forum.

Given current international policy mechanisms such as the 2010 Biodiversity Target and MDG 7, NRLs have never been a more relevant tool. Although notable gaps in NRL coverage exist in some of the most biodiverse regions, several recent initiatives demonstrate the international conservation community's interest in rectifying these gaps. Funding may continue to be a limiting factor, yet creative solutions are available that can maximize existing technology and infrastructure and bring the national red listing community together for more-effective programming. The year 2010, with its critical mass surrounding the Biodiversity Target, presents an opportune time for the international conservation community to mobilize global resources, integrate efforts across regions, and fill the gaps in coverage of NRLs.

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Supporting Information

The full NRL data set used for this analysis (Appendix S1) is available as part of the online article. The data set will be continually updated and made available at www.nationalredlist.org. The authors are responsible for the content and functionality of this material. Queries (other than the absence of the material) should be directed to the corresponding author.

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