Gaps and Mismatches between Global Conservation Priorities and Spending

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Abstract: *Several international conservation organizations have recently produced global priority maps to guide conservation activities and spending in their own and other conservation organizations. Surprisingly, it is not possible to directly evaluate the relationship between priorities and spending within a given organization because none of the organizations with global priority models tracks how they spend their money relative to their priorities. We were able, however, to evaluate the spending patterns of five other large biodiversity conservation organizations without their own published global priority models and investigate the potential influence of priority models on this spending. On average, countries with priority areas received greater conservation investment; global prioritization systems, however, explained between only 2 and 32% of the US$1.5 billion spent in 2002, depending on whether the United States was removed from analyses and whether conservation spending was adjusted by the per capita gross domestic product within each country. We also found little overlap in the spending patterns of the five conservation organizations evaluated, suggesting that informal coordination or segregation of effort may be occurring. Our results also highlight a number of potential gaps and mismatches in how limited conservation funds are spent and provide the first audit of global conservation spending patterns. More explicit presentation of conservation priorities by organizations currently without priority models and better tracking of spending by those with published priorities are clearly needed to help make future conservation activities as efficient as possible.*

Key Words: conservation investment, conservation NGOs, conservation priority areas, priority models

Brechas e Incongruencias entre Prioridades y Gasto de Conservación Global

Resumen: *Recientemente, varias organizaciones internacionales de conservación han producido mapas de prioridades mundiales para guiar a las actividades y gastos de conservación en sus propias, y otras, organizaciones de conservación. Sorprendentemente, no es posible evaluar la relación entre prioridades y gastos en una determinada organización porque ninguna de las organizaciones con modelos de prioridades globales tiene registro del gasto de su dinero en relación con las prioridades. Sin embargo, pudimos evaluar los patrones de gastos de cinco importantes organizaciones de conservación de la biodiversidad que no han publicado sus modelos de prioridades globales e investigamos la potencial influencia de los modelos de prioridades sobre los gastos. En promedio, los países con áreas prioritarias recibieron mayor inversión en conservación; sin embargo, los sistemas de prioridades globales sólo explicaron entre 2 y 32% de $1.5 billones gastados en 2002, dependiendo si los Estados Unidos eran removidos del análisis y si el gasto en conservación era ajustado por*

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el producto doméstico bruto per cápita en cada país. También encontramos poco traslape en los patrones de gasto de las cinco organizaciones de conservación evaluadas, lo que sugiere que puede estar ocurriendo una coordinación o segregación informal del esfuerzo. Nuestros resultados también destacan un número de potenciales brechas e incongruencias en la forma en que se gastan los limitados fondos para conservación y proporcionan la primera auditoria de los patrones de los gastos de conservación global. Claramente, para ayudar a que las futuras actividades de conservación sean lo más eficientes posible, se requiere una presentación más explícita de las prioridades de conservación por las organizaciones que actualmente no tienen modelos de prioridades así como un mejor registro de los gastos de las organizaciones con prioridades publicadas.

Palabras Clave: áreas prioritarias para conservación, inversión en conservación, modelos de prioridades, ONGs de conservación

Introduction

In the face of accelerating threats to biodiversity (Lawton & May 1995; Pimm et al. 1995) and conservation funding that remains far below the $20–25 billion/year thought to be necessary to achieve effective global conservation (James et al. 1999, 2001), international conservation nongovernmental organizations (NGOs) have developed or are beginning to develop prioritization systems to help make conservation investment more strategic. (All monetary units are in U.S. dollars unless otherwise stated.) These priority-setting efforts identify high-priority areas based on a variety of types and combinations of factors, including species endemism and diversity, habitat representation, ecosystem function, predicted threats, and many other geographic, ecological, economic, social, and threat-based criteria (e.g., Ando et al. 1998; Olson & Dinerstein 1998; Margules & Pressey 2000; Myers et al. 2000; Kareiva & Marvier 2003; O'Connor et al. 2003). For example, Conservation International (CI) promotes its well-known hotspots that synthesize floristic diversity and anthropogenic threats (Myers et al. 2000).

