

A FRAMEWORK FOR EVALUATING NATIONAL SEABIRD CONSERVATION EFFORTS¹

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ABSTRACT

Marine biodiversity is increasingly under threat particularly through fisheries. The conservation of marine biodiversity requires the development of methods for monitoring and assessing marine ecosystem structure and ecological processes. In this paper we attempted to evaluate the performance of 55 countries, jointly accounting for over 95 % of the world's fisheries catches, on conservation and management efforts of seabird populations that breed within their Exclusive Economic Zone. We considered: (a) conventions and agreements relevant to each country, as an indicator of the country's intention to engage in conservation actions; and (b) trends of breeding seabird populations for each country. We calculated a mean index of performance for each country, also taking into account the quality of the seabird population data that influence trends through time. Scores, which potentially ranged from 0 (no protection for seabirds) to 10 (effective protection), ranged from 1.59 for Taiwan, to 5.94 for France. More than 72 % of the countries evaluated scored from 1 to 4.

INTRODUCTION

Fisheries have dramatically expanded in the last few decades (Myers and Worm, 2003; Pauly *et al.*, 2002) and now extract from the world's oceans well over 120 million tonnes of resources annually (Pauly *et al.*, 2002). Global fishing operations reduce populations of target and non-target species and compromise ecosystem integrity (Pauly *et al.*, 1998; Jennings *et al.*, 2001), and threaten marine biodiversity. Thus, it has become imperative that scientists, stakeholders, as well as public policy makers commit to conservation of natural resources and to understanding the implications of resource management.

This, however, implies the development of methods for monitoring and assessing ecosystem structure and ecological processes, i.e., indicators of ecological change (Dale and Beyeler, 2001). Indicators are valued for their ability to integrate large amounts of information into easily understood formats for a general audience; they may also be used as starting points for further analysis. Ecological indicators, in particular, may be used to: (a) assess the condition of the environment; (b) monitor trends in condition over time; (c) provide warning signals of environmental change; and (d) evaluate and rank performance of a country's efforts to avert environmental change (Cairns *et al.*, 1993; Dale and Beyeler, 2001).

In this paper, we attempt to evaluate the performance of maritime countries on conservation and management efforts of seabird populations breeding within their Exclusive Economic Zone (EEZ). Seabirds have been proposed as useful indicators of change in marine ecosystems; particularly, seabird population trends and aspects of seabird ecology have been used as indicators of: (a) change in marine community structure and composition (e.g., Cairns, 1992; Litzow *et al.*, 2002; Le Corre and Jaquemet, 2005); (b) habitat quality and variability (e.g., Springer *et al.*, 1996; Golet *et al.*, 2002); and (c) climate change (e.g., Bunce *et al.*, 2002; Weimerskirch *et al.*, 2003; Gaston *et al.*, 2005).

¹ Cite as: Karpouzi, V.S. and Pauly, D. (2008) A framework for evaluating national seabird conservation efforts. p. 62-70 *In*: Alder, J. and Pauly, D. (eds.) A comparative assessment of biodiversity, fisheries and aquaculture in 53 countries' Exclusive Economic Zones. Fisheries Centre Research Reports 16(7). Fisheries Centre, University of British Columbia [ISSN 1198-6727].

Protection of seabirds has long been an important issue in the development of conservation policies. The world's first legislation to protect wild populations was the Seabirds Preservation Act of 1869, which called against over-exploitation of seabird colonies in Britain (Doughty, 1975; Monaghan, 1996). More recently, in the 1992 Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR Convention), Ecological Quality Objectives (EcoQOs) were proposed as an important tool for identifying ecosystem change and implementing management goals, with seabirds as one of the elements of ecological quality. Also, seabird population trends were proposed as an index of seabird community health.

This paper is an attempt to evaluate countries' performance on conservation efforts for seabird populations. First, we considered conventions and agreements relevant to each country, in order to assess the country's intention to engage in conservation actions for the protection of biodiversity. Next, we estimated trends of breeding seabird populations for each country. Last, we calculated a mean index of performance for each country, also taking into account the quality of the seabird population data that influence trends through time.

