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SUPPLEMENTARY INFORMATION

Supplementary Methods

1. Glossary of Terms

Given the complexity and hierarchical nature of the Index, we have defined a number of terms with precise meanings to help with communication and clarity. Many of these are also illustrated in Figure S1. Terms are listed in hierarchical order from broad to specific; terms not listed here are presumed to carry their expected and typical meaning.

Health: A healthy ocean sustainably delivers a range of benefits to people now and in the future.

Region: Region is a general term to connote the reporting scale for an Index score and can be global, regional or country- specific. Results reported here are national in scale. Future iterations of the Index will be calculated for case study regions.

Goal: One of ten public goals that are widely recognized for their important benefits for supporting human well-being and sustainable ocean ecosystems. We compute scores for each goal using four dimensions described in detail below (section 2). Each goal has a single unitless score per region representing the current status and its likely future trajectory.

Sub-goal: Several goals have sub-goals for which data on all four dimensions exist, allowing calculation of a complete sub-goal score. In these cases the goal is the average of these sub-goals (see section 6).

Dimension: A dimension is an aspect of a goal that contributes to its current status or likelihood of being able to sustainably deliver that goal in the future. The four dimensions used are Status, Trend, Pressures and Resilience and are described in detail in section 2. We compute each dimension based on various components and data layers that are common across regions. Each dimension has a single unitless score per goal per region that ranges in value from 0-1.

Status: The current value of a goal or sub-goal relative to its reference point. See section 2A for details.

Trend: The recent change in the value of the Status. See section 2B for full details.

Pressures: Anthropogenic stressors that negatively affect the ability of a goal to be delivered to people. Pressures can affect either ecological or social (i.e., human) systems. See section 2C for details.

Resilience: Social, institutional, and ecological factors that positively affect the ability of a goal to be delivered to people. See section 2D for details.

Composite Indicators: A composite indicator is formed when individual indicators are compiled into a single index on the basis of an underlying model. Many dimension scores, all goal scores and the overall Index score are composite indicators.

Indicator: An indicator is a direct measure of something that is used as a proxy for a broader concept, status or condition that is not directly measured [1]. It is not a specific term and instead depends on how one defines the indicator.

Component: The metrics that are used to calculate the value of a dimension. Components may be calculated using a single data layer or multiple layers depending on the goal and the dimension being assessed.

Data Layer: Actual data (proxy or otherwise) used to measure a component (or part of a component).

2. Conceptual Framework and Model

Our approach measures ocean health as a function of ten widely-held public goals (section 6, Table S1) for what the ocean can provide to people; each is described in great detail below. The ten goals include Food Provision, Artisanal Fishing Opportunities, Natural Products, Carbon Storage, Coastal Protection, Coastal Livelihoods and Economies, Tourism and Recreation, Sense of Place, Clean Waters, and Biodiversity. The Index therefore recognizes linkages between human societies and ocean ecosystems, and that people are part of coastal and ocean systems. The Index emphasizes sustainability and values both conservation and extractive use. Because our analysis focuses on such a wide range of public goals at a global scale, data sources span more than a single year. Therefore, our results quantify ocean health in its recent current state based on the best available data.

Our strong focus on sustainability and coupled human-natural systems drives our methods for calculating a score for each goal. Sustainability requires that both the current status and likely direction of change in status influence the score; we explicitly penalize scenarios that maximize value today with no concern for future conditions. However, we also explicitly focus on the near-term future (roughly 5 years) rather than longer-term sustainability because near-term time frames are most relevant to policy makers and long-term future states are difficult to predict. Long-term consequences from pressures like habitat loss and climate change are clearly also important but not assessed here.

The focus on coupled systems requires that both ecological and social data drive the score. Therefore, each goal score is calculated along four dimensions – current status, recent trend, existing pressures, and expected resilience in the near-term based on current management actions. Each of these dimensions includes ecological and social data (where and when appropriate). Below we describe in detail our entire methodology and provide a conceptual diagram of how we calculated an Index score based on this framework (Fig. S1).

The Index is designed to be flexible to accommodate different scales and geographies of interest and different and new types of data. However, two constraints must be adhered to for the Index scores to be comparable across geographies and be easily recalculated at future dates. First, every unit of assessment within the scope of analysis (in our case, individual or combinations of EEZs within the global analysis; see section 3 below) must have a value for each data layer included in the analysis, unless it is known to not be relevant to a location. In other words, missing data are not acceptable. Adhering to this criterion is critical to avoid influencing the Index score simply because of inclusion (or absence) of a particular data layer for any reporting region. One can meet this criterion by merging different datasets from different parts of the planet to create a single data layer (e.g., as is done for the Worldwide Governance Indicators (WGI); see section 7 below for details on this data layer) or by modeling data gaps using reasonable and testable assumptions (e.g., as we do for several of our data layers; see model and data layer descriptions in sections 6 and 7 below).

The second constraint requires the use of only existing datasets, and thus did not permit new data collection. This was necessary both to complete the project in a reasonable amount of time and to enable relatively easy recalculation of the Index in the future. Consequently, we gave a particularly high premium to the inclusion of publically available datasets that have strong external support to be gathered and processed each year, although future iterations of the Index could use new datasets as they become available.

We emphasize that our approach is intended to indicate current and near-term ocean health, not predict what it will be at any given time in the future. Although one can calculate a percent change to current status in the near-term future based on our models, we do not support this as a method for predicting future status. We do not model socio-ecological systems mechanistically or develop and use production functions that would allow one to run predictive scenarios. Such an endeavor is complex and beyond the scope of this project.

2A. Model

The objective (utility function) of the Index is to maximize its value (I), where I is determined as a linear weighted sum of the scores for each of the public goal indices ($I_1, I_2, \ldots, I_{10}$) and the appropriate weights for each of the goals ($\alpha_1, \alpha_2, \ldots, \alpha_{10}$), such that:

$$I = \alpha_1 I_1 + \alpha_2 I_2 + \ldots \alpha_{10} I_{10} = \sum_{i=1}^{N} \alpha_i I_i \,, \qquad \text{(Eq. S1)}$$

where $\sum \alpha_i = 1$. Derivation and application of the weights (α_i) is described below (section 4). Each goal score, I_i, is a function of its present status x_i and an indication of its likely near-term future status $\hat{x}_{i,F}$:

$$I_i = \frac{x_i + \hat{x}_{i,F}}{2} . \qquad \text{(Eq. S2)}$$

The present status of goal i, x_i, is its present status value, (X_i), relative to a reference point, $X_{i,R}$, uniquely chosen for each goal and rescaled 0-100 such that:

$$x_i = \frac{X_i}{X_{i,F}} . \qquad \text{(Eq. S3)}$$

For the Food Provision goal, where exceeding the reference point is possible but not desirable because it is unsustainable, the calculation of the present state accounts for this (see goal-specific models below, section 6A).

The reference point, $X_{i,R}$, can be determined in four potential ways, depending on the conceptual and data constraints for each goal[2]. Reference points can be estimated mechanistically using a production function (e.g., maximum sustainable yield, MSY, for fisheries), spatially by means of comparison with another region (e.g., country X represents the best possible known case), temporally using a past benchmark (e.g., historical habitat extent), or in some cases via known (e.g., zero pollution) or established (e.g., 20% of waters set aside in MPAs) targets. Past benchmarks can either be a fixed point in time or a moving target (e.g., five years prior to most current data). The type of reference point used (Table S1) can have important implications for interpretations of how a goal is doing in any given country (see specific goal models, section 6).

For six of the ten goals, production (or delivery) of the goal involves activities by people that can negatively feed back on the potential of the goal to be realized (e.g., overfishing ultimately reduces the total catch that is available). The six goals include Food Provision, Artisanal Fishing Opportunity, Natural Products, Tourism and Recreation, Coastal Livelihoods and Economies, and Sense of Place (e.g., visiting cultural sites can negatively impact them). This type of sustainability is built into the Status assessment for the goals for which it can be assessed (see specific goal models below for details, section 6) and assumed to be neutral in other goals (e.g. Sense of Place) for which we currently do not have research or data to inform how this feedback works.

The estimate of a goal's likely near-term future status, $\hat{x}_{i,F}$, is a function of four dimensions: present status, recent trend (over the past ~5 years) normalized to a reference value, T_i (i.e. the

Table S1. Type of reference point used for each goal and sub-goal. Details are provided in goal models in section 6. Additional information regarding selection of reference points can be found in Ref [2].

Goal	Sub-goal: component	Reference point type
Food Provision	Fisheries	Functional relationship
	Mariculture	Spatial comparison
Artisanal Fishing Opportunities		Functional relationship
Natural Products		Temporal comparison (historical benchmark)
Carbon Storage		Temporal comparison (historical benchmark)
Coastal Protection		Temporal comparison (historical benchmark)
Coastal Livelihoods & Economies	Livelihoods: jobs	Temporal comparison (moving target)
	Livelihoods: wages	Spatial comparison
	Economies	Temporal comparison (moving target)
Tourism & Recreation		Spatial comparison
Sense of Place	Iconic Species	Known target
	Lasting Special Places	Established target
Clean Waters		Known target
Biodiversity	Habitats	Temporal comparison (historical benchmark)
	Species	Known target

change in x_i relative to the reference point); current cumulative pressures to the goal (p_i); and social and ecological resilience to negative pressures (measured as a function of governance and social institutions in place to protect or regulate the system and the ecological condition of locations; r_i).

The role of the Resilience and Pressure dimensions is to improve our understanding of the likely near-term future condition by incorporating additional information beyond that provided by the recent trend, T_i. Our approach identifies those factors that negatively affect a goal as Pressures and those that positively affect a goal as Resilience (see section 2C, 'Calculating Pressures,' and section 2D, 'Calculating Resilience'). The recent trend captures the direction and rate of change based on conditions in the recent past (we used the last 5 years of data to calculate Trend; see section 2B, 'Calculating Trends'). However, some Pressure or Resilience measures that were in existence in the past may have a cumulative effect that has not yet manifested itself (e.g., for p: fishing pressure may have increasingly negative impacts as successive year classes of fish become increasingly less abundant; for r: establishment of a marine protected area (MPA) may require a number of years before its benefits become apparent). In addition, the recent trend does not capture the effect of current levels of Resilience (r) and Pressures (p). The expectation of a likely future condition suggested by the Trend will become more or less optimistic depending on the effects of r and p. If the effects are equal they cancel each other out.

Both r_i and p_i are scaled such that $0 \leq r_i, p_i \leq 1$, with 1 being the maximum value in both cases. The Trend (T_i) is constrained to $-1.0 \leq T_i \leq 1.0$ (i.e., values outside this range are clamped to range end values). The likely future status is then defined as:

$$\hat{x}_{i,F} = (1+\delta)^{-1}\left[1+\beta T_i + (1-\beta)(r_i - p_i)\right]x_i \qquad \text{(Eq. S4)}$$

where the discount rate (δ) is set to 0 initially (see section 8). Beta (β) represents the relative importance of the Trend versus the Resilience and Pressure terms in determining the likely trajectory of the goal status into the future. We assume β=0.67 based on the idea that the direct measure of Trend is a better indicator of future (five years) condition than indirect measures of Pressure and Resilience. This assumption makes Trend twice as important; it is not possible to derive this weight empirically, and so we test the sensitivity of the results to this assumption (see section 9, Sensitivity Analyses, and Supplementary Results). We presume a roughly 5-year horizon (t+1 = 5) for the likely future status and therefore assume $\delta = 0$ (addressed in section 8); we test the sensitivity of results to this assumption (see Supplementary Results below).

It is important to note that with high-resolution spatial and temporal data that perfectly measure all four dimensions within a goal, the likely future condition would approach the current Status as current Status approaches its maximum value. In other words, the likely future status cannot exceed the maximum possible value for Status for each goal, which is 1.0 in nearly all cases. In reality data are rarely perfect, creating potential situations where likely future condition exceeds 1.0. To address these cases, we implemented two rules that follow logical constraints. First, if current Status = 1.0, then trend is set = 0.0, since any Trend > 0.0 in those cases must be due to incomplete or imperfect data. Second, given that $x_i^{\max}$ is equal to the maximum attainable status given realistic constraints, then if poor data quality or other practical constraints lead to $\hat{x}_{i,F} > x_i^{\max}$ we set $\hat{x}_{i,F} = x_i^{\max}$.

The maximum possible value (U) is the sum of the maximum possible values for each goal indicator. Because this maximum value is the best possible value today and in the future, $r > p$ and T = 0 (if at max, the best trend is flat) and $x_i^{\max} = X_{i,R}$ where the reference state has been normalized to 1.0. U is then:

$$U = \sum_{i=1}^{N} \alpha_i x_i^{\max} \ . \qquad \text{(Eq. S5)}$$

We can therefore calculate the Index (I):

$$I = \frac{\sum_{i=1}^{N} \alpha_i I_i}{U}. \qquad \text{(Eq. S6)}$$

This formulation also allows for the assessment to be conducted using the goals that are of interest/use for a particular location. For example, few extractive use public goals are relevant to or valued in uninhabited regions, so calculation of the Index for these areas is based on a subset of goals. In this way, uninhabited areas that are pristine areas could score very high, even though they are not delivering more direct market-based benefits to people.

This last point has an important implication for how the Index is calculated, especially at larger (or global) scales. If data do not indicate that a goal is not relevant to a location (e.g., no natural products have ever been harvested from a location), one must infer, determine, or assume which of the ten public goals are desired for a given location, and in what proportion relative to all other goals. It is impossible to determine the best relative proportions to assume for each country and region of the ocean, so unless data suggest otherwise we simply assumed all goals are important within EEZs. We have not yet calculated Index scores for Areas Beyond National Jurisdiction or High Seas due to data limitations, but scores for these areas would be based on the subset of goals and sub-goals that are non-coastal, specifically: Food Provision (Fisheries only), Sense of Place (Iconic Species only), Livelihoods (using the few sectors that exist in the high seas), Clean Waters, and Biodiversity.

The Index model formulation creates some inertia in overall goal scores due to the Status driving assessment of both current and likely future states, but the Index is also designed to be responsive to changes in Trends, Pressures, and Resilience, the measures most likely to change in the near-term in response to management action. Specifically, the likely future state can change the overall goal score by +/-50%, depending on the values of each of the dimensions.

2B. Calculating Trends

The Trend is calculated as the slope of the change in Status based on recent data. Whenever possible, Trends were calculated as the slope of annual data over the previous five years; we included values from previous years and slopes calculated on as few as two data points (in very few cases) when faced with incomplete datasets. Because Status values ranged 0-1, Trends primarily ranged -1.0 to 1.0; we constrained values outside this range to these range end points because such steep slopes are usually a result of extremely unusual events or insufficient data.

When Status data existed for only a single year, we used proxy data to calculate Trends, using these same methods. Cases where this was necessary are indicated in data tables for each goal model described (i.e. where the data listed for Trend are not simply change in Status scores through time), and the methods used to calculate Trends for these cases are described in detail in the goal-specific models (section 6). For all goals we included non-significant trends as their non-zero slopes. We chose to include these values for two key reasons: 1) We were not trying to predict the future but instead only indicate likely condition. 2) In nearly all cases we did not have sufficient data to conduct more rigorous trend analyses.

In all cases we calculated the annual rate of change (i.e., the slope) which we then multiplied by five to give an estimation of where the Status is heading in the near-term future (i.e., about 5 years). We recognize that this calculation implies we are forecasting the future Status, but without this multiplication one implicitly looks just a single year into the future (i.e. the slope is just the annual rate of change). Our goal is to look beyond just a single year into the future when assessing likely future condition (i.e. sustainability), but we know that many things affect Trends in the near-term future that will modify them from being a simple linear trend (as we presume here), including altered pressures and resilience responses, nonlinear patterns in system response, stochastic environmental and biological variability, and simple bounding conditions (Status cannot go below zero or above 1.0, and so the Trend must level off as it approaches these values).

It is important to note that the Trend does not distinguish between different causes of the same potential Trend. For example, declines due to unsustainable harvest of a resource can look identical to declines due to restrictions placed on resource users to allow the resource to recover. It also may be too short a time frame to determine true trends or the causes of those trends, but the intent here is more about informing the likely near-term trajectory.

2C. Calculating Pressures

To calculate Pressures for each goal (p_x) we evaluate both ecological (p_E) and social pressures (p_S), such that:

$$p_x = \gamma * (p_E) + (1 - \gamma) * (p_S) , \qquad \text{(Eq. S7)}$$

where γ is the relative weight for ecological vs. social pressures and is set equal to 0.5. At global scales, little evidence exists to support unequal weighting of ecological and social pressures for most goals; furthermore, unequal weighting would require unique values for each goal and there is currently no empirical work to guide such decisions. At local or regional scales there may be clear evidence for unequal weights per goal and γ should be adjusted accordingly. Total Pressure scores therefore range between 0 and 1.0.

We assessed five broad, globally-relevant categories of ecological stressors: fishing pressure (p_f), habitat destruction (p_{hd}), climate change (including ocean acidification) (p_c), water pollution (p_p), and species introductions (invasive species and genetic escapes) (p_{sp}) (Table S2). The five categories are intended to capture known pressures to the social-ecological system associated with each goal, i.e. impacts that are assumed to significantly affect the ecological and social state of a system, and are derived from other systems of categorizing classes of stressors[3,4]. Because many ecological stressors within these categories have specific consequences for goals, we assessed and ranked separately each ecological stressor within these categories.

Table S2. Categories of ecological pressures and specific stressors within each category.

Pressure Category	Stressor Type
Fishing	Commercial high bycatch (e.g., trawl fishing)
	Commercial low bycatch (e.g., purse seine)
	Artisanal low bycatch (e.g., hook and line)
	Artisanal high bycatch (e.g., dynamite fishing)
	Targeted harvest
Habitat destruction	Marine subtidal soft bottom
	Marine subtidal hard bottom
	Intertidal
Climate change	Sea surface temperature anomalies
	UV radiation
	Ocean acidification
Water pollution	Nutrients
	Chemicals
	Human pathogens
	Marine debris
Species pollution	Invasive species
	Genetic escapes

There were a number of ecological pressures not included in our assessment here, including altered sediment regimes, noise and light pollution, many toxic chemicals from point sources, nutrient pollution from atmospheric deposition and land-based sources other than fertilizer application to agricultural land, and sea level rise. In all cases, global data do not exist in a format that would allow for adequate comparisons within and among countries. Future global or regional iterations of the Index could easily include these data where and when they are available using the above pressure assessment methodology. In cases where the cumulative impact of pressures for which we have data is less than 1.0, future inclusion of these additional pressures will increase the pressures score and decrease the goal and Index scores.

Ecological pressures were assessed by their relative impact within each goal. For each goal and sub-goal, and when possible component (e.g. specific habitat), we determined which ecological stressors exert pressure, and then ranked them as having 'high' (score = 3), 'medium' (score = 2) or 'low' (score = 1) impacts on the goal, sub-goal or component at a global scale (see Table S25 for Pressure rankings for all goals). Wherever possible we relied on peer-reviewed literature to establish these rankings (see Table S28), and relied on our collective expert judgment in other cases where information is not available in the literature. We chose to rank stressors rather than use a binary system of yes/no to each pressure because the range of consequence of different pressures on each goal can be quite large and to classify all those pressures as a simple 'yes' would unduly give too much influence to the weakest stressors. For example, the provision of food is most heavily impacted by unsustainable, high-bycatch fishing, but pollution does have some impact on fish stocks. Without a weighting system, these stressors would be treated equally in their impact on the Food Provision goal.

To account for the cumulative effect of stressors, we summed the weighted intensities of each stressor within a Pressure category (p_i) and divided by the maximum weighted intensity that could be achieved by the worst stressor (max = 3.0) such that:

$$p_i = \frac{\sum_i^M w_i s_i}{3}, \qquad \text{(Eq. S8)}$$

where w_i is the stressor-specific sensitivity weights (i.e., ranks, from Table S25) and s_i is the data-derived intensity of the associated stressor (which is scaled 0-1). If $p_i > 1.0$, we set the value equal to 1.0. This formulation assumes that any cumulative pressure load greater than the maximum intensity of the worst stressor is equivalent to maximum stressor intensity. The intensity data layers for stressors come from a wide range of sources (see Table S23).

Overall ecological pressures (p_E) are then calculated as the weighted-average of the Pressure categories relevant to each goal, with weights set as the maximum rank in each Pressure category (w_{i_max}), such that:

$$p_E = \frac{\sum_i^N (w_{i\_\max} * p_i)}{\sum w_{i\_\max}}. \qquad \text{(Eq. S9)}$$

Stressors that have no impact drop out rather than being assigned a rank of zero, which would affect the average score.

The calculation of ecological pressures is sensitive to the number of stressors within each category (but not to the number of categories). Inclusion of additional stressors within categories would require careful calibration of ranks so that the cumulative effect of a larger number of stressors does not exceed the maximum weighted stressor intensity to quickly simply because of including a greater number of stressors.

It is likely that some pressures interact synergistically[5], but in the absence of adequate data to quantify such interactions [6], the approach assumes that pressures do not interact with each other and instead function in an additive manner – if a Pressure category is important for a goal, it can single-handedly impede the delivery of that goal; if two categories are important they essentially have equal potential to affect the goal, and so on. In all cases the impact of pressures is calculated uniquely for each region based on which stressors are relevant to a goal but with the same set of pressure weight ranks (w_i). For the goals for which pressure ranks were assigned for specific habitats or livelihood sectors, we calculated the weighted sum of the pressures for only those habitats or sectors that are present in the country, where the weights are mean weights across all habitats or sectors in that country and where a weight for a pressure is zero if a habitat or sector doesn't use a pressure but one or more habitats or sectors within the country do.

The pressure ranks are based on a rough estimate of the global average intensity and frequency of the stressor. We recognize that this will create over- and under-estimates for different places around the planet, but to address such variance in a meaningful way would require a separate weighting matrix for every single region on the planet, which is not feasible at this time. For global-scale ranks, we focus on the average intensity because any stressor at its absolute maximum level would likely have a severe enough impact on all goals, regardless of the rank weight, to keep them from being met. A maximum-impact approach such as that is not useful for ranking relative consequences of stressors at a global scale. For local-scale applications of this framework, such maximum intensities become relevant and important. For example, a massive oil spill should be represented as the maximum intensity of chemical pollution within an area, which would have cascading effects throughout our framework in severely compromising the delivery of most of the 10 goals. We also focused on pressures as they manifest in the near future (~5yrs); we did not

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consider long-term consequences, as these are too difficult to predict and anticipate in a meaningful way given current knowledge. We emphasize that this timeframe has obvious implications for how pervasive but slow-moving stressors such as climate change and ocean acidification were ranked, often leading to lower ranks than would be expected if long-term consequences were assessed.

For social pressures, we primarily used data from the Worldwide Governance Indicators (WGI), a composite of hundreds of different measures that assesses in very broad but comprehensive terms the social structure and functioning of countries, scoring them along 6 component composite indicators: Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law, Voice and Accountability. Details on these data are provided in section 7. We averaged the scores for all six components of the WGI and then rescaled them 0-1, with Pressures then assessed as (1-WGI). For the coastal livelihoods and economies goal, we used one additional data layer to approximate social pressure: the Global Competitiveness Index (GCI; see section 7 for details). If additional social pressure layers are identified for other goals in the future, they would be averaged with the WGI score in this same manner. Social pressures are therefore:

$$p_S = \frac{\sum_i^N z_i}{N}, \qquad \text{(Eq. S10)}$$

where z_i are the social pressure measures specific to the goal (in most cases, only the WGI score). Unequal weighting may be appropriate in some cases but is difficult to assess currently. Finally, to combine the social and ecological pressures, we assumed that each should have the potential to contribute equally to the overall Pressure score (as described in Eq. S7).

A key assumption in our assessment of ecological pressures is that each goal has a linear and additive response to increases in intensity of the stressors. Clearly many ecosystems respond non-linearly to increased stressor intensity, exhibiting threshold responses, and there are likely nonlinear interactions among stressors[7]. Unfortunately little is known about the nature of these types of nonlinearities and interactions[6,8], and so we could not include them in any meaningful way here.