However, only three NGOs—CI, Birdlife International (BI), and World Wildlife Fund (WWF)—have developed priority models that are spatially explicit and global in scale. Most other NGOs have yet to complete global priority setting, have priority models that are not spatially explicit, or have decentralized planning efforts that preclude global analyses. Importantly, CI, BI, and WWF explicitly intended their priority models to serve as "a map guiding conservation investments" (Olson & Dinerstein 1998) or a "'silver bullet' strategy" to guide international conservation spending (Myers et al. 2000). In other words, these organizations produced these priority models to influence not only how their own organization does business but also how other conservation organizations do business. Such expectations justify evaluating if and how these highly publicized priority models influence the way conservation monies are being spent. Furthermore, regardless of the relationship between spending and priorities, strategic allocation of future conservation action requires a global view of current spending patterns.

Priority models will always be controversial. An organization that focuses on protecting reptiles, for example, may find little value in CI's hotspots, BI's important bird areas, or WWF's ecoregional approach to conservation. Here we assumed instead that all the priority models capture different but equally important aspects of biodiversity and compared country-level spending patterns of global conservation organizations to these priority models. We also evaluated spending relative to the amount of area identified by all three NGOs, which we call consensus areas. Such consensus areas provide a logical basis for prioritization by conservation organizations without their own priority schemes, and can serve as a useful second-order prioritization model for conservation organizations to use when allocating money among their own priority areas.

Ubiquitous limitations on conservation funding require efficient approaches to the allocation of time, energy, and financial resources (Mace 2000). The analyses we present are an important step toward understanding the efficiency of current conservation actions and identifying opportunities for improvement. Our analyses do not address the efficacy or appropriateness of conservation spending because funding decisions are made for a variety of legitimate nonbiological reasons, but they can provide insight into the relationship between biological and threat-based priorities and conservation actions. Importantly, these analyses provide the first global audit of conservation spending by major nongovernmental organizations.

Methods

GIS Data

We used geographic information system data from the prioritization maps of WWF (Global 200), CI (hotspots and wilderness areas), and BI (important bird areas; Myers et al. 2000; TNC 2000; BI 2004) to determine total area (square kilometers) within each country identified by each of these NGOs as a conservation priority and the

size of the overlap of these areas (the three, two-NGO overlaps and the consensus, three-way overlap). We then calculated the area of each country covered by each priority model. This was done by converting each priority model to a common raster grid with a cell size of 0.1° (approximately 10 km at the equator) and calculating the number of priority pixels in each country. The ratio of priority pixels to total pixels was multiplied by country area to estimate priority area. These priority data were aggregated to the country level so that comparisons could be made with fiscal data (data available online from www.nceas.ucsb.edu/~halpern/html/ConBioAppendix.htm). Countries were also classified as containing some or no priority area (single NGO or overlap model).

Fiscal Data

Ironically, the three NGOs most active in priority setting (WWF, CI, and BI) could not provide data documenting spending by country because, according to the finance offices of these organizations, they currently have no way of tracking spending at the regional or national level. This prevented us from directly comparing priorities and conservation effort for individual NGOs. Data on spending were available for five other international conservation organizations, however (World Bank, Global Environment Facility [GEF], The Nature Conservancy [TNC], Wildlife Conservation Society [WCS], and the World Conservation Union [IUCN]), allowing for an evaluation of the realized leverage of published priority models and the current pattern of global conservation spending. For three of the five conservation organizations for which we could get fiscal data, only a single year's data were available, so we focused on a single-year "snapshot" of funding (data available online from www.nceas.ucsb.edu/~halpern/html/ConBioAppendix.htm).

Fiscal year 2002 (FY02) data for conservation spending by the World Bank came from their Web site (www.worldbank.org) under projects that fell into their Biodiversity category (under Global Public Goods Priorities, subcategory Environmental Commons; accessed May 2004). Data from fiscal year 2002 (FY02) for GEF came from www.gefweb.org under their biodiversity category (accessed May 2004). The GEF often funds projects through the World Bank, so these two datasets were compared and duplicates removed.