MATERIALS AND METHODS

Scoring methods

In order to evaluate a countries' performance on conservation efforts for seabird populations, we considered the following three attributes (Table 1): (a) conventions and agreements for the protection of seabird populations relevant to each country; (b) estimated trends of breeding seabird populations for each country; and (c) quality of seabird population data. Overall, we evaluated 55 countries (Table 2), with two countries (Mozambique and Tanzania) added to the 53 evaluated by Alder and Pauly (this volume), in terms of their compliance to the United Nations Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries, and which jointly contribute to over 95 % of the world's fisheries catches. For the purpose of this study, performance of countries was evaluated for a 25-year period (from 1976 to 2000).

Table 1. The three attributes used to evaluate the performance of conservation efforts for seabird populations of 55 maritime countries.

Attribute 1	Conventions and agreements for seabird protection relevant to each country	Score
	No relevant conventions and agreements signed and ratified	0
	Half of relevant conventions and agreements signed and ratified	5
	All relevant conventions and agreements signed and ratified	10
Attribute 2	Annual % change of seabird populations breeding in each country	
	Maximum annual % decrease in population size	0
	No change in population size	5
	Maximum annual % increase in population size	10
Attribute 3	Quality of population size data	
	No data available for all the years considered	0
	Data available for half of the years considered	5
	Data available for all the years considered	10

In order to assess a country's intention to engage in conservation actions for the protection of its seabirds, we considered five conventions and agreements. Conservation actions entail species and habitat protection, management of human activities, research and monitoring, capacity building and environmental education. The following conventions and agreements that implicitly or explicitly pertain to seabirds were considered here: (a) Convention on Biological Diversity (CBD, 2007); (b) Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR, 2007); (c) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 2007); (d) Agreement on the Conservation of Albatrosses and Petrels (ACAP, 2007); (e) Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA, 2007); (f) the RAMSAR Convention on Wetlands (RAMSAR, 2007); and (g) the Convention on Migratory Species (CMS, 2007).

We assigned to each country a number of conventions and agreements for the protection of seabirds relevant to them (Table 2). Relevance of a convention and agreement depends, among others, on whether the geographic area it encompasses includes the seabird species that breed within a country's EEZ (Table 2). Each country was given a score according to the number of conventions and agreements signed and ratified in relation to the overall number of relevant agreements. A zero score was given to countries that were signatories to no conventions and agreements (Tables 1 and 2). In contrast, countries that signed and ratified all relevant conventions and agreements were given a score of 10 (Tables 1 and 2). Moreover, the score given to each country was multiplied with a weighting factor (ranging from 0 to 1, with 1 applying to countries that have participated as signatories to all conventions and agreements considered in this study), which essentially draws attention to all countries that have fully committed to seabird conservation. EXAMPLE: If a country was assigned only one relevant agreement that was signed and ratified, original score was 10. Equally, if a country was a signatory of all seven agreements considered in this study, the score was also 10. However, the score of the first country was multiplied with a weighing factor of $1/7=0.143$ (1 relevant agreement over 7 overall agreements considered here). Similarly, the weighing factor for the second country was $7/7=1$. Thus, final scores were modified to 1.43 and 10 respectively. This implies a higher commitment to conservation for those countries that have engaged in many agreements.

For each country, we estimated the % annual change in the population size of all breeding seabirds combined. Countries where seabird populations exhibited no change in time were given a score of 5 (Table 2). Countries with declining seabird population sizes were given scores between 0 and 5 (Table 2), depending on the strength of the decline. Conversely, countries with increasing seabird population sizes were given scores greater than 5 and up to 10 (Table 2). In the absence of data, we assumed that no change has occurred in seabird population size over time. Thus, each of the above-mentioned countries was given an optimistic score of 5 (moderate field performance).