2D. Calculating Resilience

To calculate Resilience for each goal (r_x) we assess three types of measures: ecological integrity (Y_E), goal-specific regulations aimed at addressing ecological pressures (G), and social integrity (Y_S). The first two measures address ecological resilience while the third addresses social resilience. When all three aspects are relevant to a goal, Resilience is calculated as:

$$r_x = \gamma * \left(\frac{Y_E + G}{2} \right) + (1-\gamma) * Y_S \;, \qquad \text{(Eq. S11)}$$

where the three types of measures are all scaled 0-1, and gamma is assumed to be 0.5. We chose $\gamma = 0.5$ so that the weight of Resilience components that address ecological systems vs. social systems were equivalent, based on the same rationale as for ecological pressures vs. social pressures, with the intent, as best as possible, to have Resilience measures directly matched with Pressures.

Ecological integrity, i.e. food web integrity, is measured as relative condition of assessed species in a given location (see ‘marine species’ data layer description in section 7). As measured, it is not directly relevant to all goals and so is omitted in those instances, in which case $r_x = (G + Y_S)/2$. The goals where ecological integrity is not directly relevant include Coastal Livelihoods and Economies, Clean Waters, Tourism and Recreation, the Mariculture sub-goal of Food Provision, Coastal Protection, Carbon Storage, and the Lasting Special Places sub-goal of Sense of Place. In each of these cases there is little evidence that the overall ecological integrity of the natural system as measured here directly affects the value of the goal (or sub-goal) in a broad sense; clearly specific contrary examples exist. Methods for calculating ecological integrity are described below (section 7, Specific Data Layers).

Goal-specific regulations (G) are intended to describe the factors that set rules and regulations to address ecological pressures, and are measured as laws and other institutional measures related to a specific goal. Governance is a function of 1) institutional structures that address the intended objective, 2) a clear process for implementing the institution is in place, and 3) whether the institution has been effective at meeting stated objectives[9]. At global scales it is very difficult to assess these three elements; we usually only had information on whether institutions exist. However, in some cases we had detailed information on institutions that enabled us to assess whether they would contribute to effective management, and thus, increased ocean health. In those latter cases, we gave more weight to those measures. Specifically, we calculated G as a weighted average:

$$G = \frac{\sum w_i G_i}{\sum w_i}, \quad \text{(Eq. 12)}$$

where G_i is the specific regulatory measure (dataset), and w_i is the weight for each i dataset used to assess G based on the quality of information contained in the datasets vis-à-vis estimates of regulation effectiveness (see Table S3). For habitat resilience and fishing resilience (all versions), and the CITES signatories (Convention on the International Trade of Endangered Species), any country without a score is given $G_i = 0$; otherwise, any country without data for G_i is excluded from Eq. 12 for that country.

Table S3. Weights used for each of the regulations, G_i, measured and used in the ecological resilience calculations (see Table S26 for details on which regulations get used for each goal). MPA = marine protected areas; CBD = convention on biological diversity; MSI = mariculture sustainability Index.

Regulation type	**weight**
Habitat resilience -MPA coastal -CBD habitat (survey and signatories)	2.0
Habitat resilience: alternative version -CBD habitat (survey and signatories)	1.0
Fishing resilience: version 1 -CBD habitat (survey and signatories) -MPA coastal/EEZ -Fisheries management effectiveness	2.0
Fishing resilience: version 2 -CBD habitat (survey and signatories) -MPA EEZ -Fisheries management effectiveness -Artisanal fishing: management effectiveness	2.0
Fishing resilience: version 3 -CBD habitat (survey and signatories) -MPA coastal/EEZ -Artisanal fishing: management effectiveness	2.0
CITES signatories	1.0
CBD mariculture (survey and signatories)	1.0
CBD alien species (survey and signatories)	1.0
CBD tourism (survey and signatories)	1.0
CBD water (survey and signatories)	1.0
MSI (traceability and code of conduct)	2.0

Social integrity is intended to describe those processes internal to a community that affect its Resilience. It is a function of a wide range of aspects of social structure, nearly all of which lack global data. As such, we rely primarily on WGI data for each goal as a measure of social integrity, using the average of the 6 components of WGI in all cases (see section 2C above for a description of WGI data and how WGI scores are used for both Pressures and Resilience). This same approach and reliance on these WGI data has been used in a wide variety of other sector-specific ocean related indices[10]. For the Coastal Livelihoods and Economies goal, we also measure sector diversity (see section 7, Specific Data Layers, for more details) and the Global Competiveness Index rescaled from 0 to 1.0 (see Pressures description above). Social Integrity per goal ($Y_{S,x}$) is therefore:

$$Y_{S,x} = \frac{\sum_{i}^{N} Y_{S,i}}{N}, \quad \text{(Eq. S13)}$$

where $Y_{S,i}$ are the social integrity measures specific to the goal (in general, only the WGI score).

Ideally, assessments of social resilience would include state and federal level rules and other relevant institutional mechanisms as well. However, such information is extremely difficult to access for every single country, and so we relied on global datasets that focus on international treaties and assessments. Another key gap is information on social norms and community (and other local-scale) institutions (such as tenure or use rights) that influence resource use and management in many settings. Information on these institutions is also extremely difficult to find at a global scale, although the WGI partly measures their effectiveness through its inclusion of corruption indices.

2E. Calculating Global and Regional Scores

To calculate a global score for the entire Index, we used the following:

$$I_{Global} = \frac{\sum_{z}^{N} A_z I_z}{\sum_{z}^{N} A_z}, \qquad \text{(Eq. S14)}$$

where A_z is the area of ocean region z (in general an EEZ; see Section 3 below on 'Reporting Units') and I_z is the Index score for that region. Alternatively, one can calculate the global score for each individual goal (x_{Global}) as:

$$I_{Global} = \frac{\sum_{z}^{N} A_z I_{z,i}}{\sum_{z}^{N} A_z}, \qquad \text{(Eq. S15)}$$

where I_z is the goal score for each ocean region z. One could then calculate the global Index as the weighted sum of these global goal scores, per equation S7 above.

To calculate I_z for each reporting region, we had to account for the fact that not all 10 goals are relevant to all places, most notably uninhabited islands that constitute unique reporting units and countries that do not have the natural systems to support particular goals (e.g., some countries do not have any of the habitats that provide carbon storage). In these cases, we drop the goals from the region's assessment and redistribute the weight assigned to the removed goal(s) equally to all remaining goals. We used a two-step process to determine which goals (if any) should be excluded from a region. First, if there was a true no-data value for a goal for a country (instead of a true zero value), we assumed this meant that the goal was not relevant to the country. For example, no data exist for exports from uninhabited islands and so such places receive a 'no data' score for this goal. The Natural Products goal would drop out of the overall assessment for those islands. Second, for the special case of uninhabited EEZs, several goals drop out because they are not relevant without a local human population: Artisanal Fishing Opportunity, Mariculture sub-goal of Food Provision, and Livelihoods (as we assess it here, which is based on country-level reporting of economic data). Uninhabited islands should get 'no data' scores for these goals, but because they can be modeled on basin-scale data they may have non-zero values (e.g., Artisanal Fishing Opportunities is based on regional economic data) and thus we made sure irrelevant goals were not included in each reporting region.

2F. Assumptions and Caveats

Our approach to calculating the Index requires a number of key assumptions. First, we assumed that goals and their component parts do not interact across goals in ways beyond those that are built into the calculation of each goal (via shared or correlated data layers). Second, we assumed that for the purposes of calculating the maximum possible value of the Index, the interactions we do include do not significantly affect the ability to achieve the maximum value for each goal simultaneously. In the cases where interactions are roughly the same between two places, the relative difference between Index scores will still be accurate. In the cases where interactions are different between two places, our calculation of the Index will be underestimated in the places with stronger positive interactions and overestimated in the places with stronger negative interactions. As such, it should be possible to achieve a maximum Index score of 100, although we recognize that this will be difficult in many places around the world given existing constraints on how resources are allocated and used. A score of 100 still serves as a useful benchmark against which to compare current conditions.

Third, because we address a relatively short time frame in the future (roughly 5 yrs), we used a discount rate equal to zero. Economic theory suggests that the value of the future state should be discounted relative to the current state, and that this discount rate depends on how long one is looking into the future; setting the discount rate to zero for our short time frame has been shown to be a reasonable assumption[11]. However, as noted below (see Sensitivity Analyses), we evaluated how results changed with non-zero discount rates and found no significant differences (Table S20). It is important to note that a non-zero discount rate requires that the current state of each goal be slightly higher than maximum for the overall Index score to reach its maximum possible value, which pushes the system towards unsustainable outcomes and is counter to the conceptual approach of the Index.

Fourth, we assumed that the Pressures and Resilience measures that we address will manifest their impacts within the near-term time frame that is the basis of the 'likely future state', but recognize this will not always be the case. Fifth, we note here that future updates of the Index using more data, more accurate data, or data better matched to the intent of a goal can lead to the Index score decreasing even when a system may actually be improving. Calculating the updated Index with and without the new types of data will determine if the change is due to changing condition of the system or simply change in the data.

Finally, reference points for different goals are variably ambitious and variably realistic. The consequence is that some goals require a higher standard to achieve a perfect score than other goals. Decisions about appropriate reference points required a balance between practical data constraints and desired targets[2]. This caveat should be kept in mind in any comparison of performance among goals and limits the interpretability of the composite score.

2G. Design Criteria for Indicator Development and Data Selection

Drawing from the vast literature on characteristics of an effective indicator, we developed a list of key criteria to use when designing the Index and choosing specific data layers. Although it was not possible to always meet all of the criteria below, these represent the standards we attempted to meet. Key references that have provided broad overviews of indicator development that support each criterion are included below; a full list of all criteria that we reviewed and how they compare to our selected criteria is available upon request.

1. **Known functional form and reference point**. One needs to have a reasonable idea of the functional form for the response of a goal or component of a goal to changes in intensity of a driver of change, as well as the reference point against which to compare any given state[12-16].
2. **Consistent directional change**. The Index or component needs to change in a consistent direction across systems and geographies to allow for direct comparability across systems[15].
3. **Robust to inclusion of missing values**. Because data quality can vary greatly among and within data sets, components of the Index must be robust to missing or poorer quality data[15].
4. **Responsive to management**. Changes in management or policy need to create changes in the Index so that there is proper incentive for action[13,15-17].
5. **Applicable across scales**. The Index must work at any and all scales to ensure its relevance and applicability to any potential management situation[15,18].
6. **Responds quickly**. The Index needs to respond quickly to any change within the system so that it is meeting the purpose of having an Index[12,13,15,19].
7. **Understandable**. The purpose, intent, and construct of the Index and its components need to be easy to understand and straightforward to communicate[12-17,20].
8. **Multiple methods to calculate**. The components of the Index can be calculated using different methods that allow for and respond to different qualities and quantities of data.
9. **Captures coupled social-ecological system**. Accurately and comprehensively represents the interactions and interdependencies of natural and human systems[13-15].
10. **Allows for discounting**. In cases where components are more or less important, and when considering the Index across different

time frames, it is clear and possible how to include discounting of different parts of the Index.

11. **Cost effective, practical, and available data**. Without easily available data, the Index cannot function[12-18,20].
12. **Complementary and not redundant**. With so many existing indicators, the Index needs to complement and leverage these indicators and avoid producing similar output[15,21].
13. **Transparency**. The construction of the Index needs to be transparent and open-access to allow full access to how it is calculated.

3. Reporting Units

Data for the different components of the Index varied in resolution, however most were at the country or EEZ level. Results we report at the 'country' level relate to the EEZ waters of that country. To create a common reporting unit we aggregated everything to the level of country EEZ or region (some regions combine several EEZs) before combining data within goals. For most countries this is straightforward because the country and EEZ match directly. However, the global standard EEZ categorization system[22] subdivides some countries (e.g., the USA is divided into Alaska, Hawaii, and mainland US), and several countries have territorial holdings scattered around the planet that are given their own EEZ designations (e.g., USA territorial holdings in the Pacific). We had few data that are specific to these individual territorial holdings, and so we aggregated many of them together, using latitude and ocean basin as criteria. For US territorial holdings in the Pacific we also divided them into two groups, those that are inhabited and those that are uninhabited. We did not assess the high seas in this initial global assessment. Table S24 shows how we divided the ocean into reporting units.

We created 174 oceanic regions based on EEZ boundaries as well as disputed or unclaimed area. We then rasterized the region boundaries into an 8-bit raster format with ~1 km resolution (934.48 m cell size), where the cell value (ID code) is a key into the attribute table shown in Table S24. Also shown are the 224 countries represented and the ISO 3166 country code(s) associated with each region. We standardized country codes based on ISO3166 (alpha3). Many countries in our analysis did not have codes in this standard, however, so we merged multiple data sources[23,24] to provide codes for 282 countries, including using a standardized English name as a code for 31 countries or territories without a registered ISO code (e.g., Easter Island).

We obtained EEZ boundary data from VLIZ[25] using Version 6.0, and manually corrected the alignment of the EEZs spanning the 180th meridian. To model the land-sea interface, we extracted a global-scale land-sea mask[3], which was derived from 30-arc second digital elevation data (SRTM30) in an equal-area Mollweide projection. These data are missing Antarctica and perhaps semi-permanent sea ice, so we mitigated gaps by masking out Antarctica from the ocean mask using Antarctica boundary data from the FreeGIS database v0.2 (ref [26]). We excluded large inland water bodies from the land-sea mask, such as the Caspian Sea. Finally, we calculated both ocean-based and land-based (technically "not ocean") masks for fixed distance zones (1 km, 3 nmi, etc.), both offshore and inland.

Due to resolution and data source differences, the EEZ data and our land-sea interface model do not align at the resolution of the latter. Consequently, we implemented a gap filling algorithm for all ocean pixels near these data gaps using the following rank order:

1. Use EEZ pixel
2. If within 50 mi offshore, use the closest EEZ pixel if no more than 50 pixels away
3. If outside 50 mi offshore, use a subocean pixel
4. Otherwise, pixel is unclaimed.

We also made manual corrections to this algorithm where the data gaps were greater than 50 pixels, such as in ocean inlets that extend more than 50 km inland in northeastern Canada, and we calculated an adjacency matrix where two regions were considered adjacent if they are within a distance of 10 km. Also, our ArcGIS 10 software was unable to process the geometry for some EEZs (including Canada) in the VLIZ shapefile, so we converted those features using OGR and PostGIS before loading into ArcGIS 10.

4. Weighting Goals for Calculating the Index

The weights (α_i) that are applied to the ten goals to calculate the single Index score (equation S7) were assumed to be equal, even though we know this assumption does not hold for the value sets of most individuals, or likely even averaged across individuals within communities. To evaluate potential consequences of different value (weighting) systems, we calculated the overall Index using four different sets of weights designed to roughly represent three likely value sets (approximately values of preservationists, non-extractive users, and extractive users) and a fourth more disparately-weighted example for illustrative purposes based on elicited preferences for different goals under a 'market first' scenario[27] (values presented in Table S4). For the three value sets we used three categorical weight values to represent high (weight = 0.15), medium (weight = 0.10) and low (weight = 0.05) value (equal weighting assigns all goals a weight of 0.10), which makes the highest weighted goals three times as important as the lowest weighted goals. Although we evaluated the more extreme weights, we expect that across a broad community of people, even very like-minded people, all 10 goals are valued to some degree, which places a constraint on what individual goal weights can be (e.g., if any single goal gets a weight > 0.20 then the remaining weight for all other goals will require that many goals get weights approaching zero). The different sets of weights are meant to be representative rather than predictive, and are intended to test how Index scores would change with different potential worldviews.

A key advantage of the weighting system is that it allows exploration of the consequence of different value sets on Index performance. Ideally these weights would be derived empirically, but such an effort would require surveying a full spectrum of people from every single country. This was beyond the scope of this project, but may be possible in a future application of the Index.

Table S4. Weights used for each goal when combining scores into the single Index under different potential value sets (labels for the value sets are approximations).

Goal	Preservationist	Extractive Use	Non-extractive Use	Strongly Extractive Use
Food Provision	0.05	0.15	0.10	0.18
Artisanal Opportunity	0.05	0.15	0.05	0.18
Natural Products	0.05	0.15	0.05	0.18
Carbon Storage	0.15	0.05	0.05	0.03
Coastal Protection	0.15	0.10	0.10	0.09
Coastal Livelihoods & Economies	0.10	0.15	0.10	0.18
Tourism & Recreation	0.05	0.10	0.15	0.09
Sense of Place	0.10	0.05	0.15	0.03
Clean Waters	0.15	0.05	0.10	0.03
Biodiversity	0.15	0.05	0.15	0.03

In many places certain goals are not relevant, for example uninhabited islands where most production-focused goals do not apply, or places that do not have coastal ecosystems that store carbon or provide coastal protection. In these cases we redistributed equally the weights from the goals that are not relevant to the remaining goals. Although there is little evidence in the decision sciences to support equal redistribution, it is not feasible to survey people from around the world that are fully representative of all perspectives to establish how preferences realign as the number of goals changes, across all combinations of goals (>350,000 combinations). This redistribution produces weights much higher than the maximum (0.15) described above for locations in which only a subset of goals is relevant (e.g., uninhabited regions).

5. Data Gaps and Data Inclusion

We focused on using global datasets so that we were able to provide a globally consistent picture and differences in Index scores across reporting units could be attributable to differences in the system rather than variation in the data. These guidelines both motivated and constrained our approaches to modeling each goal for the Index. The selection of model frameworks for each goal, reference points for those assessments, and specific decisions about which datasets to include were all heavily dictated by the availability of global datasets. As new and better data become available in the future, details of how goals or dimensions are modeled will likely change, although the framework we have developed is robust to those changes. In reality, many global datasets are compilations of local or regional datasets and their quality varies spatially. In some cases data for a particular component or dimension of a goal were available for most but not all countries. Gaps in these data were known to ***not*** be true zero values. Rather than exclude use of these data layers, we employed several different methods to fill these data gaps. Specific methods are described for particular data layers (section 7) or in some cases for particular components of goal models (section 6). This requirement for consistent data also affects the ability to compare results across scales. Regional and local assessments should use the best available data for those areas, but this decision limits the ability to compare across scales. For direct comparisons among locations to be valid, they must use consistent data.

A number of key elements related to ocean health could not be included in this iteration of the Index due to lack of existing or appropriate global datasets. Measures of Status for each goal can all be improved (see goal-specific model descriptions for details); key missing Pressures include sea level rise, altered sediment regimes, point-source pollution, and oil spills; and key missing Resilience measures include country-specific/goal-specific regulations, especially for fisheries, habitat loss, water pollution, air pollution.

6. Goal-Specific Models

Below is a detailed description of what each goal represents, the data included and model used to calculate each goal, and the assumptions made or issues addressed in constructing the model. Model equations and parameters are summarized in Table S33.

6A. Food Provision

One of the most fundamental services the ocean provides people is the provision of seafood, whether it is helping meet the basic nutritional needs of over half of the world's population to high-end sushi. This goal, then, measures the amount of seafood sustainably harvested in a given EEZ or region through any means for use primarily in human consumption and thus includes wild-caught commercial fisheries, mariculture, artisanal-scale and recreational fisheries. However, because data quality for artisanal and recreational fisheries at global scales remains very poor, we focus here on the first two sources of seafood. When data become available for artisanal and/or recreational catch, they could be included as part of the fisheries sub-goal or as a separate sub-goal depending on the context. Importantly, seafood harvest using unsustainable fishing practices or catch levels is penalized, as the goal aims to maximize the amount of sustainably produced seafood from wild or cultured stocks. Because we do not track where the fish go after being caught or produced, this goal does not aim to measure food security for the population of a given country, but instead measures the food provided from its waters.

Fisheries: Status of the Fisheries sub-goal (x_F) was calculated as a function of the absolute difference (δB_T) between a region's total landed biomass from the reference multi-species maximum sustainable yield ($mMSY_R$) weighted by a correction factor that adjusts for taxonomic reporting quality of the data (T_C, defined below), such that:

$$x_{FIS} = \left(1 - \frac{\delta B_T}{mMSY_R}\right) \cdot T_C . \qquad \text{(Eq. S16)}$$

where $mMSY_R = 0.75 \cdot mMSY$ and

$$\delta B_T = \begin{cases} 0 & \text{if } |mMSY_R - B_T| < 0.05 \cdot mMSY_R \\ |mMSY_R - B_T| & \text{if } |mMSY_R - B_T| < mMSY_R \\ mMSY_R & \text{otherwise} \end{cases}$$

This formulation produces lower scores for countries that are under-harvesting as well as those that are overexploiting stocks. To account for uncertainty in estimating *mMSY*, we set $mMSY_R$ to 75% of *mMSY*. When calculating distance from the reference point δB_T, we set $\delta B_T = 0$ when B_T is within ±5% of $mMSY_R$ and $\delta B_T = mMSY_R$ if B_T is more than twice $mMSY_R$; thus, δB_T is always in the range of [0, $mMSY_R$]. That is, we penalize total landings that fall short of or exceed the reference point. This buffer serves a precautionary role because stock assessments are rarely exact enough to allow perfect assessment of *mMSY*; similar precautionary buffers have been used elsewhere[28].

This indicator is designed to assess how much seafood is being provided in a renewable way, for local consumption or export, given the ecosystem's productive potential. The measure of $mMSY_R$ provides a suitable reference point for sustainable extraction that is based on well established concepts in fisheries biology with known caveats and shortcomings[29]. Stock assessments often implemented in developed countries that are based on detailed information about species-level population dynamics, fishing pressure, and/or multi-species interactions and will likely provide a more robust picture of stock status and result in different scores. However, they are not available at the global scale (or for all species even in developed countries). These issues will be addressed in regional scale analyses which can directly use more detailed information.

Therefore, to calculate the total landed biomass per assessment region we used FAO global fisheries catch statistics[30], data from international and national fisheries agencies, and reconstructed catch datasets that have been allocated to half-degree increments in WGS84 geographic coordinates by the *Sea Around Us* Project[31] and then aggregated to each reporting region. We recognize that global datasets on catch alone do not allow estimation of maximum sustainable yield directly. Ultimately, methods that can estimate fishery exploitation status more accurately will need to be incorporated into the Index in future iterations. Several research efforts around the world are currently developing such methods but are not currently available.

All gaps in catch reporting were treated as true zeros; six countries had poor data reporting for early years in the time series and so these were treated as zeros (Bahamas, Dominican Republic, Kenya, Sudan, Mozambique, and South Georgia & Sandwich Islands). We used data from 2006 as the current estimate because they are the most recent data spatially allocated by the *Sea Around Us* Project. During the process of spatial allocation, cells that spanned an EEZ boundary were allocated to the EEZ proportional to the area of the cell within the EEZ. When more than one EEZ fell within one of our reporting units, we calculated a weighted average based on the relative area in the particular EEZ.

We smoothed annual catch data for each species (or taxonomic group) using a 4-year moving window average and then summed values across all species to get the total catch for each year during 1950-2006. Smoothed values were used instead of raw reported values to reduce potential bias from values that change due to changes in reporting rather than actual changes in landings. The smoothing procedure is also intended to reduce the impact of a 'fishing-up' effect where increases in fishing pressure can lead to short-term but ultimately unsustainable increases in catch. This transformation does not remove all anomalies; for example, it did not eliminate the anomalous values in Mediterranean European countries in 2005 that were likely due to changes in data sources used rather than in actual landings.

The multi-species maximum sustainable yield (*mMSY*) was obtained by summing MSY_k for each *k* species:

$$mMSY = \sum_k MSY_k \ . \qquad \text{(Eq. S17)}$$

As such, it does not account for potential species interactions with changing population sizes. As noted above, we implemented a precautionary buffer of 25% of *mMSY* to allow for uncertainty in precisely measuring $mMSY_k$. Because many stock assessments do not provide *MSY*, we estimated MSY_k from peak annual catch ($C_{P,k}$) during 1953-2006 for each *k* species based on the log-linear relationship from a linear regression of *MSY* and peak catch values from Northeast US stocks, following Srinivasan et al.[32], such that $MSY_k = C_{P,k}^b$. Results are similar using other approaches to estimating *MSY*; we will be presenting these results in a separate manuscript.

To estimate b, we collected roughly 100 estimates of *MSY* and peak landed values from stock assessments available in U.S. and European governmental agency reports. We fitted two separate linear regression models for fish and invertebrates and obtained, in both cases, an estimate of $b = 0.92$ ($R^2 > 0.8$ in both cases).