For both organizations, multiyear grants and loans that overlapped FY02 were divided by the number of years in the grant to estimate the amount spent in FY02. For World Bank data, grants and loans with no start or closing data were not included. The GEF grants under $500,000 did not have Web-accessible documentation, so we assumed they were single-year grants. For both World Bank and GEF grants that had a start date but no closing date or duration of grant listed (World Bank $n = 22$, GEF $n = 52$), we assigned the median length of all grants with duration data listed that were within $100,000 of the grant in question and included those that overlapped FY02. Most regional and global grants from these organizations listed the countries to which the money was allocated. We divided equally among all listed countries the total money from that grant given in FY02 (World Bank: $8.2 million; GEF: $13.5 million). Regional and global grants without countries listed were not included (World Bank: $9.5 million; GEF: $3.0 million). In all, 160 World Bank grants and loans totaling $406 million and 189 GEF grants totaling $175 million were included.

Other financial data were provided by Steve McCormick and Randall Curtis (TNC), Steven Sanderson (WCS), and Sally Jeanrenaud (IUCN). Data from TNC and IUCN were for FY02, and data from WCS were FY03. Spending by TNC totaled $793 million, which included $401 million in land acquisitions within the United States. The Wildlife Conservation Society spent $26 million and IUCN spent $70 million. For these organizations, some financial data were reported at regional or continental scales rather than at the national scale. Such data from WCS ($3.8 million) were resolved to country with help from Meade Love Penn. Regional monies from IUCN were divided equally among all countries within the region listed on their Web site (www.iucn.org; $14.2 million). Of the $1,520,478,664 spent by these five conservation organizations, only 3.3% was omitted from analyses because it could not be allocated to the country level. The estimated amount of spending from WWF, CI, and BI that could not be included in the analyses totaled $600 million (roughly $300 million from WWF, $65 million from CI, and $235 million from BI).

Data Analysis

Total conservation spending in each country was calculated as the sum of spending in the country by all five conservation organizations. Because the efficiency of conservation spending must account for both the benefits (i.e., achieving conservation goals) and the costs associated with any action (Ando et al. 1998; Balmford et al. 2000, 2003), we repeated analyses with total money spent in each country divided by the gross domestic product (GDP, in U.S. dollars) and, separately, by the per capita national income (PNI) index. The GDP data for 2002 were available for 226 of 251 countries (Ferraro 2003), whereas PNI data were available for 190 countries. Such adjustments account for conservation costs differing among countries. Results were not significantly different between GDP- and PNI-adjusted spending, so we focused on GDP-adjusted analyses because these data were available for a greater number of countries. Because most international organizations incur at least some of their expenses on goods and services that track international rather than in-country market rates, however (e.g., professional services and equipment), the simplest, unadjusted data may best reflect actual conditions for most organizations.

Because of the high skew in spending data, we used a Mann-Whitney U test to evaluate whether spending was greater in countries with some versus no priority area (consensus or individual). We also used two-tailed t tests (assuming unequal variance) to compare average spending levels in countries with zero ($n = 64$) versus one ($n = 41$), two ($n = 80$), or three ($n = 66$) NGOs identifying area within the country as high priority. Correlation analysis was used to compare the amount of area prioritized by each of the three priority models and the consensus model and to compare the amount of money spent per country by the five organizations with spending data.

We used standard linear multiple regression analysis to evaluate the relationship between spending and priorities, with the three individual priority models, the three two-way overlap models, and the three-way consensus model as independent variables and the total spending by the five organizations as the dependent variable. Under a linear model, conservation money should be spent on a per area basis. This is a reasonable assumption because NGO priority models have as their output the spatial distribution of priority areas and both WWF and BI are explicit about their priority areas being of equal importance. Conservation International has a method for ranking its hotspots, but they do not rank their wilderness areas. Linear regression models were used to evaluate the relationship between individual priority models (WWF, CI, BI, and consensus) and country-level spending.

The mismatch (M), or residual, between actual money spent in a country and expected money spent was calculated as $M = [S - (b * P)]$, where S is the observed spending in a country, b is the slope of the regression, and P is the amount of priority area for the country. When $M = 0$, spending perfectly matches expectations given the amount of priority area in a country. Deviations from zero reflect aspects of prioritization and allocation not predicted by the priority maps (e.g., opportunity, politics, or expertise). The magnitude of the mismatch relative to the amount of money spent in each country was then calculated as M/S. All analyses were repeated excluding the United States because it was an extreme outlier.