Lastly, each country was given a score based on the availability and quality of the information on population sizes of seabirds breeding within a country's EEZ. For each country, data quality was assessed for all seabird species combined. It was expressed as the ratio of the number of years for which seabird population size data were available over the 25 years considered (Table 2). Quality scores were normalized and ranged from 0 (no data available) to 10 (best literature coverage throughout the 25-year period). Zero score was given to five countries for which no seabird population information was available, as well as to those countries with information extra- or interpolated throughout the 25-year period. All other countries were given scores based on the quality ratio estimated (Table 2). Each sub-score (i.e., agreement, trend, and quality scores) was weighted equally, which implies that each component considered was believed to have the same impact on the performance being measured. The final score was calculated as the mean of the three sub-scores. It ranged from 0 (worst performance) to 10 (best performance) (Table 2). Finally, each country was ranked based on their final score (a ranking of 1 indicates the highest level of commitment to conservation of seabirds) (Table 2).

Data sources

To assess national trends in seabird populations by countries, the data compiled by Karpouzi *et al.* (2007) were used. Karpouzi *et al.* (2007) compiled information for 351 marine bird species (belonging to four orders and 14 families) in a Microsoft Access database. The database contains information on seabirds' taxonomy, population dynamics, diet composition, and foraging ecology of seabirds. In particular, the population size table in the database covers the years from 1950 to 2003. It contains population sizes expressed as breeding pairs (bp) in the original studies. They are also re-expressed as numbers of individuals, using the following equations to account for non- and pre-breeders present in colonies: (a) for single-egg laying species $(bp \times 0.6) + (bp \times 0.7)$; and (b) for multi-egg laying species $(bp \times 0.6) + (bp \times 1.0)$ (Karpouzi *et al.*, 2007). For years when population sizes were not available, data were interpolated, assuming a linear relationship between the available counts. Data were also extrapolated from the first available count back to 1950, as well as from the last available count to 2003, assuming no change in the population size (Karpouzi *et al.*, 2007). For the purpose of this study, national trends in seabird populations by countries were assessed for a 25-year period (from 1976 to 2000). For five out of 55 countries (Bangladesh, Iran, North Korea, Malaysia, and Myanmar; Table 2), no seabird population information was available.

Table 2. Ranking of 55 countries by evaluating their performance on seabird conservation efforts.