About half of all reporting regions (N=80, Table S29) had catches that were too low, had too many gaps or had miscellaneous reporting issues making it impossible to give a reliable exploitation status score. For these countries we could not compute equation S16 and so assigned a status score of $x_{FIS} = 0.25 \cdot T_C$. This score was based on the mode of values observed among all countries with sufficient data.

To adjust for differences in reporting quality and effort of a countries' fisheries statistics system, we adopted and modified an index of taxonomic reporting quality based on the proportion of available versus reported fished stocks for each country[27]. For this taxonomic reporting quality correction factor (T_C), we calculated the proportion of fished stocks for each country that were reported to FAO. The underlying assumption is that when commercial species are present within EEZ waters of a country or several countries, this species will be fished by at least one of those countries. If the taxa do not appear as separate entities in a given country's catch, then it is likely being reported under a miscellaneous or higher-level taxonomic grouping. Countries that under-report their catches are likely not managing their resources as well as they could or should. For example, several countries known to have poor overall fish stocks reported very few stocks, but still had very high status scores (e.g., Suriname, Sierra Leone, French Guiana), suggesting that the many unreported stocks/taxa are likely not well managed and hence possibly not in good condition. Commercial marine taxa of fish and invertebrates are here defined as a species, genera, family, order, class, or ISSCAAP grouping that is reported in the catch of at least one country to FAO from 1950 through 2006. The ISSCAAP code is assigned according to the FAO 'International Standard Statistical Classification for Aquatic Animals and Plants' (ISSCAAP), which divides commercial species into 50 groups on the basis of their taxonomic, ecological and economic characteristics. The T_C index is based, for each country, on the proportion of reported taxa relative to the number of commercial taxa whose distributions, based on the overlap of at least 10% of a country's EEZ in the static species range maps of the *Sea Around Us* project[33]. This proportion was weighted based on the level of taxonomic resolution with which the catches were reported. To this end, 6 levels of taxonomic resolution were identified, from species (weight $w = 6$) to broad ISSCAAP groups (weight $w = 1$), so that the numerator is a weighted sum of the number of taxa reported (n_r) at each taxonomic aggregation level (m) compared to the weighted sum of the total number of commercial taxa distributions (n_t) for each taxonomic aggregation level:

$$T_C = \frac{\sum_{m=1}^{6} n_{rm} * w_m}{\sum_{m=1}^{6} n_{tm} * w_m}, \qquad \text{(Eq. S18)}$$

This approach may overestimate the reporting quality for isolated locations, such as remote islands, or for countries with very extensive EEZs, as these are less likely to have stocks that overlap with neighboring countries. More importantly, the reporting coefficient was incorporated in the calculation as a multiplier for sake of simplicity. This has important consequences on the scores because it assumes that all unreported stocks are heavily depleted, thus scoring 0. In addition, since total biomass caught is valuable but insufficient information on the sustainability of the harvest, one would replace the reporting coefficient with a sustainability score that measures the status of the harvested stocks (e.g. the proportion of depleted stocks) in any location where data are reliable. Explorations to this regard are currently underway and will be published in a separate manuscript.

The Trend was calculated as the slope of the Status scores over the past five years (2001-2006), as described in the general methodology (section 2B). Ecological and social pressures to fishing include most of those considered within our framework, with rank weights as noted in Table S25. Similarly, most of the Resilience measures considered in our analysis were included (see Table S22).

As a check on the status scores, we applied a variant of the Depletion Corrected Average Catch method[97], an alternative method designed for application in data-poor situations and again using catch histories. In general, this method gave marginally (but statistically non-significant) higher mean status determinations averaged over all countries, and changed the relative rankings of countries for the fisheries subgoal.

Mariculture: The Status of the Mariculture sub-goal (x_{MAR}), was defined as production of strictly marine taxa from both the marine and brackish water FAO categories, excluding aquatic plants such as kelps and seaweeds, which were assumed to contribute predominantly to medicinal and cosmetic uses rather than as a source of food. The data reported by FAO does not always separate clearly if harvest is derived through mariculture or from land-based facilities. Wherever possible, we excluded species that could not possibly have been harvested from coastal waters, such as freshwater cyclids. Mariculture Status was therefore assessed as the current sustainably-harvested yield (Y_C) within each country, such that:

$$x_{MAR} = \log_{10}(Y_C + 1), \qquad \text{(Eq. S19)}$$

where:

$$Y_C = \frac{\sum_{1}^{k} Y_k S_{M,k}}{A_C}, \qquad \text{(Eq. S20)}$$

where Y_k is the 4-year moving window average from FAO data for all k mariculture species that are currently or at one time cultured within a country, $S_{M,k}$ is the sustainability score for each k mariculture species, and A_C is the area of coastal waters (3nmi) within the country. As such, Y_C adjusts for the total potential area available for mariculture within a country, thus adjusting for differences in coastal extent across countries. Additionally, all missing values (i.e., 'no data') were assigned a score of zero. If a country used to produce a particular species but no longer does, it was assigned a score of zero for that species (under the assumption that it has the capacity to do so but is no longer realizing that capacity). We log-transformed the values because of high skew in the data due to extremely high yield values for countries in Asia (in particular China). All Status scores were rescaled to the highest Status score (China).

The sustainability score ($S_{M,k}$) for each species in each country is based on the Mariculture Sustainability Index (MSI)[34]. We used the three sub-indices that directly measured long-term renewability of a given mariculture practice: the wastewater treatment index, the origin of feed index (i.e. fishmeal or other) and the origin of seed (i.e. hatchery or wild caught). These scores are country and species-specific, and we require each species' yield Y_k to have a corresponding sustainability score $S_{M,k}$. However, if a country farms a species that was not assessed by the MSI for that country, but it was assessed in other countries, a global average score is used for that species and country. If a country farms a species that was not assessed at all by the MSI but a species within the same genus was assessed, a global average for the genus was used. Finally, if these scores were not available for the categories above, we used the global average for broad taxonomic grouping (e.g., crustaceans, algae, bivalves, etc.). We are aware that there is some bias associated with using scores derived as averages across countries because they were originally assigned to specific species-country pairs, nevertheless this is preferable to applying a sustainability score solely based on a subset of the species harvested. In addition, since plant and algae species are most commonly used for purposes other than food (as discussed above), we also excluded them from these analyses.

The Trend in Mariculture was calculated as the slope of the yield in the past five years (2004-2009), as described in the general methodology (section 2B). Only a few pollution-related ecological pressures and the general social pressures were assessed for the Mariculture sub-goal (Table S22). Resilience measures included a number of measures directed at sustainable aquaculture (Table S22). If a country was not assessed on these measures, it was excluded from calculation rather than gap-filled.

Combining Sub-goals: Finally, the two sub-goals were combined into a single goal score via a proportional yield-weighted average:

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$$x_{FP} = w \cdot x_{FIS} + (1-w)x_{MAR}, \qquad \text{(Eq. S21)}$$

$$w = \begin{cases} 1 & \text{if } x_{MAR} = \text{NoData} \\ 0.5 & \text{if } x_{FIS} = 0.25 \cdot T_C \\ \dfrac{B_T}{B_T + \sum_{k=1}^{n} Y_k} & \text{otherwise} \end{cases}, \qquad \text{(Eq. S21a)}$$

where B_T is the actual wild-caught fishing yield in 2006, and Y_k is the actual yield for each mariculture species k in 2009. If the total mariculture yield is zero in 2009, we used the most recent year since 1990 with a total mariculture yield above zero (if available). This formulation does not account for interactions between mariculture and wild-caught fisheries (most notably feeding wild-caught fish to farmed fish), and so is likely overly optimistic. The relative contribution of the subgoals to the score is thus weighted based on their current contribution to seafood provision. For the countries where both fishing and mariculture occur but for which the data for wild-caught fishing yield (B_T) was deemed unreliable, the goal score was obtained by equally weighting the fisheries and mariculture scores (e.g., w = 0.5). For the countries where wild-caught fishing occurs and mariculture either does not occur or has zero yield, then regardless whether the B_T value was deemed unreliable, only the fisheries score is used (e.g., w = 1).

It is important to note that Fisheries sub-goal values are entirely based on landed biomass and therefore do not include any information on fishing effort, discarded bycatch, illegal and unreported catch, or most kinds of small-scale or artisanal fisheries, and so both the amount of fish caught and the sustainability of the catch have key gaps to fill as modeled here. In addition, the model utilized here cannot detect the level of sustainability of exploitation for those species that have not yet been fished beyond a peak value, which are treated as 100% sustainable. Consequently, the scores assigned to countries with several developing fisheries are likely to be overestimated. Smaller-scale applications of this model may be able to produce more accurate predictions by incorporating *mMSY* estimates derived from multi-species models or from actual stock assessments that use ancillary information to landing patterns, or by using indicators based on capture per unit of effort such as the fishing effort at *mMSY* (e.g., F_{mMSY}).

Currently no model exists that can approximate the fisheries concept of maximum sustainable yield for mariculture. Therefore, the potential maximum of sustainable mariculture production was approximated here using the maximum recorded value across all countries per unit area, assuming this provides some indication of what can be achieved given current ecological and technological conditions. This reference penalizes locations that have fewer coastal areas suitable for mariculture (e.g., fewer bays, lower primary production, etc.) and it does not take into account the maximum carrying capacity of ecosystems for mariculture exploitation, as this is largely unknown.

6B. Artisanal Fishing Opportunities

Artisanal fishing, often also called small-scale fishing, provides a critical source of food, nutrition, poverty alleviation and livelihood opportunities for many people around the world, in particular in developing nations[35]. Artisanal fishing refers to fisheries involving households, cooperatives or small firms (as opposed to large, commercial companies) that use relatively small amounts of capital and energy and small fishing vessels (if any), make relatively short fishing trips, and use fish mainly for local consumption or trade. These traits differ from commercial scale fisheries that serve the global fish trade, and commercial and artisanal scale fisheries also differ in how they are valued by many communities around the world. Artisanal fisheries contribute over half of the world's marine and inland fish catch, nearly all of which is used for direct human consumption[30]. They employ over 90 percent of the world's more than 35 million capture fishers and support another approximate 90 million people employed in jobs associated with fish processing, distribution and marketing[30]. Artisanal fisheries also are distinguished by the role they play in shaping and sustaining human cultures around the world; this role contributes to their distinct value[36]. For this reason, we designate artisanal fishing opportunities as a distinct public goal. In some

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countries like the U.S.A., artisanal fishing may happen under a commercial license (e.g. a family run lobster boat or individual shellfish harvesting permit), or under a recreational fishing permit (e.g. families fishing with rods for fish to eat); the food provided by these activities should ideally be captured under the food provision goal (section 6A), whereas the opportunity to pursue artisanal fishing is captured here. The goal is not about recreational fishing for sport, which is captured in food provision (if it provides food) and tourism and recreation (section 6G).

The livelihood and household economy provided by fishing are considered part of the Coastal Livelihoods and Economies goal below (section 6F), although similar to food provision from artisanal fishing it is currently impossible to measure on a global scale. Our focus is on the opportunity to conduct this kind of fishing. What is intended by the idea of 'opportunity' is the ability to conduct sustainable artisanal-scale fishing when the need is present, rather than the actual amount of catch or household revenue that is generated. Although this may seem nuanced on the value and intent of artisanal fishing, the opportunity to conduct this fishing is clearly of great importance to many people[36].

Status for this goal is a function of need for artisanal fishing opportunities and whether or not the opportunity is permitted and/or encouraged institutionally and done sustainability. This need could potentially be driven by any number of socio-economic factors, but perhaps the simplest and most directly tied to this need is the percent of the population that is below the poverty level. Data on how many people live below the poverty level are not available for many countries. Therefore, we used an analogous proxy that is more complete globally: per capita gross domestic product (pcGDP) adjusted by the purchasing power parity (PPP). This metric translates the average annual income (pcGDP) into its local value (PPP). These data correlate with UN data on the percent of a population living below the \$2/day international poverty standard (linear: $R^2 = 0.61$, $p < 0.001$; logarithmic regression: $R^2 = 0.76$, $p < 0.001$). Because the relationship is a better fit with the log-linear regression, we log-transform the *PPPpcGDP* scores before using them.

To assess the opportunity or ability to meet this demand, we used data from Mora et al.[37], which scores countries on the institutional measures that support or facilitate artisanal and small-scale fishing. The data come from Figure S4 in Mora et al.[37], which is based on two survey questions focused on recreational and artisanal fishing (see Table S5 below for questions) and are on a scale from 0 to 100 (which we then rescale 0-1), where higher scores indicate better management. We extracted the data from the color codes on the map in Figure S4. There may be some small errors far a few countries due to difficulty of distinguishing between the two red colors at the lowest end of the scale.

The sustainability of artisanal fishing practices could be approximated by the percent of fishermen that use sustainable gear such as hook and line versus unsustainable methods such as dynamite, cyanide and, arguably, gill net fishing. Unfortunately data on proportion of gear type used within a country is scarce at best and so we were unable to include this term in the calculation of this goal; we present it here for conceptual completeness.

Status for this goal (x_{AO}) is therefore measured by unmet demand (D_U), which includes measures of opportunity for artisanal fishing (O_{AO}, defined below) and the sustainability of the methods used (S_{AO}):

$$x_{AO} = (1 - D_U) * S_{AO}, \qquad \text{(Eq. S22)}$$

where:

$$D_U = (1 - PPPpcGDP) * (1 - O_{AO}), \qquad \text{(Eq. S23)}$$

PPPpcGDP is the log-transformed, rescaled purchasing power parity adjusted per capita GDP as described above, and O_{AO} is the access to artisanal-scale fishing determined by Mora et al.[37]. We rescaled the log-transformed values from 0-1 under the assumption that very low values represent very high demand by nearly everyone in the country and should therefore make demand [1 – *PPPpcGDP*] approach 1.0. To rescale the values we used the minimum and maximum values across all countries in the most recent five years as the 0.0 and 1.0 values, respectively. In the future, if values exceed the current maximum *PPPpcGDP*, those countries will be assumed to have no demand for artisanal fishing and the value would be capped at 1.0. With this formulation, developed countries with lower demand for artisanal scale fishing (i.e. low poverty, or high *PPPpcGDP*) would score high, regardless of the opportunity made available (since it would not matter to many), and developing countries with high demand and opportunity would also score high. Because no data or information exist globally on the proportion of fishermen using sustainable versus unsustainable gear, S_{AO} is set to 1 for all current calculations for all regions. The reference point for this goal is 1.0, i.e. all demand for artisanal fishing is allowed and/or achieved and done in a sustainable manner. To calculate the trend in this goal we used the annual change in the Status. Because we only have one value for O_{AO}, the Trend becomes the change over time in the PPPpcGDP, i.e., how 'unmet demand' is changing over time.

We identified a subset of possible ecological pressures that affect the potential delivery of this goal, including chemical and nutrient pollution, alien species, subtidal and intertidal habitat destruction, commercial fishing, artisanal and small-scale low-bycatch and destructive fishing, and changes in sea surface temperature (SST). With these pressures we captured those factors that would affect the demand for artisanal fishing, the opportunity to practice artisanal fishing, or the sustainability of the practice. As such, pressures to the ecological system that would lead to changes in harvested fish populations can have a small potential impact on this goal by reducing stocks and therefore reducing the potential opportunity to catch fish. These ecological impacts have a lower weight than for the Food Provision goal, where the focus is on the amount of food produced. Social pressures, which will affect poverty levels, are included, as described in section 2.

Resilience was measured using measures of ecological integrity within coastal areas, the WGI, and regulations and other institutional measures pertaining to habitat resilience and fishing resilience (see Table S22 for list of data used). See general methodology above (section 2D) for details on how the layers were combined.

Table S5. Questions from Mora et al. [37] that were used to evaluate access to artisanal scale fishing.

If recreational fishing exists to any extent, which of the following apply: - Are recreational fishermen required to have a fishing license? Y/N - Are there regulations to the size of fish caught? Y/N - Are there regulations to the number of fish caught? Y/N - Are there regulations to the number of fishermen allowed to fish? Y/N - Are there statistics being collected for this sort of fishing? Y/N
If artisanal fishing exists to any extent, which of the following apply? - Are there regulations to the size of fish caught? Y/N - Are there regulations to the number of fish caught? Y/N - Are there regulations to the number of fishermen allowed to fish? Y/N - Are there statistics being collected for this sort of fishing? Y/N

Several issues and datasets that are relevant to Artisanal Fishing Opportunities were not included in our calculations for a number of reasons. High unemployment can lead to a greater demand for artisanal fishing opportunities[38], but unemployment is not a good measure of potential 'demand' for most developing countries since many people not working do not get recorded in unemployment statistics, even though it may be relevant for developed countries. Regardless, it is very difficult to set an arbitrary cut-off for developing versus developed countries, and so there is no clear way to use unemployment data for this goal.

Another potential driver of demand for artisanal fishing opportunities is local preference for seafood and/or access to other sources of protein. Previous analyses have shown that seafood consumption (a proxy for preference for seafood) does not correlate well with national-level artisanal catch statistics[3] and access to other sources of protein is difficult to measure, and so we did not use either of these measures here.

Finally, for our sustainability measure in the Status dimension we also considered using the information and data contained in Pitcher et al. [39] which looks at compliance of 53 countries with the UN's Code of Conduct for responsible fisheries. These results are strongly correlated with the data from Fig. S4 in Mora et al.[37] ($p < 0.001$; $R^2 = 0.22$), and thus we used the Mora et al. [37] data because they are comprehensive globally.

6C. Natural Products

In many countries the harvest of non-food natural products is important for local economies and can also be traded internationally. The sustainable harvest of these products is therefore an important component of a healthy ocean. This goal assesses the ability of countries to maximize the sustainable harvest of living marine resources, such as corals, shells, seaweeds, and fish for the aquarium trade. It does not include bioprospecting which focuses on potential (and largely unknowable and potentially infinite) value rather than current realized value, or non-living products such as oil and gas or mining products which by definition are not sustainable.

We had access to export data for six different natural products (see Table S22) and so calculate an individual Index score for each of them: coral, ornamental fish, fish oil, seaweeds and marine plants, shells, and sponges. We did not have data for other key natural products such as wood from mangroves, and we excluded oils from mammals as they are widely seen as (currently) unsustainably harvested due to low mammal populations. Mammal oils represented a small (~<2%) and decreasing amount of total oil harvest each year (since 1993 it has been well below 1%), although for some countries it remains a significant percent of total oil harvested. We calculated the goal score with and without coral harvest because many feel that all coral harvest is unsustainable. Unsustainable harvest of natural products is included in our sustainability measure (see below). We focus on results with coral products included, and note that overall goal scores with and without corals included were nearly identical for all countries (linear regression, $p<0.001$, $R^2 = 0.95$; average per-country difference = -0.016; slope = 1.03 indicating that scores are slightly higher with corals included). Countries with goal scores much higher (>0.10) with corals included were Nicaragua, Fiji, El Salvador, and Mauritius and much lower (< -0.10) with corals included were Somalia, Senegal, Vanuatu, Marshall Islands, Bangladesh, Dominican Republic, Madagascar, Bosnia and Herzegovina, Guinea, Taiwan, Italy, Belize, and USA.

For the Status of each product, we assessed the most recent harvest rate (in metric tons) per country relative to the maximum value (in 2008 USD) ever achieved in that country, under the assumption that the maximum achieved at any point in time was likely the maximum possible. This creates a reference point internal to each country. We then established a buffer around this peak catch because we do not know whether it is sustainable (similar to what was done for the fisheries sub-goal of food provision, Section 6A1). Any value within 35% of the peak was set to 1.0, with values below that rescaled to this 35% buffer value. We chose a 35% buffer following the logic of the wild-caught fisheries sub-goal, where a 25% buffer is used around mMSY. Because mMSY for wild-caught fisheries is already 10% below peak landings, we added 10% to the Natural Products buffer as a coarse approximation of the buffer mMSY builds around peak landings.

For countries that never harvested a product, we assumed they cannot produce it (in general because the product does not exist there) and so treat that as a 'no data' rather than a zero value. For countries that harvested a product at any point in time, empty values are treated as zeros since the country clearly has the capacity to harvest that product. We then rescaled these values from 0-1, with any value within 35% of the peak harvest set to 1.0, and adjusted these harvest scores by estimates of the sustainability of the harvest rate. Although we do not know actual sustainability levels, we accounted for this factor by adjusting the harvest level by a sustainability term for each product that is based on the log-transformed intensity of harvest per km^2 of coral and/or rocky reef, depending on the product, relative to the global maximum (its 'exposure'), and for ornamental fish and corals also the 'risk' that is associated with known unsustainable harvest practices (i.e., the intensity of cyanide fishing for ornamental fish, and any harvest of corals since they are CITES protected species). We log-transformed the harvest intensity scores because of a highly skewed distribution of per-country values;

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because we do not know the true threshold of sustainable harvest, nearly all values would be considered highly sustainable without the log-transformation. Finally, for fish oil, exposure was calculated based on stock status assessments. For each country we calculated the weighted proportion of species harvested sustainably. We assigned each species an exploitation status based on its catch each year relative to its MSY over the span of the database, 1950-2006, following the definitions in Table S6 which are based on FAO definitions plus the 'rebuilding' category developed by the *Sea Around Us* Project[40]. When insufficient information exist to assign a stock status, the stock was excluded from analyses. The sustainability index is computed for each *t* year as:

$$S_{NP,t} = \frac{\sum_{k=1}^{5} N_k * w_k}{\sum_{k=1}^{5} N_k}, \qquad \text{(Eq. S24)}$$

where N is the number of species in each k category of exploitation and w is the weight assigned to each category of exploitation status (Table S6).

The Status of each natural product p (x_{NPp}) is therefore:

$$X_{NPp} = H_p * S_p, \qquad \text{(Eq. S25)}$$

where H_p is the harvest level for a product relative to its own (buffered) peak reference point, S_p is the sustainability of that harvest, with:

$$S_p = 1 - \frac{E+R}{N_v}, \qquad \text{(Eq. S26)}$$

where E is the exposure term, R is the risk term and is set to 1.0 for corals and to the relative intensity of cyanide fishing for ornamental fish, and N_v = 1 or 2 depending on whether or not a viability term is used.

Table S6. Definitions and weights assigned for each category of exploitation status

Exploitation Status	**w**	**Definition**
Developing	1.0	Stock landings have not reached a peak or peak occurs in the last year of the time series
Fully exploited	1.0	Stock landings are between 50-100% of peak
Overexploited	0.5	Stock landings are between 10-50% of peak
Collapsed	0.0	Stock landings are <10% of peak & recent trend is <0
Rebuilding	0.25	Stock landings are between 10-50% of peak & recent trend is >0

Using Eq. S25 above we calculated the Status score for each product for the previous five years, and then used the slope of these Status scores to calculate the Trend for each product. For Pressures, we treated each product separately because different pressures affect each of the products differently, and therefore we calculate a unique Pressures score for each product (see Table S25 for stressors used for each product and the relative weights applied). We also calculated unique Resilience scores for each product since the regulation (*Reg*) Resilience measures are connected to specific stressors (see section 2D above). As such, we were able to calculate a total Index score for each product.

To create a single score for the Natural Products goal (x_{NP}) we then took the weighted average of the individual product scores, such that:

$$x_{NP} = \frac{\sum_{p=1}^{N} w_p x_p}{N}, \qquad \text{(Eq. S27)}$$

where N is the number of products that have ever been harvested and w_p is the proportional peak dollar value of each product relative to the total peak dollar value of all products (in 2008USD). If a product had a peak value, but was missing a harvest value for that product in a given year, then we used w_p = 0 during the aggregation for that year. Note that for the Trend calculation, some regions have staggered years between products for the slope calculations (2003-2007 for Corals, Ornamental Fish, and Shells and 2004-2008 for the rest).

There are several important caveats about the approach we used to assess the Status of natural product harvest. First, our approach is supply (export) based. If declining demand for a natural product causes a decline in production, the producing country's score declines even if it could (sustainably) produce more. Similarly, if a country chose to reduce or halt production of a natural product in order to improve conservation or sustainability, its score might still decline, although this decline might be buffered by improvement in the Resilience dimension. Additionally, such decline would likely be compensated by increased scores in several other goals resulting from decreased harvest pressures. Second, we do not have MSY estimates for any of the six natural products evaluated. When such estimates become available in the future they can easily be incorporated here, as is done in the wild-caught Fisheries sub-goal of the Food Provision goal. These caveats may lead to decreases in the score for a country despite maintenance or even improvement of the sustainable harvest of natural products; we instituted the 35% buffer around peak harvest (described above) as a way to help mitigate these potential issues. Finally, our estimate of the sustainability of many of the harvest practices is likely overly optimistic. For example, fishing for ornamental trade often employs unsustainable techniques such as cyanide fishing, but we have few data to inform such an estimate of sustainability in the Status calculation for ornamental fish.