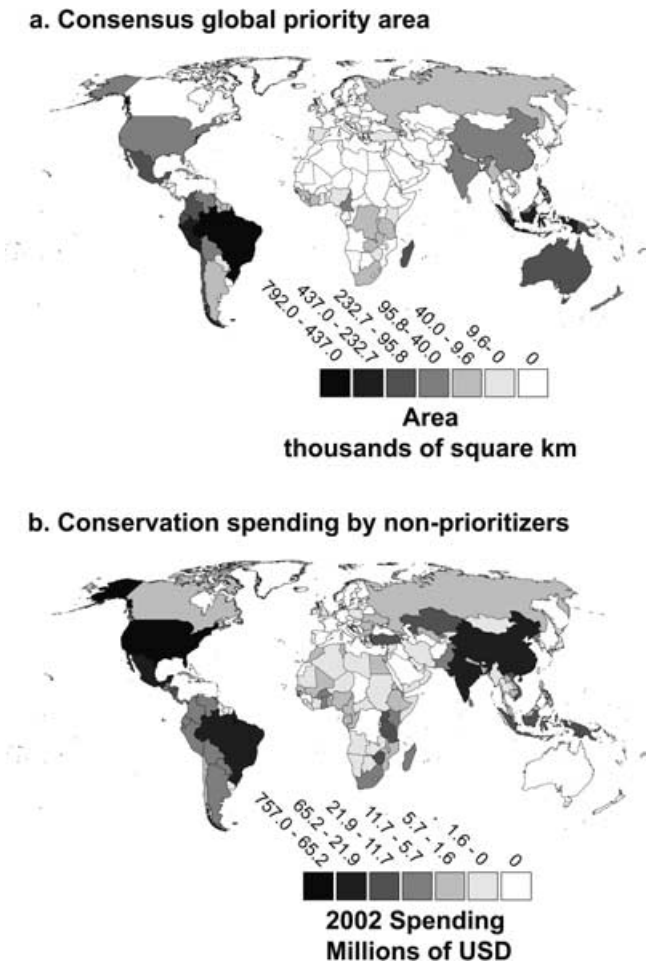

Figure 1. (a) Amount of consensus area (overlap of three priority models) and (b) total conservation spending per country. Countries are shaded categorically by the amount of total land area classified as consensus area. In (a) consensus is calculated as the amount of area within a country identified by World Wildlife Fund, Conservation International, and Birdlife International as priority conservation area. In (b) total spending is the sum from five major global conservation organizations (see Methods).

Results

The three NGOs with global priority models prioritize different total amounts of the world's terrestrial surface. World Wildlife Fund prioritizes 40.2% of all land on Earth (in 155 of 251 countries), CI prioritizes 13.4% (in 127 countries), and BI prioritizes 7.0% (in 117 countries). These priority areas largely represent different locations; areas identified as priority by all three NGOs cover 3.3% (in 63 countries; Fig. 1a).

Total global conservation expenditures for FY02 that could be assigned to countries were $1,470,344,794, with more than half of that (51%) spent in the United States (Fig. 1b). When using absolute dollars spent, average spending in countries with some consensus area was significantly greater than in countries with no consensus area (Table 1). Although countries that had two NGOs identifying some area as high priority had greater spending than countries with no priority area, it was not until all three NGOs (WWF, CI, and BI) identified area within a country that spending became significantly higher (t test, 1 vs. 0 NGOs: $p > 0.05$; 2 vs. 0 NGOs: $p = 0.01$; 3 vs. 0 NGOs: $p < 0.0001$). Results were similar when spending was adjusted by GDP or PNI, with the United States

Table 1. Patterns of spending by five conservation organizations (The Nature Conservancy, Wildlife Conservation Society, World Conservation Society, World Bank, and Global Environment Facility) compared with different prioritization models (WWF, World Wide Fund for Nature; CI, Conservation International; BI, Birdlife International).*