Country	Relevant conventions and agreements ¹	Score	% Trend ²	Score	Data quality ³	Score	Final score	Rank
Angola	ACAP, CBD, AEWA, RAMSAR, CMS	2.86	0.00	5.00	0.00	0.00	2.62	50
Argentina	ACAP, CBD, CCAMLR, RAMSAR, CMS	6.43	- 0.21	4.88	0.06	0.60	3.97	21
Australia	ACAP, CBD, CCAMLR, RAMSAR, CMS	7.14	+ 1.41	6.76	0.08	0.80	4.90	6
Bangladesh	CBD, RAMSAR, CMS	4.29	0.00	5.00	0.00	0.00	3.10	41
Brazil	ACAP, CBD, CCAMLR, RAMSAR, CMS	4.43	- 8.50	0.00	0.06	0.64	1.69	54
Canada	CBD, AEWA, RAMSAR, CMS	2.86	+1.76	7.20	0.23	2.30	4.12	17
Chile	ACAP, CBD, CCAMLR, RAMSAR, CMS	7.14	+ 0.35	5.44	0.06	0.56	4.38	9
China	CBD, RAMSAR, CMS	3.29	+ 1.43	6.79	0.09	0.92	3.67	31
Denmark	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 0.75	4.56	0.11	1.12	4.27	11
Ecuador	ACAP, CBD, RAMSAR, CMS	5.71	+ 0.24	5.30	0.09	0.85	3.95	22
Egypt	CBD, AEWA, RAMSAR, CMS	5.71	+ 4.03	10.00	0.08	0.76	5.49	2
Faeroe Islands ⁴	Bern, CBD, AEWA, RAMSAR, CMS	2.86	+ 0.80	6.00	0.14	1.37	3.41	37
France	ACAP, Bern, CBD, CCAMLR, AEWA, RAMSAR, CMS	10.00	+ 1.20	6.50	0.13	1.32	5.94	1
Germany	Bern, CBD, AEWA, RAMSAR, CMS	7.14	+ 0.65	5.81	0.28	2.80	5.25	4
Ghana	CBD, AEWA, RAMSAR, CMS	5.71	+ 0.99	6.24	0.06	0.60	4.18	14
Iceland	Bern, CBD, AEWA, RAMSAR, CMS	4.29	- 5.27	1.90	0.13	1.30	2.50	52
India	CBD, RAMSAR, CMS	4.29	+ 0.87	6.09	0.11	1.09	3.82	25
Indonesia	CBD, RAMSAR, CMS	3.29	0.00	5.00	0.00	0.00	2.76	44
Iran	CBD, AEWA, RAMSAR, CMS	3.29	0.00	5.00	0.00	0.00	2.76	45
Ireland	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 1.46	4.14	0.12	1.15	4.14	16
Italy	Bern, CBD, AEWA, RAMSAR, CMS	7.14	+ 0.31	5.39	0.18	1.80	4.78	8
Japan	CBD, CCAMLR, RAMSAR, CMS	3.71	+ 0.79	5.99	0.08	0.81	3.50	34
Korea, N.	CBD, RAMSAR, CMS	1.14	0.00	5.00	0.00	0.00	2.05	53
Korea, S.	CBD, RAMSAR, CMS	2.86	0.00	5.00	0.04	0.40	2.75	48
Latvia	Bern, CBD, AEWA, RAMSAR, CMS	5.71	- 2.31	3.64	0.14	1.40	3.58	32
Malaysia	CBD, RAMSAR, CMS	2.86	0.00	5.00	0.00	0.00	2.62	51
Mexico	CBD, RAMSAR, CMS	2.86	+ 3.18	8.98	0.08	0.77	4.20	13
Morocco	CBD, AEWA, RAMSAR, CMS	5.00	- 0.18	4.89	0.04	0.40	3.43	35
Mozambique	ACAP, CBD, AEWA, RAMSAR, CMS	2.86	0.00	5.00	0.04	0.40	2.75	49
Myanmar	CBD, RAMSAR, CMS	3.29	0.00	5.00	0.00	0.00	2.76	46
Namibia	ACAP, CBD, CCAMLR, AEWA, RAMSAR, CMS	3.71	- 2.79	3.36	0.16	1.64	2.90	43
Netherlands	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 1.09	4.36	0.15	1.45	4.32	10
New Zealand	ACAP, CBD, CCAMLR, RAMSAR, CMS	7.14	- 0.77	4.55	0.08	0.76	4.15	15
Nigeria	CBD, AEWA, RAMSAR, CMS	5.71	0.00	5.00	0.04	0.40	3.70	28
Norway	Bern, CBD, CCAMLR, AEWA, RAMSAR, CMS	7.14	- 2.51	3.52	0.13	1.28	3.98	20
Pakistan	CBD, RAMSAR, CMS	4.29	+ 0.72	5.90	0.14	1.37	3.85	24
Peru	ACAP, CBD, RAMSAR, CMS	5.71	- 2.62	3.46	0.30	3.03	4.07	19
Philippines	CBD, RAMSAR, CMS	4.29	+ 1.22	6.53	0.14	1.42	4.08	18
Poland	Bern, CBD, AEWA, RAMSAR, CMS	5.71	+ 0.02	5.03	0.05	0.47	3.74	27
Portugal	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 5.60	1.71	0.12	1.17	3.34	39
Russian Federation	Bern, CBD, CCAMLR, AEWA, RAMSAR, CMS	3.71	+ 0.59	5.74	0.07	0.70	3.38	38
Senegal	CBD, AEWA, RAMSAR, CMS	5.71	- 0.14	4.92	0.05	0.48	3.70	29

Table 2 (cont'd).