6D. Carbon Storage

The present-day pelagic ocean sink for anthropogenic carbon dioxide, estimated at approximately 2000 TgC y-1, accounts for about a quarter of total anthropogenic CO_2 emissions to the atmosphere and helps mitigate a key driver of global climate change[41]. The physical-chemical mechanisms driving the ocean sink are well understood but are not directly amenable to human management. Deliberate carbon sequestration strategies via direct injection and biological fertilization have been proposed but are controversial[42]. Highly productive coastal wetland ecosystems (e.g., mangroves, salt marshes, sea-grass beds) have substantially larger areal carbon burial rates than terrestrial forests, and so-called "Blue Carbon" has been suggested as an alternate, more manageable carbon sequestration approach[43]. The global carbon removal by these system is not well known, ranging in a recent estimate from 67-215 TgC yr^{-1} (Ref. [44]), though the fraction of this flux attributable as an anthropogenic rather than natural sink is poorly characterized. The rapid destruction of these coastal habitats may release large amounts of buried carbon back into the ocean-atmosphere system. Donato and colleagues[45], for example, estimate that mangrove deforestation generates emissions of 20-120 TgC yr^{-1}. Our focus here, therefore, is on coastal habitats because they are threatened, have large amounts of stored carbon that would rapidly be released with further habitat destruction, have the highest per-area sequestration rates of any habitat on the planet, and are amenable to management, conservation, and restoration efforts. We refer to this goal as Carbon Storage but intend its meaning to include sequestration.

We focused on three coastal habitats known to provide meaningful amounts of carbon storage: mangroves, seagrasses, and salt marshes[46]. For mangroves, we focused all forests, including coastal mangroves that are on land or in river deltas which provide significant additional amounts of carbon storage. As with other goals that rely on habitats for Status, we measured the Status of Carbon Storage (x_{CS}) as a function of its current 'condition' (C_c) relative to a reference condition (C_r) and a variable that weights the relative contribution of each habitat type (k) to total carbon storage, measured as the amount of area each habitat covers (A_k) relative to the total area covered by all three habitats (A_T) given the available data. See biodiversity goal (section 6J) for details on how habitat data were processed. Although Carbon sequestration rates and storage capacity can vary among the three habitats, value are similar enough across habitats and vary enough geographically within habitats[47] that we assumed equal potential value for each. Thus, Status is:

$$x_{CS} = \sum_{1}^{k} \left(\frac{C_c}{C_r} * \frac{A_k}{A_T} \right). \qquad \text{(Eq. S28)}$$

We employed several different methods for calculating habitat condition scores depending on the habitat of interest and available data (see Table S7).

We scaled each habitat's area to A_t for two reasons. First, it avoids penalizing a country that naturally lacks one of the habitats (e.g., Canada is too cold to have mangroves). Second, it ensures that habitats influence the goal score proportionately to their area of extent. This rewards the protection of large extents of habitat but does not assign a higher weight to higher habitat diversity. As such, our measure underestimates the actual amount of carbon storage being done by these coastal habitats (because we cannot account for habitats we do not know exist). Reference area for each habitat is treated as a fixed value; in cases where current area might exceed this reference value (e.g., through restoration), we cap the score at the maximum value (1.0). Although this does not give credit for restoration efforts improving things, data tend to be of poor quality making it difficult to determine true increases, and in general habitat restoration beyond reference values is extremely unlikely.

The Trend for this goal is the slope of the change in Status, as per general methods in section 2B. Because of variable data availability and quality for each habitat, slightly different methods were used for each habitat (see Table S7). We identified a subset of possible pressures that affect the condition of the key protective habitats and therefore the potential delivery of this goal, including chemical and nutrient pollution, alien species, subtidal and intertidal habitat destruction, destructive artisanal fishing, and changes in sea surface temperature (SST), ocean acidification, and UV radiation (Table S22 and section 2C for details). Resilience was measured as the average of the regulatory measures (*Reg*) related to pollution mitigation and habitat protection, and the social integrity measures captured by the World Bank's WGI. See general methodology above (section 2D) for details on how the layers were combined.

Ideally, we would assign different weights to the habitats based on their relative ability to store carbon, but exact values are currently poorly known. This model can incorporate such weights once they are available in a similar way to the methods developed for the Coastal Protection goal (see following section).

6E. Coastal Protection

This goal aims to assess the amount of protection provided by marine and coastal habitats to coastal areas that people value, both inhabited (homes and other structures) and uninhabited (parks, special places, etc.). At local and regional scales data may exist on all these variables at a high enough resolution to map and calculate exactly which habitats are providing how much protection to which coastal areas. At global scales, such data do not exist and so we focused on EEZ-scale assessments, even though this scale does not allow one to account for the spatial configuration of habitats relative to coastal areas and human populations. Consequently, we assumed that all coastal areas have value (and equal value) and assessed the total area and condition of key habitats within each EEZ (without regard to their precise location relative to coastal areas). The habitats that provide protection to coastal areas for which we have global data include mangroves, coral reefs, seagrasses, salt marshes, and sea ice.

Table S7. Reference states for each habitat for which it is known and used in the Carbon Storage model.

Habitat	Method for Calculating Condition	Method for Calculating Area	Data Used for Calculating Trend
Seagrass	Current % cover or hectares of habitat divided by reference % cover or hectares	Seagrass extent per oceanic region (vector-based)	Calculated across data from 1975 to 2010
Mangrove	Current km^2 divided by reference hectares	Reference hectares	Calculated across data from 1980 to 2005
Salt marsh	Increasing or stable trend assigned condition = 1.0; decreasing trend assigned condition = 0.5	Salt marsh extent per oceanic region	Categorical trend assessments (increasing = 0.5, stable = 0, or decreasing = -0.5)

The Status of this goal (x_{CP}) was calculated to be a function of the amount and/or condition of marine habitat(s) relative to their reference states and the ranked protective ability of each habitat type, such that:

$$x_{CP} = \sum_{i=1}^{k} \left(\frac{C_c}{C_r} * \frac{w_k}{w_{\max}} * \frac{A_k}{A_T} \right), \qquad \text{(Eq. S29)}$$

where C is the condition at current (c) and reference (r) time points, and w is the rank weight of the protective ability, and A is the area within an EEZ for each k habitat type, proportional to either the maximum (*max)* ranks of any habitats present or total (T) current amount of all protective habitats. We employed several different methods for calculating condition scores depending on habitat and available data (see Table S8). The maximum rank of only existing habitats (rather than all possible habitats) is used so that countries that never had mangroves, coral reefs, or sea ice do not get penalized for not having them. See Biodiversity goal (section 6J) for details on how habitat data were processed. For mangroves, we focused only on forests in the ocean (1km coastal strip) as they are main source of coastal protection. Total area of protective habitats (A_T) is simply the sum of the total known area of all protective habitat types within an EEZ, such that:

$$A_T = \sum_{i=1}^{k} A_k \, . \qquad \text{(Eq. S30)}$$

We scale each habitat's area to A_T for two reasons. First, it avoids penalizing a country that does not have one of the habitats naturally for not having it (e.g., Canada does not have mangroves). Second, it ensures that habitats influence the goal score proportionately to their area of extent. This rewards the protection of large extents of habitat but does not assign a higher weight to higher habitat diversity. As such, our measure likely underestimates the actual amount of coastal protection being done by these coastal habitats (because we cannot account for habitats we do not know exist). As with the Carbon Storage goal, reference area for each habitat is treated as a fixed value; in cases where current area might exceed this reference value (e.g., through restoration), we cap the score at the maximum value (1.0). Although this does not give credit for restoration efforts improving things, data tend to be of poor quality making it difficult to determine true increases, and in general habitat restoration beyond reference values is extremely unlikely. Rank weights for the protective ability of each habitat (R_k) come from previous work[48] that ranks mangroves, corals and sea ice as 4, salt marshes as 3, and seagrasses as 1 (higher values are better).

Table S8. Reference states for each habitat for which it is known and used in Coastal Protection model.

Habitat	Method for Calculating Condition	Method for Calculating Area	Data Used for Calculating Trend
Seagrass	Current % cover or hectares of habitat divided by reference % cover or hectares	Seagrass extent per oceanic region (vector-based)	Calculated across data from 1975-2010
Coral reefs	Current % cover divided by reference % cover	Coral reef extent per oceanic region (500 m resolution)	Calculated across data from 1975-2006
Mangroves	Current hectares divided by reference hectares, for coastal mangroves only	Mangrove extent per oceanic region (rastor-based)	Calculated across data from 1980-2005
Salt marsh	Increasing or stable trend assigned condition = 1.0; decreasing trend assigned condition = 0.5	Salt marsh extent per oceanic region	Categorical trend assessments (increasing = 0.5, stable = 0, or decreasing = -0.5)
Sea Ice	Current % cover (monthly shoreline pixels) with concent. >15% divided by reference % cover average from 1979-2010	Same as condition	Calculated from the fitted slope of % deviation from reference per year for 3-yr average from 2005-2009

The Trend for this goal is then the annual change in ranked condition weighted (averaged) according to the relative proportion of the habitat (A_k/A_T) and then converted to a 5-year time horizon, as per general methods in section 2B. Because of variable data availability and quality for each habitat, slightly different methods were used for each habitat (see Table S8).

We identified a subset of possible pressures that affect the condition of the key protective habitats and therefore the potential delivery of this goal, including chemical and nutrient pollution, alien species, subtidal and intertidal habitat destruction, destructive artisanal fishing, and changes in sea surface temperature (SST), ocean acidification, and UV radiation (Table S22 and section 2C for details). Resilience was measured as the average of the regulatory measures (G) related to pollution mitigation and habitat protection, and the social integrity measures captured by the World Bank's WGI. See general methodology above (section 2D) for details on how the Resilience layers were combined.

6F. Coastal Livelihoods and Economies

The jobs and revenue produced from marine-related industries are clearly of huge value to many people, even those who do not directly participate in the industries but value community identity, tax revenue, and indirect economic and social impacts of a stable coastal economy. We track the two halves of this goal separately because the number and quality of jobs and the amount of revenue produced are both of considerable interest to stakeholders and governments, and could show very different patterns in some cases (e.g., high revenue sectors do not necessarily provide large employment opportunities).

This goal aims to maintain, i.e., avoid the loss of, coastal and ocean-dependent livelihoods (i.e., jobs) and productive coastal economies (i.e., revenues), while also maximizing livelihood quality (relative wages). It does not attempt to capture any aspects of job identity (i.e. the reputation, desirability or other social or cultural perspectives associated with different jobs), although one can examine the component parts that make up this goal to evaluate individual sectors and infer implications for job identity. We make the assumption that all marine-related jobs are equivalent, such that, for example, a fisherman could transition to a job in mariculture or ship-building without affecting the score of this goal. While job identity has social and cultural value, there are not adequate data to track individual workers and assess their job satisfaction on a global scale. Also, because of data constraints, this goal does not provide more credit for sectors or economic activities that are more ecologically sustainable. Future, finer scale applications of the Index will incorporate these key considerations.

The goal is composed of two equally important sub-goals, Livelihoods (L) and Economies (E), which are assessed across as many marine-related sectors (fishing, aquaculture, tourism, transportation, recreation, energy, oil extraction, transportation and shipping, etc.) as possible. The full list of which sectors had available data for each sub-goal is in Table S9. Livelihoods (L) includes two equally important sub-components, the number of jobs (j), which is a proxy for livelihood quantity, and the per capita average annual wages (w), which is a proxy for job quality. Economies is composed of a single component, revenue (e), measured in 2010 USD.

Table S9. Sectors for which data were available for each of the three measures for this goal.

Sector	Jobs data	Wages data	Revenue data
Tourism	X	X	X
Commercial fishing	X	X	X
Marine mammal watching	X		X
Aquarium fishing			X
Wave & tidal energy	X		X
Mariculture	X		X
Transportation & shipping		X	
Ports & harbors		X	
Ship & boatbuilding		X	

For both jobs and revenue, we used sector- and development status-specific multipliers derived from the literature to account not only for direct employment opportunities and revenue, but also indirect and induced economic effects (see below for more detail). Because there is no absolute reference point for jobs and revenue (i.e., a target number of jobs or total revenue would be completely arbitrary), these two sub-goals employ a moving baseline. The two metrics (j, e) are calculated as relative values: the value in the current year (or most recent year), c, relative to the value in a recent moving reference period, r, defined as 5 years prior to c. This reflects an implicit goal of maintaining coastal livelihoods and economies (L&E) on short time scales, allowing for decadal or generational shifts in what people want and expect for coastal L&E. The most recent year c must be 2000 or later in order for the data to be included. We allowed for a longer or shorter gap between the current and recent years if a 5 year span was not available from the data, but the gap could not be greater than 10 years. Our preferred gap between years was as follows (in order of preference): 5, 6, 4, 7, 3, 8, 2, 9, 1, and 10 years.

For wages (w) we assumed the target value for average annual wages is the highest value observed across all reporting units. Average annual wages, in 2010 USD, were first adjusted for purchasing power parity (PPP; see Artisanal Fishing Opportunities section 6B above) to control for differences in the purchasing power of a dollar across countries with respect to a range of common goods.

The Status of this goal (x_{LE}) is the average of the Status of two sub-goals: Livelihoods (x_{LIV}) and Economies (x_{ECO}):

$$x_{LE} = (x_{LIV} + x_{ECO})/2 \ . \qquad \text{(Eq. S31)}$$

The Livelihoods sub-goal is measured as:

$$x_{LIV} = \frac{\left(\dfrac{\sum_1^k j_{c,k}}{\sum_1^k j_{r,k}} + \dfrac{\sum_1^k g_{m,k}}{\sum_1^k g_{r,k}} \right)}{2} \ , \qquad \text{(Eq. S32)}$$

where j is the adjusted (see below) number of direct and indirect jobs within sector k within a country and g is the average PPP-adjusted (see below) wages per job within sector k. Jobs are summed across sectors and measured at current (c) and reference (r) time points. Wages are averaged across sectors within each country (m) and the reference country (r) with the highest average wages across all sectors.

The Status of the Economies sub-goal (x_{ECO}) is measured as:

$$x_{ECO} = \sum_1^k \frac{e_{c,k}}{e_{r,k}} \ , \qquad \text{(Eq. S33)}$$

where e is the total adjusted (see below) revenue generated directly and indirectly from sector k, at current (c) and reference (r) time points.

The total value of economic industries cannot be captured fully by measuring only the jobs and revenue generated directly by those industries, since activity in the direct industry stimulates additional jobs and revenue in related industries. For example, the fishing industry provides direct jobs to fishers, indirect jobs to fishing gear manufacturing companies, and induced jobs to the restaurants and movie theaters where those manufacturing employees spend their income. In the case of tourism, data describing total jobs and revenue (direct plus indirect and induced) were available from the primary data source, and so we used that information as the best estimate of total employment and total revenue for that sector. For all other sectors where the data sources only provided direct jobs or direct revenue, we used sector- and development status-specific multipliers derived from the literature to estimate total job or revenue impacts. We did not apply multiplier values to wages since the cascading effects of earned income are more contentious.

We assumed that sector-specific job and revenue multipliers are static and globally consistent, but distinct for developed versus developing countries (when such information was available), because we do not have data to resolve temporal or regional differences (see Table S10 for the multiplier values used). Countries were classified as developed or developing using the Human Development Index (HDI) 2010 Report [49], with all countries falling under the HDI "very high human development" category classified as developed and all others as developing. For locations not assessed by the HDI but containing data for L&E, we classified the location by compiling information used to calculate the HDI score (schooling, life expectancy and per capita Gross National Income (pcGNI) statistics), calculating an HDI score, and classifying the country based on the 2010 HDI categorizations.

Table S10. Sector-specific multipliers used to calculate total jobs and total revenue created by sector-based employment in developing and developed nations. N/A (not applicable) indicates total employment or total revenue (direct plus indirect and induced) data provided by primary data source, eliminating the need for a multiplier value. ND indicates no data available for that sector.

	Developed Countries		**Developing Countries**	
Sector	**Jobs**	**Revenue**	**Jobs**	**Revenue**
Tourism	N/A	N/A	N/A	N/A
Commercial fishing	1.582	1.568	1.582	1.568
Marine mammal watching	1.915	1.0	1.915	1.0
Aquarium fishing	ND	1.568	ND	1.568
Wave & tidal energy	1.88	1.652	1.88	1.652
Mariculture	2.7	2.377	1.973	1.59

Income (wages) and revenue data were converted to a standard dollar year to control for inflation/deflation. We used conversion factors based on the Consumer Price Index (CPI) (see http://oregonstate.edu/cla/polisci/sahr/sahr), adjusting all dollar values to 2010 dollars. We used the final 2010 CPI conversion factors as revised on June 29, 2011. Historical local currencies were converted into USD of the same year using the currency exchange information website xe.com (and using the default date of July 28 for each year). When xe.com did not have historical conversions available for a particular currency and/or year, we used oanda.com. When neither website had the conversion available, we contacted the Financial Management Service of the US Department of the Treasury, which provided us with historical exchange rates for missing data points, with a default exchange date of December 31 of each year. We accounted for all currency revaluations.

Absolute values for *j*, *g*, and *e* in the current and reference periods (or for wages, in the assessed country and reference country) were lumped across all sectors before calculating relative values (even though the current and reference years will not be exactly the same for all sectors), allowing a decrease in one sector to be balanced by an increase in another sector. As such, we do not track the Status of individual sectors and instead always focus on the Status of all sectors together. For wages, we use the most current data available for each country and each sector, but only use data from 1990 on, assuming that wages are relatively slow to change over time (apart from inflation adjustments, which we control for by using real dollars) and thus can be compared across sectors and countries without controlling for year.

To account for broader economic forces that may affect jobs independent of changes in ocean health (e.g., a global recession), we adjusted (as noted above) relative values for the number of jobs by changes in national employment rates. For example, if unemployment increased from the reference to the current period, we would expect the number of marine-related jobs to decrease by a comparable proportion, without causing a lower score for the goal. Therefore, the objective of the goal is actually no loss of jobs *and* jobs must keep pace with growth in employment rates or sustain losses no greater than national increases in unemployment rates. We made a similar correction to revenue based on a country's GDP ("no loss *and* must keep pace with growth in GDP or can sustain losses comparable to national declines in GDP"). The current and reference years used for unemployment and GDP data were based on the average current year and average reference year across the sector data sources used for number of jobs and revenue, respectively.

Gaps were filled in the adjustment datasets (national GDP and national employment) by first determining the average metric value (e.g., average employment rate) in geographical regions (see Table S24 for regions) for each year based on all countries in that region for which there are data. Using these regional average time series, we fit nonlinear models to the adjustment data. Using the model fit, we determined the slope between each year. To fill in missing data points in country time series, we apply the slope (percent change in the metric) between the missing year and the following year (or previous year, if necessary). We prioritized filling in backwards (e.g., if a country has data from 2006 and 2008, to fill in 2007, one would use the regional delta between 2008 and 2007), but filled forwards when there were no data for a subsequent year.

For a sector to be included in our assessment it needed to report at least two time points, with the current year falling within 2000-2010, and have data for all or most coastal countries (reported separately, not as a single global number). However, a sector did not need to have data for all three measures – jobs, wages, and revenue – as this would have eliminated almost every sector. Consequently, the sectors that comprise each of the three measures differ (see Table S9 for details), and there is variation across countries in which sectors and measures comprise the Status score (because of gaps in datasets and the fact that not all sectors exist in all countries). If a country only had one data layer (a single sector for only one measure), a Status score was not calculated specific to that country, but rather a regional average was applied. We used a weighted average from the country's region, where revenue is weighted by each country's GDP and jobs are weighted by each country's workforce size, whereas wages are filled as an unweighted average.

The target value for the Status of this goal is to be equal to or greater than 1.0, but we do not give credit for values greater than 1.0 as that would define an optimal growth rate that may not be environmentally sustainable. All scores greater than 1.0 were capped at the maximum score of 1.0.

The Trend was calculated as the slope in the individual sector values (not summed sectors) for j, w, and e over the most recent five years (as opposed to the status, which examines changes between two points in time, current versus five years prior to current), corrected by national trends in employment rates, average wages, and GDP, respectively. We then calculated the average trend for jobs across all sectors, with the average weighted by the number of jobs in each sector. We calculated the average trend for wages across all sectors. We calculated the average for revenue by averaging slopes across sectors weighted by the revenue in each sector. We then averaged the wages and jobs average slopes to get a Trend value for Livelihoods (x_L) and the weighted average slope for revenue is the Trend value for Economies (x_E).

For ecological pressures we evaluated the potential stressors to each sector and then used the average weight across all the sectors as the multiplier for each stressor intensity value (see Table S25 for relevant stressors and their weights), with a different average for the Livelihoods and Economies sub-goals based on which sector data we had for each in each country. We used this averaging approach because we could not track the Status of individual sectors. For the social pressures, we used [(1-SectorEvenness) + (1-WGI) + (1-GCI)] / 3 for the Livelihoods sub-component and [(1-WGI) + (1-GCI)] / 2 for the Economies sub-component (see below for explanation of GCI). The overall Pressures score was then the average of the ecological and social pressures scores, as described in the general model framework (section 2C).

For Resilience, we used three measures of factors that influence social integrity: sector evenness (SE), the Global Competitive Index (GCI), and the WGI (Table S22). Sector evenness was measured using Shannon's Diversity Index, a common measure of ecological and economic diversity that has been applied previously to economic sectors[50]. The Diversity Index is computed as H'/H_{max} where:

$$H' = -\sum_{i}^{Z} f_i * \ln(f_i)\,, \qquad \text{(Eq. S34)}$$

and Z is the total number of sectors, f_i is the frequency of the i^{th} sector (the probability that any given job belongs to the sector), and H_{max} = ln$Z$. The GCI measures 12 different aspects of economic competitiveness (see data layer description in Section 7 below). The GCI scores can in theory span from 1 to 7, and thus we rescaled the measures to a 0 to 1 scale based on this range. We did not include ecological integrity as a Resilience measure because there is no evidence that food web integrity influences any of the sectors enough to merit inclusion. This assessment would, of course, change if we were able to distinguish sustainable vs. unsustainable livelihoods and economic activities. As such, Resilience was calculated as (SE + WGI + GCI)/3 for Livelihoods and (WGI + GCI)/2 for Economies, where terms are omitted when data for a country are not available.

A number of sectors were not included primarily because sufficient data do not exist. In the future, particularly in finer scale applications, it would be desirable to include these sectors, including (but not limited to) ecotourism (beyond just cetacean watching), sailing/kayaking/boating, surfing/kite-boarding, etc., offshore wind and wave energy, navigation assistance, safety and security, coastal development, scientific research, and restoration and conservation.

We assessed the potential consequence of the decision to cap Status scores at 1.0 prior to calculation of the sub-goal overall Index score and found that it made no difference. The only cases where this decision would affect the outcome is when the Status score was greater than 1.0 (before capping) and the Trend was negative (i.e. capping at 1.0 and then calculating the Index score with a negative Trend could bring the Index score below 1.0 when it would not have been less than 1.0 without the capping). For the Livelihoods sub-goal there were 10 cases of Status > 1.0 and a negative Trend; for the Economies sub-goal there were 5 cases. For all, the Trend was between zero and -0.05 and the overall Index score was therefore only slightly below 1.0.

6G. Tourism and Recreation

Tourism and recreation in coastal areas is a major component of thriving coastal communities and a measure of how much people value ocean systems, i.e. by traveling to coastal and ocean areas, people express their preference for visiting these places. This goal is not about the revenue or livelihoods that are generated by tourism and recreation (that is captured in the livelihoods goal, section 6F above) but instead captures the value that people have for experiencing and enjoying coastal areas.