	Absolute dollars					
Priority model	*priority*	*no priority*	*ratio*	F	R^2	p
All countries ($n = 251$)						
consensus	$19,651,844.00	$1,230,566.00	16.0	5.39	0.02	0.021
WWF	$8,912,085.00	$917,077.10	9.7	16.53	0.06	<0.0001
CI	$10,549,973.00	$1,044,887.00	10.1	5.45	0.02	0.020
BI	$11,496,905.00	$927,423.10	12.4	3.95	0.02	0.048
Without U.S.A. ($n = 250$)						
consensus	$7,759,105.00	$1,230,566.00	6.3	78.58	0.24	<0.0001
WWF	$4,054,360.00	$917,077.10	4.4	81.90	0.25	<0.0001
CI	$4,625,754.00	$1,044,887.00	4.4	119.00	0.32	<0.0001
BI	$5,070,140.00	$927,423.10	5.5	109.80	0.31	<0.0001
	Gross-domestic-product-adjusted dollars					
	priority	*no priority*	*ratio*	F	R^2	p
All countries ($n = 226$)						
consensus	$2,916.69	$801.69	3.6	12.95	0.05	<0.0001
WWF	$1,724.14	$692.90	2.5	18.53	0.08	<0.0001
CI	$1,879.58	$808.41	2.3	17.38	0.07	<0.0001
BI	$2,294.12	$485.70	4.7	13.77	0.06	<0.0001
Without U.S.A. ($n = 225$)						
consensus	$2,622.63	$801.69	3.3	11.92	0.05	0.001
WWF	$1,596.60	$692.90	2.3	12.52	0.05	<0.0001
CI	$1,721.46	$808.41	2.1	17.19	0.07	<0.0001
BI	$2,126.92	$485.70	4.4	14.29	0.06	<0.0001
	Per-capita-national-income-adjusted dollars					
	priority	*no priority*	*ratio*	F	R^2	p
All countries ($n = 190$)						
consensus	$11,376.77	$3,868.35	2.9	6.20	0.04	0.014
WWF	$7,509.08	$2,246.34	3.3	9.18	0.05	0.003
CI	$7,354.15	$4,781.15	1.5	9.51	0.06	0.002
BI	$9,568.71	$2,321.38	4.1	9.18	0.05	0.003
Without U.S.A. ($n = 189$)						
consensus	$11,176.63	$3,868.35	2.9	5.87	0.04	0.016
WWF	$7,395.35	$2,246.34	3.3	8.25	0.05	0.005
CI	$7,198.26	$4,781.15	1.5	9.17	0.05	0.003
BI	$9,706.10	$2,321.38	4.2	8.25	0.05	0.005

**Priority and no priority columns represent the average amount of money spent in countries with and without priority area; ratios compare these two values. All entries in ratio column are* $p < 0.0001$ *for Mann-Whitney* U *test of difference between priority and no priority spending. The* F, R^2, *and* p *values are for regression analyses comparing spending and priority area for each country (data not reported).*

excluded from analyses, and when using any of the three individual priority models (Table 1). Substantial amounts were spent in countries without priority area, however (consensus: 16% in 85 countries, 33% with U.S. excluded; WWF: 6% in 28 countries, 12% with U.S. excluded; CI: 9% in 51 countries, 18% with U.S.A. excluded; BI: 8.5% in 51 countries, 17% with U.S.A. excluded), and no money was spent in many countries containing priority area (consensus: 10 countries; WWF: 46 countries; CI: 41 countries; BI: 29 countries). We were unable to test whether WWF, CI, and BI spent money according to their own priority models because, as noted in the Methods, these organizations currently do not track spending in a way that can be directly compared to their priorities. Although this situation is surprising, CI and WWF are working to improve their systems, and public access to the resulting data will create new opportunities to evaluate the utility and effectiveness of conservation priorities.

Correlations between the amount of area within countries classified by different priority models as high priority showed fairly strong overlap (Table 2), indicating general consensus on the relative amounts of different parts of the world most in need of protection. Correlations between the spending patterns of the five conservation organizations with spending data, on the other hand, showed little overlap (Table 2), suggesting that whether unintentionally or by design each organization focuses their spending on nonoverlapping regions of the world.