Country	Relevant conventions and agreements ¹	Score	% Trend ²	Score	Data quality ³	Score	Final score	Rank
South Africa	ACAP, CBD, CCAMLR, AEWA, RAMSAR, CMS	8.57	- 0.25	4.85	0.14	1.44	4.95	5
Spain	Bern, CBD, AEWA, RAMSAR, CMS	7.14	+ 1.04	6.30	0.11	1.09	4.84	7
Sri Lanka	CBD, RAMSAR, CMS	4.29	+ 0.15	5.19	0.18	1.75	3.74	26
Sweden	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 1.59	4.06	0.14	1.41	4.20	12
Taiwan	CBD, RAMSAR, CMS	0.00	- 2.43	3.57	0.12	1.20	1.59	55
Tanzania	ACAP, CBD, AEWA, RAMSAR, CMS	4.29	- 1.50	4.12	0.04	0.36	2.92	42
Thailand	CBD, RAMSAR, CMS	3.29	+ 0.70	5.88	0.06	0.63	3.27	40
Turkey	Bern, CBD, AEWA, RAMSAR, CMS	4.29	+ 0.43	5.54	0.04	0.42	3.42	36
Ukraine	Bern, CBD, AEWA, RAMSAR, CMS	7.14	- 4.02	2.64	0.13	1.31	3.70	30
UK	ACAP, Bern, CBD, CCAMLR, AEWA, RAMSAR, CMS	10.00	- 0.58	4.66	0.12	1.24	5.30	3
USA	ACAP, CBD, CCAMLR, RAMSAR, CMS	4.00	+ 0.03	5.04	0.26	2.62	3.89	23
Viet Nam	CBD, RAMSAR, CMS	3.29	+ 0.98	6.23	0.12	1.20	3.57	33
Yemen	CBD, RAMSAR, CMS	2.86	+ 0.02	5.03	0.04	0.38	2.76	47

¹ Conventions and agreements for the protection of seabird species relevant to each country:

ACAP: Agreement on the Conservation of Albatrosses and Petrels;

CBD: Convention on Biological Diversity;

CCAMLR: Convention on the Conservation of Antarctic Marine Living Resources;

Bern: Bern Convention, Convention on the Conservation of European Wildlife and Natural Habitats;

AEWA: Agreement on the Conservation of African-Eurasian Migratory Waterbirds;

RAMSAR: The RAMSAR Convention on Wetlands.

The agreements that a country signed are in bold characters. The agreements also ratified are in bold italics. The agreements in which countries simply participate with Memoranda of Understanding are underlined.

² % Trend: annual % change [i.e., (+) increase, (-) decrease] of seabird populations breeding within a country's Exclusive Economic Zone.

³ Data quality: ratio of number of years for which population sizes were available over the overall number of years considered.

⁴ Faeroe Islands: Not covered by the Bern Convention (IUCN, 1992), but responsible of implementing CBD and AEWA as a self-governing overseas administrative division of Denmark.

RESULTS AND DISCUSSION

Overall, we considered 55 countries (Table 2). More than 65 % of the countries evaluated (36 out of 55 countries; 65.5 %) scored between 1 and 4 (Table 2). Final scores ranged from 1.59 for Taiwan, to 5.94 for France (Table 2). Taiwan's lowest ranking in the performance evaluation may be attributed predominantly to the fact that Taiwan is not a signatory to any major international conventions and agreements (Table 2), even if participation in international nature conservation activities is one of the objectives of the Taiwan Nature Conservation Strategy (CPA, 1985). Also, seabird populations have been declining at an annual rate of 4.25 % since the mid-1980s (Table 2). Taiwan is home to a number of vulnerable to critically endangered seabird species, which are most likely affected by the loss of coastal wetlands (e.g., reclamation of tidal flats and salt marshes), and egg-collection for food mainly by Taiwanese fishermen (BirdLife International, 2007a, b).