There are potentially dozens of variables that affect how many people engage in tourism and recreation within a country and where they go, including local and global economies, infrastructure to support the activities, promotion of particular locations, safety and security, political stability, and so on. Because we currently do not know which variables matter and to what degree, or have data for many of these variables, we instead assume that tourists distribute themselves within a country proportional to where local populations are, i.e. that populated areas get a greater proportion of the tourists. Although clearly an imperfect assumption, it allows for simple approximation of how many tourists entering a country go to coastal areas for tourism. For similar reasons, we use a spatial comparison reference point that compares each country to the best performing countries.

We focused on international arrivals because even though domestic travel within countries is clearly a major component of tourism and recreation in most countries, it is much harder to quantify domestic travel for leisure purposes given existing data. Teasing out or modeling domestic tourism may be possible at local spatial scales. As such, we measure the Status of this goal (x_{TR}) as:

$$x_{TR} = \log\left[\left(\frac{D_t}{V_T} * S_t\right) + 1\right], \qquad \text{(Eq. S35)}$$

where D is the number of tourist-days based on the product of the total number of international arrivals for leisure and recreation to a country and the average length of stay per tourist (data from UNWTO[51]), at time t (most recent year is 2009), V_T is the total population size of the country (data from ESRI[24]), and S is a sustainability factor for each year, which we equate with the Travel and Tourism Competitiveness Index (TTCI). We used tourist-days as the measure for this goal because some locations, especially remote ones, may receive fewer arrivals but tourists may stay for longer periods of time. We therefore multiplied the number of arrivals by the average length of stay in order to incorporate this information. The TTCI uses a variety of indicators to determine economic and environmental sustainability of tourism (see section 7 for description of the data layer). Uninhabited territories were assumed to never have or get tourism (i.e., this goal does not apply to them) and so were not scored on this goal. Total population size data were the 2007 midyear estimated population of the country as reported by the U.S. Census Bureau, Population Division/International Programs Center[52].

We log-transformed the Status scores because of an extremely exponential distribution of scores driven by a few countries with much higher tourism rates relative to population size. Even after this transformation the distribution of scores remained strongly exponential and so we rescaled scores to the value of the 90th percentile country, which was 25% of the maximum score. The 17 countries above this score were all given status scores = 1.0.

Most countries within Oceania did not have reported data for international arrivals, and so we gap-filled these countries based on the average overall Status score for all countries bordering the Pacific that had data. Although an imperfect method, we felt it was better to have some tourism reported for countries that clearly receive many tourists than to assume zero tourists for these countries or to treat them as ‘no data’ situations in which they would get no credit for the tourism they do support.

The Trend for this goal is simply the change in Eq. S35 over time, from 2005-2009. As described in section 2B, we calculate the annual rate of change (i.e., the slope) and multiply by five to get an estimate of the near-term future trend and clamp these values to range -1.0 to 1.0. Pressures to this goal are entirely from pollution, as there is little evidence that any of the other pressures affect whether or not tourists visit a location [53]. Resilience measures come from the WGI data and from the CBD questions targeted at water pollution (Table S22).

It is important to note that the international arrivals data, although the best available, poorly represent even international tourism, let alone all tourism as a whole. Poor data quality was another reason we rescaled Status scores to the 90th percentile country, as the top 10% were so much higher that the scores for all other countries were compressed to very small values, which would in turn unduly (and likely incorrectly) influence the overall Index score. Furthermore, we tested several other approaches to approximating coastal tourism based on these data, most notably by apportioning tourism based on the ratio of coastal population to total population and based on ratio of coastal land to total country size. In both cases the use of the ratio adjusts the tourism (arrivals) data but does not account for any difference in the size of countries, i.e., two countries could have the same number of coastal tourists and therefore get identical goal scores and yet be dramatically different in size. In this example, the larger country should have more tourists in order to get the same score.

A key limitation remains in our approach to modeling tourism in that it presumes tourism should scale to local population size, such that very populous countries that have modest to high absolute levels of tourism (e.g. USA, China, India, Brazil) get extremely low status scores for this goal. Without a true production function for what comprises sustainably levels of tourism in each country, any simplified model produces anomalous results such as we found here. It is important to keep this caveat in mind when interpreting results from this goal.

6H. Sense of Place

With this goal we tried to capture the aspects of the coastal and marine system that people value as part of their cultural identity. This definition includes people living near the ocean and those who live far from it but still derive a sense of identity or value from knowing particular places or species exist. We divided this goal into two sub-goals: Iconic Species and Lasting Special Places, and weighted them equally when combining to create a single goal score.

Iconic Species sub-goal: Iconic species are those that are relevant to local cultural identity through a species' relationship to one or more of the following: 1) traditional activities such as fishing, hunting or commerce; 2) local ethnic or religious practices; 3) existence value; and 4) locally-recognized aesthetic value (e.g., touristic attractions/common subjects for art such as whales). Habitat-forming species are not included in this definition of iconic species, nor are species that are harvested solely for economic or utilitarian purposes (even though they may be iconic to a sector or individual).

To define the list of iconic species for each country, we compiled lists of country-specific iconic species with lists of global iconic species to create the total list of iconic species per country (see 'Iconic species' in section 7). Species were drawn from the World Wildlife Fund's global and regional lists for Priority Species (especially important to people for their health, livelihoods, and/or culture) and Flagship Species ('charismatic' and/or well-known).

Ultimately, almost any species can be iconic to someone, and so the intent with this goal was to focus on those species widely seen as iconic within a country, and iconic from a cultural or existence value (rather than for a livelihoods or extractive reason). Many lists exist for globally important, threatened, endemic, etc. species, but in all cases it is not clear if or to what extent these species represent culturally iconic species. The lists we used from World Wildlife Fund are the only source that included cultural reasons for listing iconic species.

The Status of this sub-goal (x_{ICO}) is therefore simply the % of iconic species in each threat category (as defined by the IUCN Red List[54,55]), such that:

$$x_{ICO} = \frac{\sum_{i=1}^{6} S_i * w_i}{\sum_{i=1}^{6} S_i}, \qquad \text{(Eq. S36)}$$

where for each IUCN threat category i, S_i is the number of assessed species in category i and w_i is the status weight assigned (see Table S11 for IUCN threat categories and weights) following the methods described by Butchart et al.[56]. This formulation gives partial credit to species that still exist but are in one of the other threat categories. The reference point is to have the risk status of all assessed species as Least Concern (i.e., a goal score = 1.0). Species that have not been assessed or labeled as data deficient are not included in the calculation.

The IUCN provides information about whether assessed species are increasing, stable or decreasing in population size, or whether the trend is unknown. We report the Trend as the average of the recorded (categorical) trend (excluding unknown trends) for all the iconic species assessed by IUCN in each country, giving scores of 0.5 (increasing population), 0.0 (stable), and -0.5 (decreasing population) to each species. Pressures are considered across all iconic species and are weighted as shown in Table S25. An additional pressure was added for this sub-goal only (targeted harvest, see section 7) to account for the fishing pressure on iconic species taxa. For Resilience, we used being a signatory on a number of conventions and treaties as a measure of regulatory response to ecological pressures, ecological integrity across the entire EEZ, and WGI measures to assess the overall Resilience for this goal (see Table S22), following the general modeling approach outlined in section 2C and 2D.

Lasting Special Places sub-goal: The 'Lasting Special Places' sub-goal focuses instead on those geographic locations that hold particular value for aesthetic, spiritual, cultural, recreational or existence reasons[57]. This sub-goal is particularly hard to quantify. Ideally one would survey every community around the world to determine the top list of special places, and then assess how those locations are faring relative to a desired state (e.g., protected or well managed). The reality is that such lists do not exist. Instead, we assume areas that are protected represent these special places (i.e. the effort to protect them suggests they are important places). Clearly this is an imperfect assumption but in many cases it will be true.

Using lists of protected areas as the catalogue of special places then creates the problem of determining a reference condition. We do not know how many special places have yet to be protected, and so we end up having all identified special places also being protected. To solve this problem we make two important assumptions. First, we assume that all countries have roughly the same percentage of their coastal waters and coastline that qualify as lasting special places. In other words, they all have the same reference target (as a percentage of the total area). Second, we assume that the target reference level is 30% of area protected[58].

As such, we calculate the Status of this goal as:

$$x_{LSP} = \frac{\left(\frac{\%_{CMPA}}{\%_{\mathrm{Re}f\_CMPA}} + \frac{\%_{CP}}{\%_{\mathrm{Re}f\_CP}} \right)}{2}, \qquad \text{(Eq. S37)}$$

where CMPA = coastal marine protected area, CP = coastline protected, and Ref = 30% for both measures. We focus only on coastal waters (within 3nmi of shore) for marine special places because it was assumed that lasting special places are primarily in coastal areas; we wanted our estimates of % area protected to be bounded to this coastal region. For coastlines, we focused only on the first km-wide strip of land as a way to increase the likelihood that the area being protected by terrestrial parks is connected to the marine system in some way. We found that the coastal (terrestrial) protected area extent scales linearly from 1 to 9 km inland ($R^2 = 0.98$), such that our decision to use a 1km^2 buffer should not affect results at all. We use the compiled list of protected areas provided by the United Nation's World Database on Protected Areas (WDPA) to derive these % protected values[59]. The WDPA aggregates several key databases: IUCN's World Commission on Protected Areas, Global Marine Protected Areas, UNESCO World Heritage Marine sites, National Parks and Nature Reserves, and the United Nation List of Protected Places.

In most of these cases the year of designation is listed for each protected area, and so we use the % area (or % coastline) added each year relative to the reference point in the last five most complete years (2002-2006) to derive the trend in protected sites, and therefore the Trend in Status of Lasting Special Places. Pressures to this goal derive primarily from pollution and habitat destruction (see Table S22). Resilience measures for this goal come from CBD questions relating to pollution and habitat destruction, the amount of money (proportional to GDP) invested into protected areas, and the WGI indicators.

6I. Clean Waters

People value marine waters that are free of pollution and debris for aesthetic and health reasons. Contamination of waters comes from oil spills, chemicals, eutrophication, algal blooms, disease pathogens (e.g., fecal coliform, viruses, and parasites from sewage outflow), floating trash, and mass kills of organisms due to pollution. People are sensitive to these phenomena occurring in areas that they access for recreation or other purposes as well as for simply knowing that clean waters exist. This goal scores highest when the contamination level is zero.

We condensed these various measures of pollution into four components that comprise the Clean Waters goal: eutrophication (nutrients), chemicals, pathogens and marine debris. This decision was meant to represent a comprehensive list of the contamination categories that are commonly considered in assessments of coastal clean waters[60] and for which we could obtain datasets. Because of limited data availability for chemical pollution, we measured the chemicals component as the average of land-based organic pollution, land-based inorganic pollution and ocean-based pollution from commercial shipping and ports. We did not have global data for oil spills and so could not include oil pollution, but in future assessments where such data exist it would be included in chemical pollution as well. In all four cases, the Status of these components is the inverse of their intensity (i.e., high input is a bad status).

We used the modeled input of land-based nitrogen input from Halpern et al.[3] as a proxy for nutrient input. We did not use the Global NEWS data for river output of nutrients[61] because it focuses on large watersheds that cover most of the global landscape but a small percentage of the global coastline. The modeled proxy approach does not allow the distinction between toxic and non-toxic bloom events that can arise from excess nutrient input (often both referred to in the literature as harmful algal blooms, or HABs) or at what nutrient concentration an ecosystem is pushed into a HAB condition (i.e., the threshold value). Local studies may be able to obtain information on such non-linear responses and include it as part of this Status measure.

The Status of chemical pollution was measured via three global datasets: land-based organic and inorganic pollution from agricultural pesticide use and runoff from impervious surfaces, respectively, and ocean-based pollution from commercial shipping and ports (all three from ref [3]). We were not able to assess specific toxic chemicals at the global scale; however regional case studies often will have data available for the quantities and toxicity of a range of chemicals put into watersheds and coastal waters.

Human-derived pathogens are found in coastal waters primarily from sewage discharge or direct human defecation. Since we did not have access to a global database of *in situ* measurements of pathogen levels, we used a proxy measure for the Status of pathogen pollution, namely the number of people in coastal areas without access to improved sanitation facilities. The underlying assumption is that locations with a low number of people with access to improved facilities will likely have higher levels of coastal water contamination from human pathogens. To estimate this pathogen intensity, we multiplied average population density within the 50km of land adjacent to coasts by the percentage of the population without access to improved sanitation. This allows countries with low coastal population densities and low access to improved sanitation to score better than high population countries with better access if the absolute number of people without access is lower in the small country.

The Status of trash pollution was estimated using globally-available coastal beach cleanup data from the Ocean Conservancy, which records the weight of trash per year that were collected. We normalized these data per length of coastline to create a tons/km of trash metric.

The Status of this goal (x_{CW}) is then calculated as the geometric mean of the four components, such that:

$$x_{CW} = \sqrt[4]{a * u * l * d}\,, \qquad \text{(Eq. S38)}$$

where a = the number of people without access to sanitation (i.e. coastal population density times % without access to enhanced sanitation) rescaled to the global maximum, u = 1 – (nutrient input), l = 1 – (chemical input), and d = 1 – (marine debris input). The intensity or input values for each sub-component come from the data sources listed in Table S23. We used a geometric mean, as is commonly done for water quality indices[62], because a very bad score for any one sub-component would pollute the waters sufficiently to make people feel the waters were ‘too dirty’ to enjoy for recreational or aesthetic purposes (e.g. a large oil spill trumps any other measure of pollution).

Although clean waters are relevant and important anywhere in the ocean, coastal waters drive this goal both because the problems of pollution are concentrated there and because people predominantly access and care about clean waters in coastal areas. We also have severe data limitations for open ocean areas with respect to measures of pollution. Finally, the high seas experience little meaningful regulation or governance over the input of pollution into these areas. We therefore calculate this goal only for the first 3nmi of ocean for each country's EEZ. We chose 3nmi for several reasons, but found the status results to be insensitive to different distances (linear relationship between width of coastal area assessed and pollution stressor scores: $R^2 = 0.99$, $p<0.001$; global average scores differed minimally, from 0.084 at 1km to 0.072 at 9km). First, for aspects of Clean Waters that relate to what people can see (i.e., people want to see clean waters), the marine 'viewshed' is the important variable. Second, it is the waters that are closest to shore that most affect people's sense of Clean Waters, as it is these nearshore waters that affect their beach-going, shoreline fishing, and other activities.

Three of the four status measures did not have enough data to allow calculation of trends over the past 5 years, and so we used other related proxy measures to estimate trends. For both fertilizers and pesticides, FAO reports the tonnage used (by country) for most countries; these data were used to model the nutrient and organic chemical pollution components of Status and are therefore assumed to be correlated to trends that would emerge from rerunning the modeled watershed plumes calculated by Halpern et al. [3]. Trends in trash were estimated using trends in coastal population density for the 50 miles closest to shore, based on the significant (albeit weak) relationship between the amount of trash found along beaches [63] and coastal population[64] (log-log correlation; $R^2=0.13$, $p<0.001$; $n=99$). We acknowledge that this approach to calculating the trend does not account for marine debris derived from ships and other ocean-based sources. Data for access to enhanced sanitation and coastal population density exist for multiple years and so we were able to calculate the trend directly for pathogen pollution. The Trend for the Clean Waters goal was then calculated as the average of these four trends.

Because we did not have an easy way to determine the reference point for these proxy data sets for trends, we convert the slopes into a -1.0 to 1.0 range by dividing the slope by the value for the initial year in the proxy data and by the number of years measured, i.e. treating the initial year as the reference point and calculating the annual percent change from that initial point until the more recent data year. We then follow the standard procedure described in the general methodology above (section 2B).

This goal is unique in that the maximum Status is also the absence of Pressures. As such, one minus the Status of each pollutant was used for Pressures data. Pressures were therefore the intensity and input of nutrients, chemicals, pathogens, and trash (as listed above). High population density and industrial intensity threatens to increase the level of human-derived contamination in the future (unless there is strong governance in place to contain the potential effects). All four pressures were weighted equally important (see Table S25)

For Resilience in the clean waters goal, we excluded measures of ecological resilience, as clean waters may occur also in the presence of a compromised food web which does not necessarily affect the ability of the system to stay uncontaminated. For measures of social structure and governance we used data from the Worldwide Governance Indicators (WGI) and CBD questions related to clean water (Table S22).

A number of potential components of clean water were not included due to lack of global datasets, including toxic algal blooms, oil spills, turbidity (sediment input), and floating trash. In future applications of the Index where such data are available, they would be included in their appropriate component of Clean Waters (nutrients, chemicals, and trash, respectively).

6J. Biodiversity

People value biodiversity in particular for its existence value. The risk of species extinction generates great emotional and moral concern for many people. As such, this goal assesses the conservation status of species based on the best available global data through two sub-goals: Species and Habitats. Species were assessed because they are what one typically thinks of in relation to biodiversity. Because only a small proportion of marine species worldwide have been mapped and assessed, we also assessed Habitats as part of this goal, and considered them a proxy for condition of the broad suite of species that depend on them.

For the Species sub-goal, we used recent assessments by the International Union for Conservation of Nature (IUCN)- Global Marine Species Assessment of the extinction risk status of 2377 species for which distribution maps also exist across a wide range of taxa to provide a geographic snapshot of how total marine biodiversity is faring, even though it is a very small sub-sample of overall species diversity[65]. We calculate each of these sub-goals separately and treat them equally when calculating the overall goal score.

Species sub-goal: The target for the Species sub-goal is to have all species at a risk status of Least Concern. We scaled the lower end of the biodiversity goal to be 0 when 75% species are extinct, a level comparable to the five documented mass extinctions[66] and would constitute a catastrophic loss of biodiversity. The Status of assessed species was calculated as the area- and threat status-weighted average of the number of threatened species within each 0.5 degree grid cell. Species distribution and threat category data came from the IUCN Global Marine Species Assessment results[55,67,68]. We calculated the average species status (instead of other statistics) to account for different species richness values in different locations around the world. Taxa included in the analysis are listed in Table S17. Threat weights (w_i) were assigned based on the IUCN threat categories status of each i species, following the weighting schemes developed by Butchart *et al.*[56] (see Table S11 for IUCN threat category weights). For the purposes of this analysis, we included only data for extant species for which sufficient data were available to conduct an assessment. We did not include the Data Deficient classification as assessed species following previously published guidelines for a mid-point approach[69,70].. The Status score in the Species sub-goal (x_{SPP}) was calculated as the region's area-weighted average species risk status. For each 0.5 degree grid cell (c) the risk status (w) for each species (i) present is summed and divided by the total number of species present in the cell (N). This average species risk is subtracted from on so that the presence of more threatened species produces a higher score (see Table S11), and multiplied by the ocean area (A_c) occupied by the cell (km^2):

$$x_{SPP} = \frac{\sum_{k=1}^{M} \left(1 - \frac{\sum_{i=1}^{N} w_i}{N} \right) \cdot A_c}{A_T}, \qquad \text{(Eq. S39)}$$

These values are summed for all the region's cells (M) and divided by the total amount of the region's ocean area (A_T). It is important to note that the IUCN Red List assessments provide a global, rather than country- or region- specific threat status for each species.

Table S11. Weight values for assessment of Species, based on IUCN risk categories.

Risk Category	IUCN code	Weight
Extinct	EX	0.0
Critically Endangered	CR	0.2
Endangered	EN	0.4
Vulnerable	VU	0.6
Near Threatened	NT	0.8
Least Concern	LC	1.0

We calculated Trend as the average of the population trend assessments for all species within a region, with species' trends assigned a value of 0.5 for increasing, 0 for stable, and -0.5 for decreasing using the population trend data associated with the species assessment conducted by IUCN. Pressures to species biodiversity included all pressures except human pathogens and social pressures derived from the WGI data (see Table S22). Resilience measures used for the Species sub-goal include nearly all available regulations and other institutional measures and the social resilience from the WGI data (see Table S22). We did not include ecological integrity measures as they are based on the same data used to calculate Status and Trend.

Habitat sub-goal: The Status of the Habitat sub-goal (x_{HAB}) was assessed for all habitats for which at least some global data were available, specifically: mangroves, coral reefs, seagrass beds, salt marshes, sea ice edge, and subtidal soft-bottom habitats. Status was assessed as the average of the condition estimates for each k habitat present in a region (C_k; measured as the loss of habitat and/or % degradation of remaining habitat), such that:

$$x_{HAB} = \frac{\sum_{i=1}^{k} C_k}{k}, \qquad \text{(Eq. S40)}$$

where $C_k = C_c/C_r$ and C_c is the current condition and C_r is the reference condition specific to each k habitat present in the region. This formulation ensures that each country is assessed only for those habitats that can exist, e.g. Canada is not assessed on the Status of its (nonexistent) coral reefs. We generally considered the reference years to be between 1980-1995 and the current years to be between 2001-2010, although these varied by habitat due to data availability.

A significant amount of pre-processing of the habitat data was needed to fill data gaps and resolve data quality issues (see the data layers section for details on data sources). Because consistent habitat monitoring data was unavailable for many countries, anomalous values can occur. This is particularly true for highly variable habitats like seagrasses or coral reefs which can have significant site-to-site and year-to-year differences in extent and condition [71,72]. Biases may also have been introduced from spatial (e.g. protected or impacted sites) and temporal (e.g., directly after a disturbance event) selections in sampling. In regions where we had a limited number of surveys in a particular country, overall Status can be under- or overestimated because of these fluctuations.

Trend in habitat data were calculated as the linear trend in extent or condition with slight variations depending on habitat type. Coral reef habitat trends were calculated on a per country basis, using all available data. For seagrasses we calculated trends on a per site basis. For mangroves we used the rate of change in areal extent [73] over the entire time series of available data (1980-2005). For sea ice we calculated the slope across three-year moving averages to smooth out potential climate variation, with 2009 (average of 2008-2010) as the most recent year. For soft-bottom habitat we simply calculated the slope of the recent change in condition over the past five years, i.e. the change in proportion of catch from trawl fishing per unit area of habitat within a region.

Ecological pressures varied by habitat (see Table S22 for details) and were applied per-country depending on which habitats were present in each country. Social pressures were assumed to affect all habitats equally, based on the WGI index. Similarly, Resilience measures varied by habitat (see Table S22 for details), and therefore country, depending on which Pressures ranked most highly for each habitat. Ecological integrity was included in Resilience measures here, unlike other habitat-based goals, as it more directly relates to the intent of the goal (Biodiversity) than for other goals (Carbon Storage and Coastal Protection). We also included several Resilience measures from the CBD questionnaire that apply broadly to the goal of biodiversity conservation even though not tied to specific pressures (which is the criterion we use for all other Resilience measures). Social resilience was assumed to be equally relevant to all habitats and all countries and was based on the WGI index.

Data availability remains a major challenge for species and habitat assessments. We compiled and analyzed the best available data in both cases, but key gaps remain. Although several efforts have been made in recent years to create or compile the data necessary to look at the status and trends of marine habitats, most efforts are still hampered by limited geographical and temporal sampling, although mangroves are an exception[74]. The few habitats that are well-monitored cannot necessarily be easily extrapolated to draw conclusions about the global status and trends of habitats. In addition, most benthic habitats have only been monitored since the late 1970s at the earliest, many sites were only sampled over a short period of time, and very few sites were monitored before the late 1990s so establishing reference points was difficult. Salt marshes and seagrasses were the most data-limited of the habitats included in the analysis. Similar issues existed for the Species sub-goal. Although several marine habitat-forming species, and some commercially important groups (e.g., tuna and billfishes) were included, the majority of marine species have not yet been formally assessed by the IUCN. Taxonomic and geographical biases may have affected our ability to detect changes, especially at smaller spatial scales. In addition, the IUCN assessments represent the extinction risk primarily at a species level. For those species with broad spatial distribution and/or that comprise several populations, these estimates may not be representative of regional or local extinction risks.

7. Specific Data Layers

Table S23 in '*Supplementary Figures and Tables*' below lists each data layer that was used, and where, in the Index. Here we provide further details for each data layer, including information on how and why they were used, when relevant what assumptions were required to allow their use for their intended purpose, and any caveats that need to be considered. Layers are numbered in alphabetical order, using names listed in Table S23 and archived at http://ohi.nceas.ucsb.edu/data when available.

7.1. Alien species

Where used: Pressure for several goals

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Description: These data come from the global invasive species database[75]. The database reports number and type of alien species in each marine ecoregion[76], with species types categorized as invasive and harmful invasive species. For our purposes, total count of all invasive species was used. We intersected the ecoregion data with our reporting units to determine the proportion of each ecoregion that falls within each reporting unit and then assigned this percentage of invasive species from the ecoregion to the reporting unit. The sum of all invasive species within each reporting unit was then rescaled to the maximum global value.