Table 2. Pearson correlation coefficients (r) for spending per country for pairs of conservation organizations and the amount of priority area identified by different priority models.*

	Spending per country				
	WCS	*TNC*	*IUCN*	*GEF*	*WB*
WCS	1.00	0.96	0.23	0.07	0.04
TNC		1.00	0.23	−0.01	0.02
IUCN			1.00	0.19	0.07
GEF				1.00	0.28
WB					1.00
	Amount of priority area				
	WWF	*CI*	*BI*	*consensus*	
WWF	1.00	0.56	0.64	0.54	
CI		1.00	0.85	0.88	
BI			1.00	0.94	
consensus				1.00	

**Abbreviations: WCS, Wildlife Conservation Society; TNC, The Nature Conservancy; IUCN, World Conservation Union; GEF, Global Environment Facility; WB, World Bank; WWF, World Wildlife Fund; CI, Conservation International; BI, Birdlife International; Consensus, three-way overlap of WWF, CI, and BI. The high correlation between WCS and TNC in spending is driven by both organizations spending most of their money in the United States.*

Multiple regression analyses showed that with all eight factors included (see Methods), 56% of country-level spending patterns could be explained (df = 7,242; $F = 44.23$; $p < 0.001$; $R^2 = 0.56$). However, all two-way overlap model variables had coefficient values equal to 0, so these terms dropped out, leaving only the individual models (WWF, CI, and BI) and the consensus model as important explanatory factors. With only these four variables included in the multiple regression model, 37% of the variation in country-level spending could be explained (df = 3,246; $F = 49.14$; $p < 0.001$; $R^2 = 0.37$).

Linear regression analyses of individual priority models and country-level spending showed that although spending in a country was significantly correlated with the amount of priority area in the country, the strength of the overall relationship was weak ($R^2 \leq 0.06$ for all priority models; Table 1, Fig. 2). In particular, conservation spending was relatively high in China, India, Mexico, and the United States given the amount of priority area in those countries (only the United States when using WWF's priority model), whereas spending was relatively low in Australia (consensus, WWF, and BI priority models), Brazil (consensus and CI), Indonesia (consensus), Russia (WWF), Canada (WWF), and Peru (consensus; Figs. 2a & 3a). With the United States removed from analyses, priority models explained between one-quarter (consensus, WWF) and one-third (CI, BI) of the variation in spending, but when using GDP-adjusted dollars spent (with or without the U.S.A.—it is no longer an outlier point), explanatory power remained low (Table 1).

Only 48% of all countries had GDP-adjusted spending that was within 50% of the expected amount given the amount of consensus priority area within the country (46% for unadjusted spending; see Methods for how these values were calculated). Results were similar when using the other priority models (WWF: 40%; CI: 41%; BI: 42%). These results included the many countries with no priority area and no spending (consensus: $n = 104$; WWF: $n = 68$; CI: $n = 73$; BI: $n = 83$). Interestingly, Tanzania

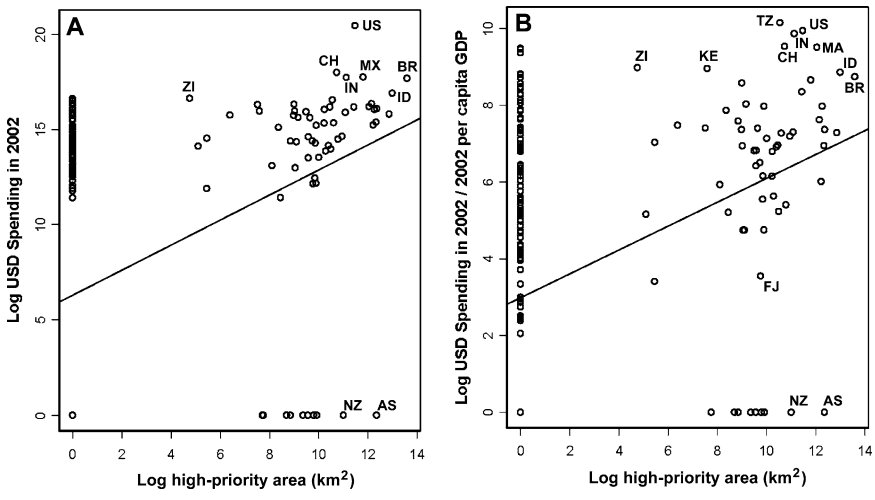

Figure 2. Country-level conservation spending versus total size of consensus priority area (overlap of three priority models). Axes are log(x + 1) transformed so that data near the origin are more distinguishable, but regression statistics were calculated on untransformed values (Table 1). The line is the regression line for transformed data. (a) Consensus area versus total money spent in each country and (b) consensus area versus total gross-domestic-product(GDP)-adjusted money spent. Several points are identified by two-letter country codes: US, United States; CH, China; MX, Mexico; BR, Brazil; IN, India; ID, Indonesia; AS, Australia; NZ, New Zealand; ZI, Zimbabwe; KE, Kenya; MA, Madagascar; and FJ, Fiji.