Other countries that ranked low in the evaluation performance are Brazil and North Korea. Brazil's seabird populations exhibited the greatest declining annual rate of 8.5% decline (Table 2). Moreover, Brazil has displayed low to moderate intention in protecting seabird diversity. Brazil has signed and ratified only the CBD and RAMSAR, and thus committed to actions that promote the conservation, sustainable use and equitable sharing of benefits of the country's wetlands and biological diversity. Also, in the late 1990s, Brazil completed a National Biodiversity Strategy Action Plan to meet the CBD objectives. In addition, a National Plan of Action was also completed in 2004, in order to implement the recommendations of FAO's International Plan of Action for reducing incidental catch of seabirds in longline fisheries (FAO IPOA-Seabirds).

In the case of North Korea, information on seabird populations was not available; thus, the country scored zero in the data quality (Table 2). In addition, North Korea is not a signatory to any of the conventions and agreement considered in this paper (Table 2). Nevertheless, the government of North Korea has passed a number of legislations to establish protected areas. These include: nature protection areas, animal protection areas, breeding seabird protection areas, aquatic resources protection areas, strict nature reserves, forest reserves, experimental and scientific reserves, and protected landscapes (Scott, 1989). In the late 1980s, there were six breeding seabird protection areas and four aquatic resources protection areas, established to protect populations of marine invertebrates and fish (IUCN, 1992). However, the need for agricultural land, has led to reclamation of large areas. In addition to the damage this may be causing to coastal wetlands, it has been reported that the rocks being used for the reclamation are obtained by blasting offshore rocky islets of great conservation value (Poole, 1991).

The countries that ranked highest in the performance evaluation were France, Egypt, and the UK (Table 2). For France and the UK, these results were highly influenced mainly by the countries' participation in all seven relevant conventions and agreements (Table 2). Indeed, both countries have shown strong commitment towards the protection of seabirds and their habitat, by: (a) preparing and implementing management plans for habitat protection and restoration, (b) creating and updating inventories of Important Bird Areas, (c) evaluating trends of wintering and breeding birds, and (d) raising awareness, at the European Union and national levels, by networking and exchanging of expertise. However, the above-mentioned actions have not been fully reflected in the seabird population trend analysis undertaken in this study. Although breeding seabirds in France have exhibited an increasing trend, conversely in the UK, seabirds are declining with an annual rate of 0.58 % (Table 2). As a result, both countries achieved a moderate score not higher than 6 (Table 2).

In the case of Egypt, the score was highly driven by the country's participation in four out of seven agreements, and also by the high annual increasing rate of 4.03 % for the country's seabird populations (Table 2). Egypt has a long coastline, which extends along two seas (the Mediterranean and the Red Seas). In the Mediterranean Egypt, five major important seabird sites are found, four of which belong to the complex of the Nile Delta lakes (Sultana, 1993). These wetlands are partly protected areas and RAMSAR sites, however they are largely unprotected from fishing, pollution, land reclamation, and disturbance (Sultana, 1993). These wetlands are important sites mostly for migratory tern and gull species that winter in the area (Sultana, 1993). On the other hand, along the Red Sea coast of Egypt, a large network of marine protected areas exists, which protects important breeding, roosting, and feeding seabird habitat (i.e., mangroves, tidal flats, coral reefs) (PERSGA/GEF, 2003). Although little is known about the population status of seabirds breeding in Egypt before 1970s (Cooper *et al.*, 1984), recent studies show an increasing trend in seabird populations in the area (PERSGA/GEF, 2003). Seabird population trends are mainly driven by those of four tern and gull populations

(i.e., the White-cheeked, *Sterna repressa*, Lesser crested, *S. bengalensis*, and Bridled terns, *S. anaethetus*, and the White-eyed gull, *Larus leucophthalmus*) that breed in the Red Sea. Among these species, the White-eyed gull is endemic in the area and the Egyptian Red Sea islands hold the largest known breeding population in the world (Cooper *et al.*, 1984; PERSGA/GEF, 2003).