Predicting the full potential impact of alien species depends in large part on having high-resolution spatial information on where they exist, how far they have spread and exactly which components of the food web they affect. The data from Molnar et al. [75] approximate these impacts but at ecoregional scales. In addition, the impacts of alien species will vary depending on the goal under consideration. This implies that harmful effects would need to be assessed separately for each goal. Such an endeavor may be possible when applying this framework to a smaller case-study where this type of information can be acquired.

7.2. Artisanal fishing: high bycatch

Where used: Part of Status and Trend for Natural Products; Pressure for several goals

Description: Reefs at Risk Revisited[77] recorded the presence of destructive artisanal blast and poison (cyanide) fishing in a country based on survey observations and expert opinion. Because these data are categorical, we used a binary system for scoring regions for this stressor. Where destructive artisanal fishing practices were recorded as either "moderate" or "severe," we categorized the value as maximum (score = 1). "Unclassified" areas are considered under low threat from blast and poison fishing by Reefs at Risk Revisited and were categorized as having no artisanal high bycatch fishing (score = 0).

A notable limitation of using these data as a proxy for high bycatch artisanal fishing is that they only cover coral reef habitats. High bycatch artisanal fishing likely exists in every coastal country on the planet, but we have no way of knowing the type or extent (for every country). For all non-habitat destructive (but still potentially high bycatch) fishing we use FAO catch data (described below in Artisanal Fishing: Low Bycatch).

7.3. Artisanal fishing: low bycatch

Where used: Pressure for several goals

Description: FAO reports statistics on this type of catch for many but not all countries; we used data for 59 countries reported in 2006 and modeled the values for the remaining countries. There is no information on the gear type used for this catch; we make the assumption that little of it is done with habitat-destructive gear (e.g., blast fishing) or high bycatch gear (e.g., seine nets) but recognize that high bycatch gear in particular is common. However, we used a separate dataset for destructive artisanal fishing practices (see 'Artisanal Fishing: High Bycatch' above). Full details on this data layer are provided in Halpern et al.[3].

7.4. Artisanal fishing: management effectiveness and opportunity

Where used: Status for Artisanal Fishing Opportunity goal, Resilience for several goals

Description: This layer represents the opportunity for artisanal and recreational fishing in each country based on the quality of management of the small-scale fishing sector. Global data were extracted from Mora et al.[37], Figure S4. Figure S4 is based on two expert opinion survey questions related to artisanal and recreational fishing (classified as small-scale fishing; presented in Table S5). Overall scores for small-scale fisheries management for each country are based on a scale of 0 to 100, with higher scores representing better management of the artisanal and recreational fishing sectors. These values were then rescaled (using a maximum value of 100 and minimum value of 0) to give a country score between 0 and 1 for each OHI region.

7.5. Artisanal fishing: need

Where used: Status and Trend for Artisanal Fishing Opportunity goal

Description: The need for artisanal fishing opportunities is measured as the Purchasing Power Parity adjusted per capita Gross Domestic Product (PPPpcGDP). Gross Domestic Product (GDP) was obtained in 2010 US dollars from The World Bank. The World Bank defines GDP as the gross value of all resident producers in the economy plus product taxes and minus and subsidies not included in the value of the products. The GDP was then adjusted by population size to get per capita output and by Purchasing Power Parity (PPP) to account for the difference in exchange rates between countries.

7.6. Chemical pollution: land-based inorganic
Where used: Status and Pressure for Clean Waters, Pressure for most other goals.
Description: Raw data were drawn from modeled plumes of land-based inorganic pollution, as developed in Halpern et al.[3], that produced intensity of pollution at $1km^2$ resolution. The model used impervious surface area within watersheds as a proxy measure for likely amount of this pollution that reached river mouths, and plumes were distributed using a diffusive model. Each ocean pixel was then rescaled 0-1 based on the global maximum pixel value (see ref [3] for details). See nutrient pollution layer for scoring method for this impact layer.

7.7. Chemical pollution: land-based organic
Where used: Status and Pressure for Clean Waters, Pressure for most other goals
Description: Raw data were drawn from modeled plumes of land-based organic pollution, as developed in Halpern et al.[3], that produced intensity of pollution at $1km^2$ resolution. The model distributed country-level pesticide use onto land-use classes (via dasymetric mapping techniques) and then summed by watersheds as a proxy measure for likely amount of this pollution that reached river mouths. Plumes were then distributed using a diffusive model. Each ocean pixel was then rescaled 0-1 based on the global maximum pixel value (see ref [3] for details). See nutrient pollution layer for scoring method for this impact layer.

7.8. Chemical pollution: ocean-based
Where used: Status and Pressure for Clean Waters, Pressure for most other goals
Description: Ocean-based chemical pollution is assumed to come from commercial and recreational ship activities. Recreational shipping activity data are not available globally, so for this layer we used a combination of commercial shipping and ports and harbors data. Commercial shipping traffic data comes from the World Meteorological Organization Voluntary Observing Ships Scheme (http://www.vos.noaa.gov/vos_scheme.shtml) and uses data collected from 12 months of shipping traffic beginning in October 2004. This commercial shipping data estimates the density of commercial shipping traffic for 1 km2 cells, and can therefore be used as an estimate of the amount of pollution produced by commercial shipping. Port-derived pollution is modeled as a diffusive plume with a maximum distance of 100 km for 618 global ports and comes from several sources: the 2002 World Port Ranking (N=36) and 2003 U.S. Port Ranking (N=102) compiled by the American Association of Port Authorities (http://www.aapa-ports.org), Australia ports database (N=30), and Lloyds List database (N=450). Full details on the Commercial Activity data layer are provided in Halpern et al.[3]. See Nutrient Pollution layer for scoring method for this impact layer.

7.9. Coastal human population
Where used: Status, Trend and Pressure for Clean Waters and as a proxy for the intertidal habitat destruction pressure applied to various other goals
Description: Coastal population density data were extracted from the gridded population of the world dataset (CIESIN 2005) using only the UN-adjusted population counts and density (1990, 1995, and 2000), not population projections. We then rescaled the data using log-linear scale transformation with the maximum global score coming from the 2000 dataset (123,083 persons per km^2). To define a coastal zone, we used a fixed-distance inland criteria of 50 miles, the value used by the U.S. Census Bureau[78]. We then resampled our 50mi inland buffer raster to match the GPWv3 resolution (2.5 arc-min), and then selected all population density data that were within a 50mi inland buffer. For 163 oceanic regions, we calculated Pressures using available data. For 9 other regions, we modeled them using geographical regional means based on other oceanic regions nearby, weighted by their 3nmi offshore area.

7.10. Coastal land and ocean area
Where used: used with other data layers in a variety of dimensions for all goals
Description: For coastal ocean (offshore) areas, we derived fixed-distance buffers at 1 km, 3 nmi, and 10 km from our land-sea interface model (Section 3) and coded them by reporting region using spatial intersection. For coastal land (inland) areas, we extracted hi-resolution country boundary data from ESRI[24], and rasterized it with a resolution to match our land-sea interface model. We propagated the ISO_3DIGIT code values in the rasters to track country membership for cells. We grew this raster by 50 pixels to bridge gaps between the ESRI data and our land-sea model. Finally, we computed the area within 50mi inland buffer per country code, and then

mapped to oceanic region. We also extracted the total km^2 per country from ESRI[24] and CIA World Factbook. Note that the ESRI data have Taiwan as part of China, so we manually extracted the mainland of Taiwan to calculate land area. For coastal ocean (offshore) areas, we created buffers at 3 nmi and 10 km from the land-sea interface and coded them by reporting region region using spatial intersection.

7.11. Commercial fishing: high bycatch

Where used: Pressure for several goals

Description: This Pressure represents fish caught using high bycatch gear, which includes demersal destructive (e.g. trawl), demersal non-destructive high bycatch (e.g. pots, traps) and pelagic high bycatch (e.g. long-lines) gear. The species-gear associations are from Watson et al.[79]. Catch data come from 2006 and were spatialized by the *Sea Around Us* Project into ½ degree cell resolution [31]. We then summed these values into our EEZ reporting units. When cells spanned EEZ borders, we divided catch proportionally based on amount of area in each EEZ. Full details on the data that comprise this layer are provided in Halpern et al.[3].

7.12. Commercial fishing: low bycatch

Where used: Pressure for several goals

Description: This Pressure represents fish caught using low bycatch gear, which includes demersal non-destructive low bycatch (e.g. hook and line) and pelagic low bycatch (e.g. purse seines) gear. The species-gear associations are from Watson et al. [79]. Catch data come from 2006 and were spatialized by the *Sea Around Us* Project into ½ degree cell resolution [31]. We then summed these values into our EEZ reporting units. When cells spanned EEZ borders, we divided catch proportionally based on amount of area in each EEZ. Full details on the data that comprise this layer are provided in Halpern et al.[3].

7.13. Convention on Biological Diversity (CBD) signatories

Where used: Resilience for most goals

Description: These data come from the Convention on Biological Diversity which lists the ratified parties to the convention (http://www.cbd.int/information/parties.shtml). The CBD has 3 main objectives: 1) The conservation of biological diversity; 2) The sustainable use of the components of biological diversity; 3) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources. All ratifying countries were given full credit for membership (score = 1), and non-parties were given no credit (score = 0). For 19 sovereign countries, we designated their territories with its signatory status following Table S24.

7.14. Convention on Biological Diversity (CBD) survey

Where used: Resilience for most goals

Description: The country responses to the Convention on Biological Diversity (CBD) Third National Report (2005) were applied in different combinations for five separate Resilience measures (Table S12). Each question was weighted equally within each category and responses were averaged to give a score between 0 and 1 for all responding countries. For each question score, we assigned a 1 if country is a signatory and answered "yes", or a 0 if country is a signatory and either answered "no" or had no answer. The CBD has 193 members and 153 members responded to the Third National Survey (2005). All countries were given credit within each of the 4 resilience measures for simply being a member of the CBD (0.5), the other 0.5 of the Resilience score came from each country's response to the specific questions within each Resilience measure. In cases where the "European Union" answered yes or was a signatory, all EU25 countries were given that answer if they did not provide one themselves. We had data for 147 regions, and used geographical means, weighted by country area, for the remaining regions. The survey uses a 0 to 3 scale for questions 79 and 81, and a 0 to 2 scale for question 80, which we rescale linearly to 0 to 1.

Table S12. Questions applied to each resilience measure from the Convention on Biological Diversity (CBD) Third National Report Questionnaire

Resilience Measure	Questions Used
CBD alien species	160 (b-e)
CBD habitat	153 (a,b,c,e,g) and 158 (a,b,c,f,g,h)
CBD mariculture	158 (d) and 159 (a-l)
CBD tourism	79, 80, 82
CBD water	153 (d,f)

7.15. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listed species

Where used: Resilience measure for Iconic Species sub-goal of Sense of Place, part of Status and Trend in Species sub-goal of Biodiversity and Natural Products goal

Description: This species database is created and maintained by UNEP-WCMC online at (http://www.cites.org/eng/resources/species.html) and contains the scientific names of every species ever listed in CITES Appendices I, II, or II for the purpose of protection of these species against over-exploitation through international trade. All species of cetaceans, sea turtles, and coral are considered CITES listed species. See Table S13 for purposes of listing in each Appendix.

Table S13. Purpose for species listing in CITES Appendices

Appendix I	Includes species threatened with extinction that are or may be affected by trade. Trade in Appendix-I specimens may only take place in exceptional circumstances.
Appendix II	Includes species that are not presently threatened with extinction, but may become so if their trade is not regulated. It also includes species that need to be regulated so that trade in certain other Appendix-I or -II species may be effectively controlled; these species are most commonly listed due to their similarity of appearance to other related CITES species.
Appendix III	Includes species listed by a range country to obtain international cooperation in controlling trade.

7.16. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) signatories

Where used: Resilience measure for Iconic Species sub-goal of Sense of Place, Species sub-goal of Biodiversity, and Natural Products

Description: These data come from the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and list the contracting parties to the convention (http://www.cites.org/eng/disc/parties/alphabet.php). The Convention is an international agreement between governments that aims at ensuring that any international trade in plants and animals "does not threaten their survival." All countries party to the Convention by August 2011 were given full credit for membership; those countries that are not contracting parties are given no credit (score = 0).

7.17. Coral reefs

Where used: Status and Trend in Coastal Protection, Biodiversity and Natural Products

Description: Coral reef extent data are derived from the 500m resolution dataset developed for Reefs at Risk Revisited[80], and we calculate extent area using a resampled version of our EEZ regions to match their 500m resolution. For coral reefs, we use condition data from percent live coral cover from 12,634 surveys from 1975-2006 (ref [71,81]). When multiple data points are available for the same site and year, we average these data, and also average the site data to calculate a per country per year average. However, data were missing for several countries and some countries did not have data for the reference or current year time periods or had only 1-2 surveys. Because coral cover can be highly temporally and spatially dynamic, having only a few surveys that may have been motivated by different reasons (i.e. documenting a pristine or an impacted habitat) can bias results. To calculate C_k we used fitted values from a linear trend of all data per country, which was more robust to data poor situations and allowed us to take advantage of period of intense sampling that did not always include both current and reference years. Then, we create a fitted linear model of all these data points in 1975-2010, provided that 2 or more points are in 1980-1995 and 2 or more points are in 2000-2010. We defined the 'current' condition (health) as the mean of the predicted values for 2008-2010, and the reference condition as the mean of the predicted values for 1985-1987. Where country data were not available, we used an average from adjacent EEZs weighted by habitat area, or a georegional average weighted by habitat area, based on countries within the same ocean basin (Figure S4). In Natural Products, we use coral and rocky reef extent data.

7.18. Ecological integrity

Where used: Resilience measure for many goals

Description: This layer is a slight modification of the marine species layer, described below. It is the weighted sum of assessed species, but with weights assigned according to Criterion A1 in IUCN assessments (population abundance), because the abundance of species rather than their categorical threat status is a more relevant measure of ecological integrity. Weights are only slightly modified from Table S11, such that: EX = 0.0, CR = 0.2, EN = 0.5, VU = 0.7, NT = 0.9, and LC = 0.99. We then calculated the spatial average of these per-pixel scores based on a 3 nmi buffer for goals that are primarily coastal and for the whole EEZ for goals that derived from all ocean waters.

7.19. Fertilizer trends

Where used: Trend for Clean Waters

Description: Trend in fertilizer consumption comes from the FAO Statistical Yearbook 2011. The data span 2002-2008 and have country spatial resolution. We obtained total nitrogen fertilizer consumption data (in metric tons of nutrients) from FAO[82] which measures "actual deliveries to agriculture by the manufacturers or actual quantity consumed by a country for agriculture production" via FAO survey results using a fertilizer resources questionnaire. For each OHI region we report the metric tons of nutrients per km^2, calculate a linear regression per region over the 2002-2008 timeframe, and then compute the Trend value for each region.

7.20. Fisheries catch data

Where used: Food provision Status and Trend.

Description: Fisheries catch data come from FAO global fisheries catch statistics, data from international and national fisheries agencies, and reconstructed catch datasets that have been spatialized to half-degree resolution in WGS84 geographic projection by the *Sea Around Us* Project[31] and then aggregated to each reporting region. All gaps in catch reporting were treated as true zeros; six countries had poor data reporting for early years in the time series and so these were treated as zeros (Bahamas, Dominican Republic, Kenya, Sudan, Mozambique, and South Georgia & Sandwich Islands). We used data from 2006 as the current estimate because they are the most recent data spatialized by the *Sea Around Us* Project. During rasterization, cells that spanned an EEZ boundary were allocated to the EEZ proportional to the area of the cell within the EEZ. When more than one EEZ fell within a single one of our reporting units, we calculated a weighted average based on the relative area in the particular EEZ.

We smoothed annual catch data for each species using a 4-year moving window average and then summed values across all species to get the total catch for each year during 1953-2006. Smoothed values were used instead of raw reported values to reduce potential bias from values that change due to changes in reporting rather than actual changes in landings. For example, we found anomalous values in Mediterranean European countries in 2005 that were due to changes in how data were reported.

7.21. Fisheries management effectiveness

Where used: Resilience in several goals

Description: These data come from Mora et al.[37], and assess the current effectiveness of fisheries management regimes along 6 axes: Scientific Robustness, Policy Transparency, Implementation Capacity, Subsidies, Fishing Effort, and Foreign Fishing. All countries with coastal areas were assessed through a combination of surveys, empirical data and enquiries to fisheries experts. For each OHI reporting region, scores for each category were rescaled between 0 and 1 using the maximum possible value for each category and then the average score of all 6 categories combined was recorded as the overall Fisheries management effectiveness score.

7.22. Genetic escapes

Where used: Pressure for several goals

Description: This layer represents the potential for harmful genetic escapement based on whether the species being cultured is native or introduced. Data come from the Mariculture Sustainability Index (MSI) [34]. In the MSI analysis native species receive the highest score (10), while foreign and introduced species receive the lowest (1) on the premise of potential impacts to local biodiversity if these species were to escape. Use of native but non-local species were scored intermediately based on the assumption that potentially negative alterations to genetic biodiversity occur from non-local sources as well, but to a lower degree. Genetic ‘pollution’ can arise when larvae, spats or seeds escape from poorly managed hatcheries, making native species vulnerable to out-breeding depressions and/or genetic bottlenecks [34]. The MSI reports data for 359 country-species combinations (with 53 countries represented). Where multiple scores exist for a country the weighted average of all scores (0-10) is used. All country scores were then rescaled from 0 to 1, using the maximum raw score of 10 and minimum of 1. Countries that were not analyzed by Trujillo[34] did not receive a score and this pressure layer falls out of their analyses.

7.23. Global Competitiveness Index (GCI)

Where used: Pressure and Resilience for Coastal Livelihoods and Economies

Description: The World Economic Forum's Global Competitiveness Index (GCI) provides a country level assessment of competitiveness in achieving sustained economic prosperity[83]. The GCI is a weighted index based on 12 pillars of economic competitiveness: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation. We used the 2011-2012 GCI scores (http://gcr.weforum.org/gcr2011/), which includes 142 countries. The GCI can in theory span from 1 to 7, so we rescaled the scores to a 0 to 1 scale based on this range.

7.24. Habitat destruction: intertidal

Where used: Pressure for several goals

Description: The intertidal habitat destruction proxy measures the coastal population density within 10 km of the coast based on the assumption that the potential for intertidal habitat destruction is proportional to the density of human population living along the coast. We extracted population density for the most recent year, 2000 (see human coastal population layer; (CIESIN), resampled our 10 km buffer raster to match the GPWv3 resolution (2.5 arc-min). We marked the coastline edge pixels for the population data, log-rescaled the value to the global maximum within the edge pixels plus 10%, and then calculated the zonal mean population density score for each region.

7.25. Habitat destruction: subtidal hard bottom

Where used: Pressure for several goals

Description: See Artisanal fishing: high bycatch data layer description.

7.26. Habitat destruction: subtidal soft bottom

Where used: Pressure for several goals; inverse is Status for Habitat sub-goal of Biodiversity

Description: Spatially distributed half-degree global commercial catch data developed by *Sea Around Us* Project[31], based on FAO and other source data, were assigned to fishing gear types using global taxon-gear associations[79,84]. These data were used to calculate catch (tonnes per year) from trawling for each year from 1950-2006. Trawling gears were defined as dredges, hand dredges, bottom trawls, and shrimp trawls (mid-water trawls were excluded). These catches were assumed to be uniform within each half-degree cell. 'Trawlable habitat' within an EEZ was defined as shallow subtidal (0-60m) and outer shelf (60-200m) soft bottom habitat from Halpern et al.[3]. The total trawled catch within each EEZ was then divided by the total area of soft-bottom habitat to produce a measure of trawl intensity per unit area. Because these data were extremely skewed, we log(X+1) transformed them and then rescaled to the maximum value from all year-country possibilities. Status was then calculated as one minus the rescaled catch density in the most recent year (2006). This status value was then rescaled to the median intensity-density value across all years, i.e. any value greater than the median was set = 1.0. The Pressure score was then one minus this median-rescaled value; the inverse of this rescaled value was used for the Habitat sub-goal of the Biodiversity goal.

7.27. Iconic species list

Where used: Status and Trend for Iconic Species sub-goal of Sense of Place

Description: The OHI global iconic species list was created by combining three species lists from WWF Global: global priorities, regional and local priorities, and flagship species (Table S14). The criteria for including species within those WWF lists overlapped with key points from OHI's definition of iconic species. OHI defines iconic species as species recognized as relevant to local cultural identity through the species' relationship to traditional activities such as fishing, hunting, commerce or involvement in local ethnic or religious practices; and species with locally-recognized aesthetic value (e.g. touristic attractions/common artistic subjects such as whales). Habitat forming species were not included in this definition of iconic species. Lists were not used when the only criteria for species inclusion included that the species are impacted by human activities or have a threatened population status. Once the species lists were obtained, each species was assigned to EEZs based on range countries from the IUCN Red List 2011. Additionally, national priority and flagship species lists were included for those specific countries only.

Table S14. Sources for global iconic species list

Iconic List	Source
Priority Species	http://wwf.panda.org/what_we_do/endangered_species/
Flagship Species	http://wwf.panda.org/what_we_do/endangered_species/
Australia's Flagship Species	http://www.wwf.org.au/our_work/saving_the_natural_world/wildlife_and_habitats/australian_priority_species/
Pakistan's Priority Species	http://www.wwfpak.org/species/priority_species.php
India's Priority Species	http://www.wwfindia.org/about_wwf/priority_species/
Madagascar's Flagship Species	http://www.wwf.mg/ourwork/cssp/species_report/wwf_madagascar_s_flagship_species/
Malaysia's Flagship Species	http://www.wwf.org.my/about_wwf/what_we_do/species_main/
Portugal's Flagship Species	http://www.wwf.pt/o_nosso_planeta/especies/top_5_das_especies_de_portugal___as_cinco_especies_mais_ameacadas_e_emblematicas_de_portugal/
Peru's Priority Species	http://peru.panda.org/nuestro_trabajo/iniciativas_globales/

7.28. International arrivals

Where used: Status and Trend for Tourism and Recreation

Description: The number of tourists per year for each country was estimated using data from the World Tourism Organization (UNWTO) from 2005-2009 for tourism and leisure specific international arrivals. For some countries these data were either unavailable or incomplete, so the ratio of tourism and leisure specific international arrivals to total international arrivals was estimated in two different ways (using total international arrivals data from the UNWTO). Where these data were unavailable for a country we multiplied the total international arrivals for each country by the global average ratio of tourism-specific international arrivals to total international arrivals to produce an estimate of tourism-specific international arrivals for each country. Where the tourism-specific data were incomplete for a country but at least 1 year of tourism-specific data for that country was available we took the country's own average ratio of tourism-specific international arrivals to total international arrivals to produce an estimate of tourism-specific international arrivals for each year that these data were unavailable. Years for which a country lacked data on total and tourism-specific international arrivals were left blank. Countries known to not allow tourism (e.g. North Korea) were given a value of zero.

7.29. Mangroves

Where used: Status and Trend in Coastal Protection, Carbon Storage, and Biodiversity

Description: Data on the extent of mangrove forests came from a global, raster-based, 30m resolution dataset[74]. Most of the Landsat images used in this analysis were from 2000. We calculated mangrove area per oceanic region using our 1km resolution raster model, using the entire EEZ extent. For the Biodiversity and Coastal Protection goals, we assumed that only habitats present in the nearshore coastal (1km) strip provide coastal protection benefits. For Carbon Storage, we used 1980 extent data from FAO[73], which includes both coastal and inland areas. To calculate condition of the habitat we use FAO [73] data and extract area data for 1980, 1990, 2000, and 2005 on a per country basis, using 2005 as the current condition, and 1980 as the reference condition. For Trend in mangrove habitat we use the rate of change in area over years 1980-2005. In each of the goals, we use the reference condition data from 1980 as the basis for the habitat weights.