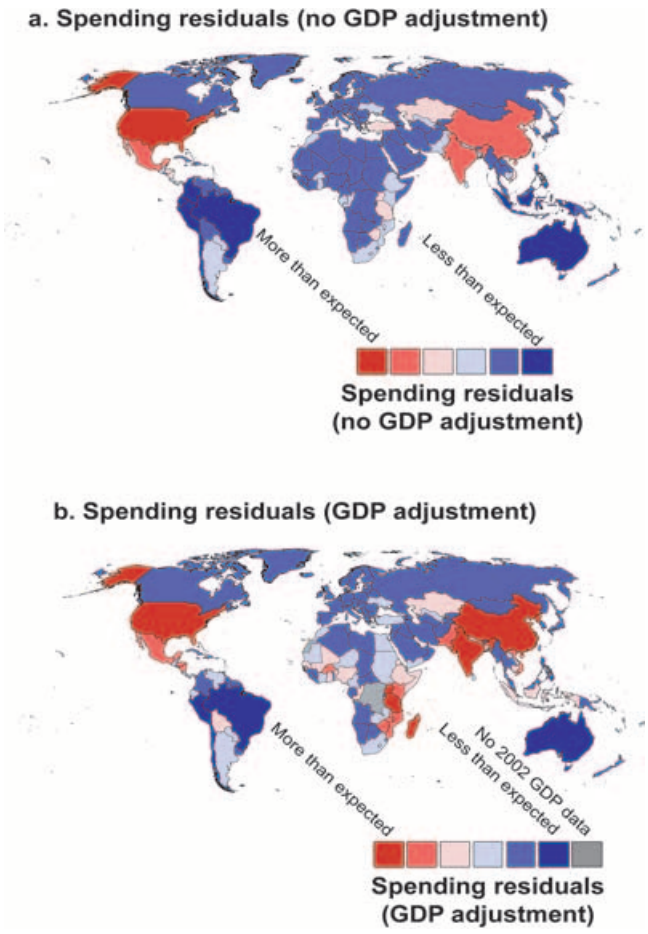

Figure 3. Mismatch values (akin to residuals; see Methods) in global conservation spending: (a) raw data used for analyses and (b) gross-domestic-product(GDP)-adjusted spending within each country used for analyses. Countries are shaded by the standard deviation from the mean in mismatch value based on GDP-adjusted dollars spent in each country. Reds indicate when spending was higher than it should have been given the total amount of consensus area, and blues indicate when spending was too low.

had the highest GDP-adjusted spending (Figs. 2b & 3b), reflecting the fact that the GDP in many countries (particularly in Africa and the Middle East) is so low that even modest expenditures in these countries can appear to be high relative to the amount of priority conservation areas.

Discussion

Although existing priority models (e.g., hotspots, Global 200) combine biological values and threat information to describe compelling foundations for conservation action, getting the money to follow such priorities is a challenge. Our analyses are the first to explicitly and quantitatively track where international conservation organizational spending takes place and how the money is spent relative to priorities. We found important gaps and mismatches in how conservation spending is allocated. Countries that appear underfunded with respect to current priorities, such as Brazil, Indonesia, Australia, and Peru, should probably receive more attention. It is encouraging that overall spending is predominantly in countries containing priority area (Table 1), and even that this spending appears to be coordinated across organizations (Table 2), but our results indicate that global priority models are having little effect on how money is distributed among countries containing high-priority area (see low R^2 values in Table 1). Even under the most optimistic interpretation of our results there remains much room for improvement in coordinating spending and conservation goals.