With regards to national seabird population trends, for five out of 55 countries, analysis of trends showed no change in the seabird population sizes (Table 2). For 25 out of 55 countries, population sizes have increased since 1975 (Table 2). On the other hand, for 16 out of 55 countries seabird populations have been declining since 1975, with an annual rate higher than 0.5 % (Table 2). This is worth mentioning, because when reference levels were set for EcoQOs to be met, 0.5 % annual decline in seabird populations was decided as the limit reference point (i.e., LPR: a value of a property of a resource that, if violated, is taken as evidence of conservation concern). Any other value below the LPR should raise conversation concerns for the health of seabird communities breeding within a country's EEZ. Thus, such decline in the size of seabird populations should trigger further research to investigate the causes of change, as well as management by drafting and implementing species action plans.

When assessing national population trends, a few issues were identified. Firstly, the % annual change in the population size for each country was estimated after combining all breeding seabirds combined. This would satisfy a number of criteria for a biodiversity indicator (summarized in Table 2 in Gregory *et al.*, 2003, 2005). However, by taking this inclusive approach, there is the potential for the declines among threatened species to be counterbalanced by population increases among more common, opportunistic, 'less desirable' species (Gregory *et al.*, 2003, 2005). Nevertheless, it is a simple approach that does not require deciding on species-specific conservation status, population targets or reference periods. Indeed, selecting priority areas for protection of just threatened species may be a first step towards an effective conservation plan. However, it does not guarantee conservation of the overall species diversity (Bonn *et al.*, 2002), which is an explicit goal in the CBD.

Secondly, in some cases, information for a country's breeding seabirds may have been dependent on a single source. In the case of India, for instance, annual waterbird censuses for the region initiated in the late 1990s and were documented by Wetlands International (e.g., Li and Mundkur, 2007). In particular, Li and Mundkur (2007) suggest a dramatic increase in three major seabird populations breeding in India (i.e., the Whiskered tern, *Chlidonias hybridus*, the Little tern, *Sterna albifrons*, and the Indian cormorant, *Phalacrocorax fuscicollis*) at an annual rate of about 50 % since 1997. This has influenced our estimate of the overall trend (Table 2). A similar situation also became obvious for other countries, such as China and Pakistan. Zuo Wei and Mundkur (2004) suggest a major increase in a few gull and cormorant populations breeding in both Pakistan and China at an annual rate of about 20 % since 1997. This information also influenced our estimates of the overall trends (Table 2). Indeed, recent dramatic changes in the population size of species with opportunistic feeding behaviour and multiple clutch size may have masked historical changes and consequently distorted our results.

When assessing the quality of the seabird population data, it became apparent that for all countries considered here the percentage of data extrapolated was greater than 69 %. This indicated that time series and historical data on seabird population sizes were not accessible to us due to the language barrier or did not exist. Given the nature of the indicators' computation, continuing problems of missing data may result in distorted findings on country performance. In order to be able to set conservation targets of population levels, it is essential to continue building a picture of what the seabird populations were like before the beginning of commercial fishing and humans impacting on marine ecosystems and how they have changed over time. The establishment of contact with regional authorities and the local scientific communities should be encouraged in an attempt to share seabird information that is not published in English. However, in the absence of local information, the use of other available methods may help assess trends in seabird populations. For instance, a method has been proposed that quantifies qualitative information on abundance of marine organisms from narratives of early expeditions, and finally uses it to map trends of observed abundances in a specific locality over time (Palomares *et al.*, 2006).

This effort is work in progress to depict a more accurate picture of the status of seabird populations and how countries respond and act towards conservation of marine biodiversity. The same is also underway for other taxa (e.g., marine mammals, sea turtles), biomes, and other aspects of marine biodiversity, and will also cover other countries of the world. Composite population trend indicators, as we have described in this paper, will provide a

solid basis for measuring a country's performance and progress towards the biodiversity targets set at global and regional scales.

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