7.30. Mariculture Sustainability Index (MSI): mariculture sustainability and mariculture regulations

Where used: Resilience and Sustainability for Mariculture sub-goal of Food Provision

Description: Five different mariculture practice assessment criteria from the MSI[34] contributed to the sustainability aspect of Status and Resilience measures for the Mariculture portion of the Food Provision goal (See Table S15 for description of assessment criteria and scoring scheme). For Resilience we used the "traceability" and "code of practice" measures because these are the only 2 social criteria assessed in the MSI that have the potential to positively affect the long term resilience of a mariculture system. For sustainability within the Status measure we used the "fishmeal use", "waste treatment", and "seed and larvae origin" criteria because these are the only internal mariculture practices with the potential to affect the long term sustainability of the mariculture system itself. The MSI reports data for 359 country-species combinations (with 60 countries and 86 species represented) for each assessment criterion. Scores for each assessment criterion were aggregated and averaged based on the proportion of the landings that each assessed species contributed to the overall catch in each country in the current year. All country average scores were then rescaled from 0 to 1 using the maximum possible raw MSI score of 10 and minimum of 1, and then weighted equally to come up with a composite Resilience or sustainability aspect of Status score. Gap filling for countries not originally assessed in the MSI was used for the three sustainability aspect of Status measures where possible by applying the average cross-country score for a species if that specific species or a similar species was assessed in another country. Also, when a country had less than 60% of its catch represented by an MSI score (based on FAO landings data) gap filling was used by applying the average cross-country score for the same or very similar species cultured in other countries. Where country specific data were not available for the two Resilience measures gap filling was not used because these measures are social in nature and more reliant on the specific decisions made by each country than on the species cultured. As such, it was decided that cross-country species averages were not appropriate to use in the gap filling process for Resilience.

7.31. Mariculture yield

Where used: Status and Trend for Mariculture sub-goal of Food Production

Description: Reported Mariculture production comes from the FAO Global Aquaculture Production Quantity dataset[82]. Only production classified in the Marine and Brackishwater environments were included in the analysis. All Freshwater production was excluded. All species produced within a country were summed to give a single production value for each country in each year that production took place.

7.32. Marine jobs: commercial fishing

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: Data come from the United Nations Food and Agriculture Organization (FAO) Fisheries and Aquaculture Department which provides a Global Number of Fishers (GNF) data set: http://www.fao.org/fishery/statistics/global-fishers/en. The dataset contains yearly total numbers of employees in commercial fishing, subsistence fishing, and aquaculture (land- and ocean-based combined) between 1970 and 2008 in more than 160 countries.

The dataset includes the following occupational categories: aquatic-life cultivation, inland waters fishing, marine coastal waters fishing, marine deep-sea waters fishing, subsistence and unspecified. We omitted jobs with an unspecified category to avoid overestimating employment for marine fishing or aquaculture. We omitted jobs in the subsistence category since subsistence opportunities are captured within the Artisanal Fishing Opportunity Goal of the OHI and in the aquatic-life cultivation category since that represents a distinct sector (see Mariculture below). For commercial fishing, we eliminated inland waters fishing and summed marine coastal waters and marine deep-sea waters fishing for each country in each year. Data are reported separately for men and women, but we summed these numbers.

Employment is disaggregated into full-time, part-time, occasional, and unspecified statuses. These categories are defined as full time workers having > 90% of their time or livelihood from fishing/aquaculture, part time workers are between 30-90% time (or 30-90% of their livelihood) and occasional workers are < 30% time. Unspecified status workers could fall anywhere from 0-100% time. Taking the midpoints of those ranges, we assume that 1 part time worker = 0.6 full time workers, 1 occasional worker = 0.15 full time workers, and 1 unspecified worker = 0.5 full time workers, which we used as a weighting scheme for determining total numbers of jobs.

It is important to note that while these data came from FAO sources, they are not considered official FAO statistics because they have not undergone official validation and consistency checks from FAO. The data also contain significant gaps, but they provide the most comprehensive source of global data on commercial fishing and aquaculture employment.

7.33. Marine jobs: mariculture

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: We used the FAO GNF dataset (see Marine jobs: commercial fishing above for full dataset description) to estimate jobs for mariculture. For this sector, we used data in the aquatic-life cultivation category. Again, employment is disaggregated into full-time, part-time, occasional, and unspecified statuses and we implement a

Table S15. Description of practice and score scheme from Trujillo et al. [34] for applied criteria categories

Criteria	Where Used	Description of practice and score scheme
Fishmeal use	Sustainability aspect of status	Fish protein and oil inclusion in the diet at any stage of development must be considered; herbivore species will score 10, and carnivorous (piscivorous) organisms will score closer to 1, depending on the level of feed supplied.
Waste treatment	Sustainability aspect of status	Water exchange, output destinations, recycling and filtering of open water discharge or closed system reuse systems. Systems that are closed score high (10), while open systems without waste treatments score low (1)
Seed and larvae origin	Sustainability aspect of status	Hatcheries are major providers of larvae, fry and seeds. Broodstock origin and strain will also affect the score. Wild seed collection and its importance contribute to a low score due to bycatch and other effects on non-target species.
Code of practice usage	Resilience	Certification, up to date set of standards and principles, i.e., FAO Code of Conduct (FAO 1995, 1999), or Eco-labelling are scored high, while no certification or similar scheme scores low (1)
Traceability	Resilience	Food safety related to a specific geographical origin, slaughtering or processing facility, and batch of fish can be identified scores high (8-9). If the origin and preparation of feed used in the farmed sector is included then scores high (10).

weighting scheme where full time = 1 job, part-time = 0.6, occasional = 0.15, and unspecified = 0.5. Aquatic-life cultivation includes marine, brackish and freshwater aquaculture. In order to estimate the proportion of total aquaculture jobs that can be attributed to marine and brackish aquaculture, we used country-specific proportions of marine and brackish aquaculture revenues (compared to total revenues) calculated from FAO aquaculture production data (obtained from FishStat), assuming that numbers of jobs approximately scale with production in terms of revenue. For country-years where there were no data for the proportion of marine/brackish production because of gaps in the FAO production data, we used the proportion from the most recent year for which data were available. For countries for which we did not have proportion estimates from any years, we used the average proportion from the country's geographic region (e.g., Caribbean, Polynesia, Eastern Asia), with the exception of American Samoa, for which we used the proportion value from Guam since both are part of the same OHI EEZ (i.e., USA Pacific Uninhabited Territories). Since proportion data were only available for 1997, 2002, and 2007, jobs data from 1970-1999 were adjusted using 1997 proportions, jobs data from 2000-2004 were adjusted by 2002 proportions and jobs data from 2005-2008 were adjusted by 2007 proportions.

7.34. Marine jobs: marine mammal watching

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: The International Fund for Animal Welfare's (IFAW) Whale Division provides time series data on whale watching in more than 115 coastal countries[85]. This dataset may be an imperfect representation of all marine mammal watching due to its focus on whales, although it does include data for other types of marine mammal watching (e.g., dolphins). However, to our knowledge, it is the most complete dataset pertaining to the global marine mammal watching industry. We obtained regional averages of the number of whale watchers per employee, as well as the number of whale watchers in each country. Using this information, we estimated the number of whale watching jobs in each country by dividing the country's total number of whale watchers by the average number of whale watchers per employee for that country's region (e.g., Africa & Middle East, Europe, North America). It is important to note that data are not annual, but there are at least four years of data between 1991 and 2008 for each country.

When IFAW reported "minimal" numbers of whale watchers, we converted this description to a 0 for lack of additional information. Because some of the whale watching in O'Connor et al.[85] focused on freshwater cetacean viewing, we categorized the target species listed for each country as freshwater or marine. For countries with both marine and freshwater species, we categorized the whale watching in those countries as either 50% or 90% marine, based on the number of marine versus freshwater target species and information provided in the report narrative. For Colombia and Indonesia, more detailed information in the report narrative allowed for a more precise determination of the percentage of marine-based whale watching. We applied these marine proportions to data on the number of whale watchers before converting these estimates into employment estimates.

7.35. Marine jobs: tidal energy

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: For the two countries, France and Canada, which produce significant enough amounts of tidal energy to register with the UN Energy Statistics Database we estimated numbers of employees. For the La Rance plant in France, this information was obtained from a recent press statement[86]; we assumed employment stayed constant over the time period for which we had production data for this plant, given relatively consistent or even growing production. For the Annopolis Royal plant in Canada, we received information from the plant about employment over time (Ruth Thorbourne, personal communication, Aug 9 2011).

7.36. Marine jobs: tourism

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: The World Travel & Tourism Council (WTTC) provides data from 1988 to 2011 on travel and tourism's total contribution to employment for 180 countries (http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool/). Although other global data sources on tourism are available (i.e. United Nations World Tourism Organization [UNTWO]), the WTTC database was chosen because it offers yearly time series data that span through the current year and project into the future to 2021, it includes nearly complete coverage of all nations, and it disaggregates direct and total (direct plus indirect) employment impacts of tourism. We extracted data through 2010 so as not to include projection data. We used total employment data to avoid the use of literature derived multiplier effects. The WTTC shares a significant drawback with UNTWO data, in that data on coastal/marine and inland tourism are lumped. Therefore, a country-specific coefficient must be applied to estimate the jobs provided by coastal/marine tourism alone. We adjusted national tourism data by the proportion of a country's population that lives within a 25 mile inland coastal zone, following what was done for the Tourism and Recreation model (section 6G).

7.37. Marine and terrestrial protected areas

Where used: Resilience measure for many goals; Status for Lasting Special Places sub-goal of Sense of Place

Description: The World Database on Protected Areas [59] comes from the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC) and includes all nationally designated (e.g. National Parks, Nature Reserves) and internationally recognized protected areas (e.g. UNESCO World Heritage Sites, Ramsar Wetlands of International Importance) globally in ESRI shapefile formats. All protected areas within the database meet IUCNs definition of a protected area. The protected areas range in official standing (e.g. proposed, designated); we only included protected areas in the dataset that had designated status. We extracted vector data for 98,358 designated protected areas from the WDPA database (using STATUS= "Designated"), and projected them into Mollweide. Each record for a designated protected area includes the year in which the protected area was designated (STATUS_YR), ranging from 1872-2009 and NoData (0). We also extracted an extra 8,965 designated protected areas by downloading vector data from the WDPA website for select countries who were not included in the WDPA (2010) database (for various reasons), and then we excluded areas without explicit spatial area data (IS_POINT=1): Dominican Republic (no designated areas), Gambia (2 designated areas), Guinea (106 designated areas), Singapore (7 designated areas), United Kingdom (8,849 designated areas), and Uruguay (1 designated area).

We rasterized all the WDPA designated areas using 1km resolution and the year designated as the cell value, resolving conflicts using the oldest year as a priority field and excluding NoData. As described in Table S16, for status we calculated areas within 3 nmi offshore and within 1 km inland; for the coastal version of resilience, we calculated the total area within 3 nmi offshore; and for the EEZ version, any offshore areas within the region were included. For the resilience, we used a reference point of 30% protection of the coastal area, where any region with more than 30% of its coastal area having protected areas were set to resilience=1. A total of 45 countries did not have spatially-explicit nearshore marine or coastal protected areas listed in the 2010 WDPA database. For six of these countries we were able to use the 2011 WDPA database to get protected area information. Nine of these countries likely truly do not have any nearshore marine or coastal protected area and three countries were not included in the dataset and also given a score of zero. The remaining 27 have some amount but there is no spatial information provided in the database and so we could not resolve if the areas fell within the nearshore marine or coastal regions (as we define these areas) and so were given no credit for coastal protected areas.

Table S16. Application of WDPA data by goal.

Where used	**Marine protected areas**	**Terrestrial protected areas**
Lasting Special Places sub-goal	3 nmi offshore from coastal boundary.	1 km inland from coastal boundary.
Resilience for coastal goals	3 nmi offshore from coastal boundary.	NA
Resilience for EEZ goals	Protected areas from *Sea Around Us* project database. Gaps filled by WDPA protected areas.	NA

7.38. Marine revenue: aquarium trade fishing

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: To approximate revenue from aquarium fishing we used export data from the FAO Global Commodities database[82] for 'Ornamental fish' for all available years, 1976-2007. We used data from two of the four subcategories listed, excluding the subcategory 'Fish for culture including ova, fingerlings, etc.' because it is not specific to ornamental fish and the subcategory 'Ornamental freshwater fish' because it is not from marine systems.

7.39. Marine revenue: commercial fishing

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: Revenue data for commercial fishing were obtained from FAO's FishStat database, which provides yearly dollar values of commercial fisheries production in marine, brackish and fresh waters from 1950 to 2007. Data are given by species, so to isolate marine and brackish fishery production, data were omitted that pertained to freshwater species. This species classification process was very time consuming, and thus was only conducted in 5 year increments, providing data for 1997, 2002 and 2007.

7.40. Marine revenue: mariculture

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: Data on revenues from marine aquaculture were derived from FAO's FishStat database, which includes country-level data on total production values (marine, brackish, and freshwater) of aquaculture from 1984 to 2010. To isolate production values attributable to marine and brackish aquaculture, data pertaining to freshwater species were omitted. This species classification process was very time consuming as each species had to be queried individually per year. There was little year-to-year variation, and thus data were extracted in 5 year increments, providing data for 1997, 2002 and 2007.

7.41. Marine revenue: marine mammal watching

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: IFAW (see jobs section) provides time series (for at least four years between 1991 and 2008), country-level data on total expenditures (including direct and indirect) attributable to the whale watching industry [85]. Here, total expenditures are used as a close proxy for total revenue. We used total expenditure data (direct and indirect expenditures) to avoid using a literature derived multiplier effect. When IFAW reported "minimal" revenue from whale watching, we converted this description to a 0 for lack of additional information. For countries with both marine and freshwater cetacean viewing, we adjusted by the proportion marine as described for the jobs dataset.

7.42. Marine revenue: tidal energy

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: The United Nations Energy Statistics Database provides production data, in kilowatt-hours (KWh), for tidal and wave electricity. However, only two countries, France and Canada, have high enough levels of production to be reported in this data source both for tidal energy production. For Canada, production data were replaced with production data (Gross Megawatt hours per year from 1995-2010) provided directly from the Annapolis tidal power plant because the plant provided a longer time series (Ruth Thorbourne, personal communication, Aug 9, 2011). To convert production data into revenue, production values were multiplied by average yearly prices of electricity per KWh specific to Canada and France, provided by the US Energy Information Administration (http://www.eia.gov/emeu/international/elecprii.html; updated June 2010) after conversion to 2010 USD. Some of the production data could not be used because there were not available electricity price data to convert production into revenue, truncating our time series.

7.43. Marine revenue: tourism

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: WTTC (see jobs section) also reports time series data on the dollar values of visitor exports (spending by foreign visitors) and domestic travel and tourism spending; combining these two data sets creates a proxy for total travel and tourism revenues. WTTC was chosen as the source for tourism revenue data because of the near-complete country coverage, the yearly time series component spanning from 1988 through 2011 and projecting until 2012, and the inclusion of both foreign and domestic expenditures. This dataset, like that for tourism jobs described above, lumps inland and coastal/marine revenues, and so was adjusted with the same coastal coefficient (percent of a country's population within a 25 mile inland coastal zone) as the jobs data. We used only data through 2010 so as not to include projection data. We used total contribution to GDP data (rather than direct contribution to GDP) to avoid the use of literature derived multiplier effects.

7.44. Marine species

Where used: Status and Trend Species sub-goal of Biodiversity; ecological integrity Resilience measure for several goals

Description: For Trend and Status, marine species listed within the IUCN Red List are used for the OHI marine species list. The main taxonomic groups included were: habitat forming corals, mangroves, seagrasses, sea snakes, marine mammals, marine turtles, angelfish, butterflyfish, groupers, wrasses, parrotfish, hagfish, sharks and rays, tuna and billfishes, bivalves and gastropods (see also Table S17). For Status there are 2377 IUCN marine species for which we used distribution maps from IUCN where possible and from the Aquamaps database in the remaining cases (www.aquamaps.org)[55,67,69].

Table S17. Taxonomic classifications (by Class) for species included in Species sub-goal in Biodiversity goal. *=855 of these species are in Order Perciformes; **= 769 of these species are in Order Scleractinia; *** = 170 of these species are in Order Rajiformes.

Class	# Spp
Actinopterygii	904*
Anthozoa	771**
Bivalvia	6
Cephalaspidomorphi	3
Chondrichthyes	360***
Elasmobranchii	16
Gastropoda	1
Hydrozoa	14
Liliopsida	64
Magnoliopsida	59
Mammalia	72
Merostomata	1
Myxini	48
Polypodiopsida	3
Reptilia	54
Sarcopterygii	1

7.45. Marine wages

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: We used the Occupational Wages around the World (OWW) database produced by Remco H. Oostendorp and Richard B. Freeman in 2005 (http://www.nber.org/oww/). These data were drawn from the International Labour Organization and subjected to a standardization process (for more information, see http://www.nber.org/oww/Technical_document_1983-2003_standardizationv3.pdf). The database provides several different calibrations, and we use the "x3wl calibration", described by the database creators as a "country-specific and uniform calibration with lexicographic weighting," and recommended as being the preferred calibration in most cases. Although significant gaps exist in this database, it contains country-specific information on average wages in many industries for more than 150 countries from 1983-2003. Data represent average monthly wages of a male worker. We multiplied wages by 12 to get annual wages and converted all values to 2010 USD. We used the industry and occupation classifications reported in the OWW to estimate wages for marine-related sectors (see Table S18).

Table S18. Types of jobs (occupations) for which data are reported for various sectors.

Sector	Occupation Classifications
Commercial fishing	Industry: deep sea & coastal fishing. Occupations: deep sea fisher; inshore (coastal) maritime fisherman
Ports & harbors	Industry: supporting services to maritime transport. Occupation: dock worker
Ship & boat building	Industry: shipbuilding and repairing. Occupation: ship plater.
Tourism	Industry: restaurants and hotels. Occupations: hotel receptionist; cook; waiter; room attendant or chambermaid. These data are not specific to coastal/marine tourism jobs, and thus we assumed that wages in these jobs are equal in coastal and non-coastal areas.
Transportation & shipping	Industry: maritime transport. Occupations: ship's chief engineer; ship's passenger stewards; able seaman

7.46. Multispecies maximum sustainable yield (mMSY)

Where used: Status and Trend of Fisheries sub-goal of Food Provision and Status of fish oil component of Natural Products

Description: Multi-species MSY was derived for each country based on peak catch data[82] using methods explained by Srinivasan et al.[32]. When the landed biomass was not reported with sufficient taxonomic resolution (e.g. “unidentified mollusks”) we excluded them from our calculations as it would be inappropriate to estimate MSY for such miscellaneous aggregates of species. To calculate the total landed biomass per assessment region we used 2006 catch data that have been spatialized to half-degree resolution by the *Sea Around Us* project [31] and then aggregated within EEZs. All gaps in catch were treated as true zeros. We used data from 2006 as the current estimate as they are the most recent data that are globally complete. Half-degree cells that spanned an EEZ boundary were allocated to the EEZ proportional to the area within the EEZ. When more than one EEZ fell within a single one of our reporting units, we calculated a weighted average based on the proportional area in each EEZ.

7.47. National GDP statistics

Where used: Status and Trend for Economies sub-goal of Coastal Livelihoods and Economies

Description: National GDP data were obtained from the World Bank (http://data.worldbank.org/indicator/NY.GDP.MKTP.CD) and converted into 2010 USD from current USD.

7.48. National unemployment statistics

Where used: Status and Trend for Livelihoods sub-goal of Coastal Livelihoods and Economies

Description: National unemployment data, as the percent of the national labor force that is not employed, were obtained from the World Bank at http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS.

7.49. Natural Products exposure

Where used: Status and Trend for Natural Products

Description: To measure exposure for sponges, seaweeds and plants, ornamental fish, coral, and shells we measure the intensity of harvest per km^2 of potential habitat for a country based on export data from the FAO Global Commodities database [82] and coral and rocky reef extent data from Halpern et al.[3]. These exposure values are then rescaled to between 0-1 using the global maximum intensity of harvest as the maximum value and 0 as the minimum value. For the fish oil exposure value we use the Stock Exploitation Status for each country[40] explained in more detail below.

7.50. Natural Products harvest

Where used: Status and Trend for Natural Products

Description: For all six Natural Product commodities measured, export data were drawn from the FAO Global Commodities database[82] for all available years, which included 1976-2007 for corals, ornamental fish, and shells and 1976-2008 for fish oil,

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seaweeds and plants, and sponges. For the latter group, the sum of all subcategories was used (see Table S19). For ornamental fish the sum of two of the four subcategories was used. We excluded the subcategory 'Fish for culture including ova, fingerlings, etc.' because it is not specific to ornamental fish and the subcategory 'Ornamental freshwater fish' because it is not from marine systems. Corals and shells are reported together in nine subcategories; we used the subcategories most closely tied to each, leading to the sum of two subcategories for corals and seven subcategories for shells (one subcategory was used for both; Table S19). We did not use one subcategory – 'Powder and waste of shells' – as it likely a byproduct of the other subcategories rather than a primary target (and it comprises a very small amount of the total anyway). For the monetary value data, we converted from nominal dollars as reported by FAO ("observed measure unit - US Dollar") into constant 2008 USD using CPI adjustment data (Sahr 2011 - http://oregonstate.edu/cla/polisci/sahr/sahr).

Table S19. Natural Product sub-categories used from FAO global commodities database. 'nei' = 'not elsewhere indicated'.

Natural Product	**Sub-Categories used**
Sponges	Natural Sponges nei, Natural Sponges other than raw, Natural Sponges raw
Fish oil	Alaska pollock oil nei, Anchoveta oil, Capelin oil, Clupeoid oils nei, Cod liver oil, Fish body oils nei, Fish liver oils nei, Gadoid liver oils nei, Hake liver oil, Halibuts liver oils, Herring oil, Jack mackerel oil, Menhaden oil, Pilchard oil, Redfish oil, Sardine oil, Shark liver oil, Shark oil, Squid oil
Seaweed and Plants	Agar agar in blocks, Agar agar in powder, Agar agar in strips, Agar agar nei, Carrageen (*Chondrus crispus*), Green laver, *Hizikia fusiforme* (brown algae), Kelp, Kelp meal, Laver dry, Laver nei, Laver smoked, Other brown algae (*Laminaria, Eisenia/ Ecklonia*), Other edible seaweeds, Other green algae (*Ulva, Enteromorpha*), Other inedible seaweeds, Other red algae, Other seaweeds and aquatic plants and products thereof, Rock laver, *Undaria pinnafitida* (brown algae)
Ornamental fish	Ornamental saltwater fish, Ornamental fish nei
Corals	Coral and the like, Miscellaneous corals and shells
Shells	Miscellaneous corals and shells, Abalone Shells, Mother of Pearl shells, Oyster shells, Sea snail shells, Shells nei, Trochus shells

7.51. Nutrient pollution

Where used: Status and Pressure for Clean Waters, Pressure for most other goals

Description: Raw data were drawn from modeled plumes of land-based nitrogen pollution, as developed by Halpern et al. [3], that provided intensity of pollution at 1km^2 resolution. The model distributed country-level fertilizer use onto land-use classes (via dasymetric mapping techniques) and then aggregated the spatialized data by watersheds as a proxy measure for likely amount of this pollution that reached river mouths. Plumes were then distributed using a diffusive model. Each ocean pixel was then rescaled 0-1 based on the global maximum pixel value (see ref [3] for details).These rescaled raw data were used in two ways. For the Clean Waters goal and for coastal Pressure, which focused on the first 3 nmi of ocean adjacent to land, the layer was clipped to 3 nmi offshore, weighted by habitat-type, and then the per-pixel average calculated for each reporting unit (EEZ). This zonal mean gives an average intensity score that accounts for the large differences in area per reporting unit, but is also weighted by habitat type using weighting factors in Halpern et al.[3]. We therefore rescaled the zonal mean by dividing by maximum value (7.58). For a Status score, we used 1 minus the pressures score. For EEZ Pressure, we calculated the zonal mean of the rescaled raw data for each EEZ.

7.52. Ocean acidification

Where used: Pressure for many goals

Description: This Pressure layer models the difference in global distribution of the aragonite saturation state (AAS) of the ocean in pre-industrial (~1870) and modern times (2000-2009). These data are modeled at 1-degree resolution. Changes in the

AAS can be attributed to changes in the concentration of CO_2 and thus we use the difference between the pre-industrial and modern times as a proxy for ocean acidification due to human influences. Full details on this data layer are provided in Halpern et al.[3].