Our analyses provide an important first step in understanding the role of biological and threat-based priorities in driving conservation spending, but they do not account for the many other important factors that are likely to influence spending patterns. In particular, the actual allocation of conservation funds is likely to be influenced by multiple factors beyond published geographic priorities, including donor wishes, historical relationships, in-country spending by other organizations or government agencies, geographic specialization by organizations, political stability, and opportunity. For example, developed countries are largely ineligible for funding from GEF or the World Bank, and countries with great political instability are not likely to be targeted for conservation spending (Smith et al. 2003). Furthermore, some organizations are explicit about not working in some regions of the world (e.g., TNC does not work in Africa). At least 3 of the 10 gaps in conservation spending with respect to the consensus model, when a country that contains consensus priority area receives no money, in fact, can partly be explained by such factors (Australia, New Zealand, and Spain are all ineligible for funding from the World Bank and GEF, but could, in theory, receive funding from TNC, IUCN, or WCS). Finally, many conservation organizations may be acting strategically in allocating conservation money to avoid spending where other organizations work. Such approaches to the allocation of conservation money are understandable and expected (Kareiva & Marvier 2003; O'Connor et al. 2003). Inclusion of such factors in future analyses is warranted, but our analyses indicate that biological factors are having little to no influence on spending patterns, a situation that is unlikely to be optimal.

Regardless of one's preferred set of explanatory variables (biological, social, economic), it is still of great value to know where conservation monies are being spent relative to conservation priorities. This information is essential for understanding the value of the ubiquitous planning

and priority-setting exercises that appear to command attention at professional meetings, attract many practitioners, and consume significant resources. Organizations need to critically evaluate the efficacy of their prioritization efforts with respect to both their internal activities and their effect on the broader conservation community. We believe that the relatively limited funds available for global conservation (Mace 2000) and the great and increasingly urgent need for more conservation action suggest that it is necessary and appropriate to focus conservation spending on consensus priority areas. Our analyses provide a tool to guide such an approach.

The approach we developed here for identifying these gaps and mismatches is an important step forward in achieving more efficient and effective conservation. Better access to financial data from NGOs would help create a more realistic picture of how conservation monies are spent and will allow for more sophisticated economic analyses (i.e., it may become possible to assign costs to international vs. in-country market rates). Our results were robust to the method of adjustment, however (raw data vs. GDP-adjusted vs. PNI-adjusted), so it is unlikely that the gaps and mismatches in conservation spending would change significantly with higher-resolution financial data. That said, the list of "most mismatched" countries would likely change if additional or different explanatory variables (e.g., government spending patterns, donor wishes) were used in similar analyses.

Using adjusted spending (GDP or PNI) as a measure of relative conservation costs and benefits illustrates how the purchasing power of a dollar in many countries is high enough that even countries with low absolute spending have high adjusted spending. Similarly, it would take only relatively small increases in spending to make conservation effort better match expectations in many "underspent" countries. Such increases in spending would still not result in sufficient conservation spending globally, just spending that is more in line with established priority models. It is also clear that the United States receives a disproportionate share of conservation money by any measure, but this is not a justification for reducing conservation spending in the United States. Even in the United States, conservation spending remains well below recommended levels (Shaffer et al. 2002). The most efficient way to address this bias is to increase conservation spending in low-income countries, where a dollar goes much further. The effectiveness of this strategy, however, will be determined by the ratio between costly centralized expenses that are incurred at international market rates (e.g., professional services and equipment) and local expenses (e.g., park guards).

Conservation organizations increasingly recognize the need to develop explicit, transparent, and rational systems for the allocation of scarce resources among competing priorities (Christensen 2002, 2003; Balmford et al. 2003; Stephens 2004). These efforts will involve a balance between systematic planning and informed opportunism (Meir et al. 2004). The credibility of extensive and expensive conservation planning efforts, however, depends on our ability to find and quantify the link between priorities and effort. At the moment, we lack the data necessary to understand where on this continuum conservation actions fall. Our evaluation of the relationship between financial allocations and stated priorities provides a simple first step in this analysis and suggests that conservation priority systems may be influencing the flow of conservation investments, although this influence appears to be relatively small and limitations in data make it difficult to establish causal relationships. Regardless, conservation organizations should first ensure they have a system in place for evaluating how well spending matches stated goals and priorities before continuing to spend money prioritizing. Conservation priority systems have the potential to be powerful and influential tools, but it is time to balance enthusiasm for their potential with a thorough analysis of their actual impact on conservation action.

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