7.53. Pathogen pollution

Where used: Status, Trend and Pressure for Clean Waters; Pressure for several other goals

Description: The percentage of the population with access to improved sanitation facilities (World Health Organization and United Nations Children's Fund, Joint Monitoring Programme, 2011) was used in combination with measurements of population density[64] as a proxy for pathogens in coastal waters. Access to improved sanitation facilities is defined as the percentage of the population within a country with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. These data are a country-wide average (not specific to the coastal region) and the most recent year available is 2008. Percentages (0-100) for each country were rescaled to 0-1 based on a maximum target of 100% of the population with access to improved sanitation, and a minimum value of 0.

7.54. Pesticides trends

Where used: Trend for Clean Waters

Description: Trend in pesticide consumption comes from the FAO Statistical Yearbook 2011[82]. These data span 1999-2009 and have country spatial resolution. We obtained total pesticide consumption data (in metric tons of active ingredients) from FAO [82] which uses survey methods to measure quantities of pesticides applied to crops and seeds in the agriculture sector, and includes insecticides, mineral oils, herbicides, fungicides, seed treatments insecticides, seed treatments fungicides, plant growth regulators and rodenticides. For each OHI region we report the metric tons of active ingredients per km^2, calculate a linear regression per region over the 1999-2009 timeframe, and then compute the Trend value for each region.

7.55. Rocky reef

Where used: Exposure component of Status for Natural Products

Description: To create a data layer of global rocky reef habitat we used data created by Halpern et al.[3]. Rocky Reef intertidal data do not exist globally so rocky reef habitat was assumed to exist in all cells within 1 km of shore globally. See Halpern et al.[3] for details.

7.56. Salt marsh

Where used: Status and Trend in Coastal Protection, Carbon Storage, and Biodiversity

Description: Salt marsh data per country come from multiple sources[87] and are generally reported as habitat area. We calculated annual change rates in habitat area using these habitat areas from 1994-2007, where available. In the case of Europe, most data were obtained via the European Environment Agency databases housing information pertaining to the European Union's Habitat Directive. The Status of salt marsh related ecosystems was also extracted from these data. Severe data gaps exist for several key regions of the world, including the Middle East, South America, and Africa. Extensive salt marshes are believed to exist in the Middle East, bordering the unique salt flat ecosystems known as *sabkha*, however no numbers concerning extent could be found. Similarly, data on salt marshes in South America were extremely limited, with no estimates on current rates of loss or historical extent from or before the 1970s. The majority of the data included in the model come from North America (United States and Canada), Australia, New Zealand, China, Europe, and the United Kingdom. For Trend estimates, we extracted categorical condition data (‘increasing”, “stable”, “declining” score as 0.5, 0.0, and -0.5, respectively) from these sources on a per country basis for countries where both a current and reference data year available. For salt marsh Trend we use the trend on these categorical values on a per country basis.

7.57. Sea ice

Where used: Status and Trend in Coastal Protection

Description: Sea ice extent was calculated using sea ice concentrations from the USA National Snow and Ice Data Center[88], which are updated yearly. These raster data are 25km in resolution (625km^2 per pixel) in a Stereographic polar projection. Status calculations are the percent of monthly pixels during 3-yr smoothed averages for 2009 (years 2008-2010) with ice concentration of 15% or more. For reference conditions, the long-term climatological mean across the whole data set (1979-2010) was used. The Trend calculation included percent of year-month pixels during 3-yr smoothed averages from 2005 (years

2004-2006) to 2009 (years 2008-2010) with ice concentration of 15% or more.

7.58. Sea surface temperature (SST) anomalies

Where used: Pressure for several goals

Description: This stressor measures the number of positive temperature anomalies that exceed the natural range of variation for a given location, i.e. the degree to which a location experiences unnaturally warm temperature. It is not a measure of absolute temperature at a location. The idea behind using this measure of SST change is that species are adapted to their natural range of temperatures and this metric provides a globally consistent measure of events beyond that normal range to use as a basis for SST impacts. Full details on this data layer are provided in Halpern et al.[3].

7.59. Seagrass

Where used: Status and Trend in Coastal Protection, Carbon Storage, and Biodiversity

Description: Seagrass extent was calculated from vector-based data from the Global Distribution of Seagrasses[89]. Seagrass Status and Trend data were calculated on a per-site basis from ref [90], which provides seagrass habitat extent data for several sites around the world over several years. Habitat condition (health) data came from these data, where the reference condition is the mean of the three oldest years between 1975-1985, or the two earliest years if needed. If data responding to these conditions was not available, we fitted a linear model to all data points, and then used the mean of the predicted values for 1979-1981 as the reference condition. For the current condition we used the mean of the three most recent years after 2000 or the two most recent years. If condition data satisfying these constraints were still not available, we fitted a linear model to all data points, provided that there were at least three data points and then used the mean of the predicted values for 2008-2010 as the current condition and the mean of the predicted values for 1979-1981 as the reference condition. Otherwise, we used neighboring (adjacent) regional averages, weighted by habitat area, or averages weighted by habitat area using seagrass geographical regions as defined by Hemminga and Duarte[91]. We did not project beyond a 15-year timeframe. The Hemminga and Duarte regions are organized as follows with reference to the OHI regions (Table S24):

Caribbean	80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 102, 105, 106, 116, 117, 118, 119, 120, 121
E. Pacific	79, 101, 103, 104, 116, 166, 170
Indo-Pacific	1, 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 108, 109, 110, 111, 112, 113, 114, 141, 142, 143, 152, 153, 154, 155, 156, 158, 161, 164, 165, 171, 179
Mediterranean	43, 44, 50, 51, 54, 55, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 130, 133, 135, 136, 137, 138, 139, 163, 172
N. Atlantic	41, 42, 45, 46, 47, 48, 49, 52, 53, 69, 70, 107, 116, 125, 126, 127, 128, 129, 130, 131, 132, 134, 140, 144, 145, 167, 168, 169, 176
New Zealand	115
S. Atlantic	27, 71, 72, 73, 74, 75, 76, 77, 78, 122, 123, 124, 146, 147, 148, 149, 150, 151
S. Australia	2, 12, 182
W. Pacific	10, 16, 17, 18, 56, 157, 159, 160, 174, 180

For trend in seagrass status we use two data sources; Waycott et al.[90] and Short et al.[92]. Short et al.[92] measured percent cover on a per sample, per site, per year basis, whereas Waycott et al.[90] measured habitat area on a per site, per year basis. We used data from Short if there were at least 3 data points between 2001-2010. If this condition was not met, we calculated trends from Waycott et al. [93] for the most recent 10 years after 1990 or else we used the mean of the trend in the adjacent regions or the regions within the corresponding seagrass geographical regions using the same methods described above for the in status.

7.60. Sector Evenness

Where used: Resilience for Coastal Livelihoods and Economies goal

Description: Sector evenness was measured using Shannon's Diversity Index, a common measure of ecological and economic diversity that has been applied previously to economic sectors. This calculation is based on the total number of sectors and the probability that any given job belongs to a sector.

7.61. Soft-bottom subtidal

Where used: Status and Trend for Habitat sub-goal of Biodiversity

Description: Soft-bottom habitat_within an EEZ was defined as the total area of shallow (0-60m) and shelf (60-200m) soft-bottom habitat within the reporting region based on benthic substrate point samples[3]. To estimate status of this habitat, we used intensity of trawl fishing as a proxy. Spatialized catch data are available from the global catch database of the *Sea Around Us* project[31]. The database is derived from FAO global fisheries catch statistics, data from international and national fisheries agencies, and reconstructed catch datasets [94]. The product of these sources of catch data were disaggregated spatially to a grid of 0.5° latitude by 0.5° longitude (259,200 grid cells globally) based on species distribution maps for over 1500 commercially exploited fish and invertebrate taxa and lists of fishing access agreements, which regulate foreign access to the Exclusive Economic Zones (EEZs) of maritime countries [84]. Catch data are available by gear type[79,84], and a subset of catch in tonnes from trawling and dredging gears was obtained by EEZ. We used the following gear types (with codes) to define "trawled" catch: dredges (830), hand dredges (831), bottom trawls (840), and shrimp trawls (860), and we excluded mid-water trawls (850). We aggregated by summing the trawled catch data (1950-2006) by reporting region, and converted to catch density by dividing annual catch by the trawlable (soft-bottom) habitat. Because of extreme skew in these values, we log rescaled them using the maximum density as the reference point Status was then one minus the rescaled catch density in the most recent year (2006) (see Biodiversity goal model above, section 6J). This status value was then rescaled to the median intensity-density value across all years, i.e., any value greater than the median was set = 1.0.

7.62. Stock exploitation status

Where used: Status and Trend of fish oil component of Natural Products goal

Description: Stock exploitation status data spans years 1950-2006 and are based on the exploitation status of fished stocks in each oceanic region. The stock exploitation status data come from the *Sea Around Us* project [40] and measure the status of each stock each year relative to the peak catch for that stock. Five levels of exploitation status are defined: Developing, Fully Exploited, Overexploited, Collapsed, and Rebuilding (See Table S6 for definitions). Regional scores were calculated as the average score of all stocks fished in a country based on the following sustainability coefficients: developing stock (1), fully exploited (0.5); overexploited (0.5); rebuilding (0.25); collapsed (0). Countries with fewer than three stocks assessed were treated as data deficient and assigned a default weight 0.5.

7.63. Targeted harvest

Where used: Pressure for Iconic Species sub-goal of Sense of Place

Description: This data layer compiles data from FAO [82] on catch of cetaceans and marine turtles. We searched and extracted all catch titles that could include cetaceans or marine turtles and aggregated to create a total reported catch count for cetaceans and tonnes caught for marine turtles for each country. Reported catch for 2009 was used for most countries unless data were unavailable for 2009 and there was a reported catch for 2008. In those cases, 2008 data were used. For both cetaceans and marine turtles the summed catch was rescaled from 0-1, with 1 = 110% the maximum value across all countries. The two scores were then averaged to create a single “targeted harvest” score.

7.64. Total land area

Where used: Status, Trend, and Pressure for several goals

Description: Total land area (km^2) was used in the calculation of many goals. We extracted spatial data of country boundaries from ESRI[24], and calculated country area. For the Coastal Livelihoods and Economies goal, we then revised some estimates with data extracted from CIA World Factbook [95] when the value was greater than the coastal area derived from our high-resolution land-sea model. For a small number of countries without land area data, we obtained estimates from web searches.

7.65. Total population

Where used: Status in Tourism and Recreation

Description: For total population per country we used the 2007 midyear estimated population of 221 countries from the U.S. Census Bureau, Population Division/International Programs Center, as published by ESRI[24]. Taiwan is not included so we added a population value (22.9 million) from a web search.

7.66. Tourist days per stay

Where used: Status in Tourism and Recreation

Description: For average number of days that people stay for tourism in each country we used data from the World Tourism Organization (UN-WTO) from 2005-2009 where available for each country (UN-

WTO). When data was unavailable for a given year, the average value from previous years was used. For countries with no data for 2005-2009 the last most complete data set (from 1995) was used to gap fill these values.

7.67. Trash pollution

Where used: Status and Pressure for Clean Waters, Pressure for many other goals

Description: Trash (marine debris) input information comes from the Ocean Conservancy[63]. Total trash collected (lbs) is reported for 111 countries based on trash collected at International Coastal Cleanup days. For each OHI region density of trash was reported by dividing the total trash collected by the length of coastline cleaned. We rescaled the trash metric per country using a log-linear scale transformation with a maximum as the largest reported metric plus 10 percent. We then computed the Status score per oceanic region as 1-x, where x is the weighted average of the per country scores, weighted by the area of 3nmi inland for each coastal country in that region.

7.68. Travel and Tourism Competitiveness Index (TTCI)

Where used: Status and Trend for Tourism and Recreation

Description: The Travel and Tourism Competitiveness Index is produced by the World Economic Forum and measures the factors and policies that make a country an attractive place to invest in the Travel and Tourism sector. The index analyzes 139 countries and scores each based on three sub-indices: Human, Cultural, and Natural Resources; Business Environment and Infrastructure; and Regulatory Framework. These three sub-indices are in turn composed of 14 "pillars" of Travel & Tourism Competitiveness that are informed by a multitude of individual indicators based on the World Economic Forum's annual Executive Opinion Survey and hard data from publically available sources: Human, Cultural, and Natural Resources (human resources, affinity for travel and tourism, natural resources, and cultural resources); Business Environment and Infrastructure (air transport infrastructure, ground transport infrastructure, tourism infrastructure, ICT infrastructure, and price competitiveness in the industry); and Regulatory Framework (policy rules and regulations, environmental sustainability, safety and security, health and hygiene, and prioritization of travel and tourism). Because these indicators are meant to represent the overall quality and future potential of the tourism sector within a country, we assume these indicators to be representative of the long term sustainability of the tourism sector within each country, Overall index scores range from 1-6 which were rescaled to 0-1 using a maximum value of 6 and minimum of 1.

7.69. UV radiation

Where used: Pressure for several goals

Description: This pressure measures the number of times between 2000 and 2004, in each 1 degree cell, that the monthly average exceeded the climatological mean + 1 standard deviation within the entire dataset (1996-2004). These values were summed across the 12 months to provide a single value, ranging from 0-19. We did not use the metric of change in these anomalous values from the early period to the current period, as was done for SST data, since the entire UV dataset covers only 9 years. See Halpern et al.[3] for full details on this dataset.

7.70. Worldwide Governance Indicators (WGI)

Where used: social resilience and Pressure measure for most goals

Description: The Worldwide Governance Indicators (WGI) are composed of six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. These 6 aggregate indicators combine data from a variety of survey institutes, think tanks, NGOs, and international organizations to report on the relative governance of 213 economies worldwide. The WGI combines individual indicators through an Unobserved Components Model to produce the 6 dimensions of governance that range in value from approximately -2.5 to 2.5, have a standard normal distribution, a mean of zero, and a standard deviation of 1. We take an average of the six dimension scores to produce a single governance score for each country to use as the social resilience measure. Social pressure is then calculated as one minus this average WGI score.

8. Discount rates

There is a very large literature on economic discounting when estimating current and future value of goods and services. Discount rates tend to be smaller when assessing something with intrinsic, aesthetic, spiritual, etc. value, regardless of the time horizon, as these values tend to be time-independent. Because the future time horizon used in the Index is roughly 5 years and many of the goals have strong non-market values associated with them, we used a discount rate of 0% when calculating overall Index scores. Below we explore the sensitivity of results to this decision.

9. Sensitivity Analysis Methods

Three aspects of our modeling approach have the potential to strongly influence results, and so we tested sensitivity of results to our decisions. We also evaluate the influence of each goal on overall Index scores.

Goal weights (alphas)

The importance of each goal for any individual's assessment of overall ocean health, i.e. the α weights from Eq. S6, will clearly influence the Index score. However, the Index is a community-scale measure rather than any individual's perspective. Consequently, we do not explore the full range (0.0 to 1.0) of potential weights for each goal. Instead, we focused on the range and distribution of α across goals expected in four value sets (preservationist, non-extractive user, extractive, and strongly extractive user; see section 4). We used Monte Carlo simulations to evaluate the sensitivity of the overall Index score to these weights, for the global score and each country. These simulations use the range and distribution of weight values (where each α_i = 0.05, 0.10, or 0.15) and randomly redistribute them to goals, exploring all combinations and providing a mean and variance around overall Index scores.

Discount rate (delta)

Each goal score is affected by assumptions about the discount rate, i.e. how important the likely future trajectory is for people when determining the value they place on a situation or scenario. Although we feel a discount rate of zero is appropriate and defensible (section 8 above), discount rates of up to 3% are commonly used for environmental management assessments [96]. We therefore ran each goal model with annual discount rates of 1%, 2%, and 3% – i.e., 5 yr discount values of 5.1%, 10.4%, and 15.9%, respectively – to assess changes in individual goal scores, which translates into t+1 = 5yr discount values of 5.1%, 10.4%, and 15.9%, respectively.

Trend weight (beta)

We assumed that information about the recent Trend in a goal was a better predictor of likely future trajectory (twice as good) relative to Pressures and Resilience measures, primarily because the Trend is a known shift in the goal whereas the Pressures and Resilience measures are estimates of what will likely alter that trajectory. It is likely that the trend would contribute at least equally to determining a goals near-term trajectory but no more than four times as much, and so we ran each goal model with β ranging between 0.5 and 0.8.

Influence of each goal

To test the influence of each goal on the overall Index score, we jackknife resampled the Index removing one goal and recalculating the Index for each country and across all countries globally.

Supplementary Results

Sensitivity Analysis Results

Weighting values

Monte Carlo simulations found an Index score of 60.1 ± 3.5SD globally (Fig. S5), which is essentially identical to the score we report. Results for the different representative value sets (preservationist, non-extractive users, extractive and strongly extractive users) are provided in Table S30.

Discount rates

Different discount rates had no effect for global goal scores (Table S20) or for country-specific goal scores (results not shown).

Table S20. Goal scores using different discount rates applied to the likely future condition component of each goal.

	Discount Rate			
Goal	**0%**	**1%**	**2%**	**3%**
Food Provision	15	15	15	14
Artisanal Opportunities	84	82	81	79
Natural Products	34	33	33	32
Carbon Storage	68	67	66	65
Coastal Protection	59	58	56	55
Coastal Livelihoods & Economies	74	73	72	70
Tourism & Recreation	12	12	11	11
Sense of Place	48	47	46	45
Clean Waters	71	69	68	66
Biodiversity	81	80	78	77

Beta

The relative weight placed on trends versus the difference between Pressures and Resilience measures, β, produced nearly identical results for all global goal scores, except for the two goals with the largest (negative) Trend values, Carbon Storage and the Species sub-goal of Biodiversity. In both cases, as greater weight (importance) is place on the Trend score in determining the likely future state, the goal predictably decreases, albeit still by modest amounts (Table S21).

Table S21. Goal scores using different beta values for weighting Trend relative to Pressure and Resilience measures in each goal.

	Beta				
Goal	**0.5**	**0.6**	**0.67**	**0.7**	**0.8**
Food Provision	16	15	15	15	15
Artisanal Opportunities	85	84	84	84	83
Natural Products	34	34	34	34	34
Carbon Storage	71	70	68	68	66
Coastal Protection	60	59	59	59	58
Coastal Livelihoods & Economies	75	74	74	74	74
Tourism & Recreation	12	12	12	12	12
Sense of Place	48	48	48	48	48
Clean Waters	71	71	71	71	71
Biodiversity	84	82	81	81	79

Influence of each goal

Global Index scores changed at most by five when a single goal was removed. Index scores for each country and globally, recalculated with each goal removed, are provided in Table S31. Distribution of per-country changes in Index scores are shown in Fig. S7.

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Supplementary Tables and Figures

Supplementary Tables

Table S22. Data layers used in each dimension for each goal. See Tables S7 and S8 for details on how 'Condition' and 'Area' were calculated for the habitat-based goals.

Goal	Sub-Goal	Status	Trend	Pressures	Resilience
Food Provision	Fisheries	Multispecies maximum sustainable yield (mMSY)	Change in Status over time	Chemical pollution	CBD habitat
		Taxonomic reporting quality		Nutrient pollution	Marine protected areas, EEZ
				Habitat destruction: subtidal hard bottom	Fisheries management effectiveness
				Habitat destruction: subtidal soft bottom	Access to artisanal fishing
				Habitat destruction: intertidal	Ecological integrity
				Alien species	Worldwide Governance Indicators
				Genetic escapes	
				Commercial fishing: high bycatch	
				Commercial fishing: low bycatch	
				Artisanal fishing: high bycatch	
				Artisanal fishing: low bycatch	
				Social pressure	
	Mariculture	Mariculture yield	Change in Status over time	Chemical pollution	CBD water
		Degree of sustainability of culture		Nutrient pollution	CBD mariculture
				Social pressure	Mariculture regulations
					Worldwide Governance Indicators
Artisanal Fishing Opportunities	Artisanal Fishing Opportunities	Artisanal fishing need	Change in Status over time	Chemical pollution	CBD habitat
		Access to artisanal fishing		Nutrient pollution	Marine protected areas, coastal
				Habitat destruction: subtidal hard bottom	Ecological integrity
				Habitat destruction: intertidal	Worldwide Governance Indicators
				Alien species	

				Commercial fishing: high bycatch	
				Commercial fishing: low bycatch	
				Artisanal fishing: high bycatch	
				Artisanal fishing: low bycatch	
				WGI pressure	
Natural Products	Coral	Harvest	Change in coral Status	Chemical pollution	CBD water
		Exposure		Nutrient pollution	CBD habitat
		Risk		Habitat destruction: subtidal hard bottom	Marine protected areas, coastal
				Alien species	CITES signatories
				SST	Worldwide Governance Indicators
				Ocean acidification	Ecological integrity
				UV	
				Social pressure	
	Ornamental fish	Harvest	Change in ornamental fish Status	Chemical pollution	CBD water
		Exposure		Nutrient pollution	CBD habitat
		Risk		Habitat destruction: subtidal hard bottom	Marine protected areas, coastal
				Alien species	Access to artisanal fishing
				Artisanal fishing: high bycatch	CITES signatories
				Artisanal fishing: low bycatch	Worldwide Governance Indicators
				SST	Ecological integrity
				Social pressure	
	Shells	Harvest	Change in shells Status	Nutrient pollution	CBD habitat
		Exposure		Habitat destruction: subtidal soft bottom	Marine protected areas, coastal
				Habitat destruction: intertidal	CITES signatories
				Alien species	Worldwide Governance Indicators
				SST	Ecological integrity
				Ocean acidification	
				Social pressure	
	Fish oil	Harvest	Change in fish oil Status	Chemical pollution	CBD water
		Degree of		Nutrient pollution	CBD habitat

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		exploitation of fished stocks		Habitat destruction: subtidal soft bottom	Marine protected areas, coastal
				Alien species	Fisheries management effectiveness
				Commercial fishing low bycatch	CITES signatories
				SST	Worldwide Governance Indicators
				Social pressure	Ecological integrity
	Seaweed and plants	Harvest	Change in seaweed Status	Chemical pollution	CBD water
		Exposure		Nutrient pollution	CITES signatories
				Habitat destruction: intertidal	Worldwide Governance Indicators
				Alien species	Ecological integrity
				SST	
				Social pressure	
	Sponges	Harvest	Change in sponge Status	Nutrient pollution	CBD habitat
		Exposure		Habitat destruction: subtidal soft bottom	Marine Protected Areas, coastal
				Alien species	CITES signatories
				Artisanal fishing: high bycatch	Worldwide Governance Indicators
				SST	Ecological integrity
				Ocean acidification	
				Social pressure	
Carbon Storage	Mangroves	Area	Change in Status over time	Chemical pollution	CBD habitat
		Condition		Nutrient pollution	Marine protected areas, coastal
				Habitat destruction: Intertidal	Worldwide Governance Indicators
				Social pressure	
	Seagrass	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: intertidal	Marine protected areas, coastal
				Alien species	Worldwide Governance Indicators
				SST	
				Ocean acidification	
				Social pressure	
	Salt marsh	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat

				Habitat destruction: intertidal	Marine protected areas, coastal
				Alien species	Worldwide Governance Indicators
				Social pressure	
Coastal Protection	Mangroves	Area	Change in Status over time	Chemical pollution	CBD habitat
		Condition		Nutrient pollution	Marine protected areas, coastal
				Habitat destruction: intertidal	Worldwide Governance Indicators
				Social pressure	
	Seagrass	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: Intertidal	Marine protected areas, coastal
				Alien species	Worldwide Governance Indicators
				SST	
				Ocean acidification	
				Social pressure	
	Salt marsh	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: intertidal	Marine protected areas, coastal
				Alien species	Worldwide Governance Indicators
				Social pressure	
	Coral reefs	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: subtidal hard bottom	Marine protected areas, coastal
				Alien species	Worldwide Governance Indicators
				SST	
				Ocean acidification	
				UV	
				Social pressure	
	Sea ice	Area	Change in Status over time	SST	Worldwide Governance Indicators
		Condition		Social pressure	
Coastal Livelihoods & Economies	Livelihoods	Recent change in marine jobs across sectors	Trend in Livelihoods Status	Chemical pollution	Worldwide Governance Indicators
		Recent change in marine wages across sectors		Pathogen pollution	Global Competitiveness Index
				Nutrient pollution	Sector diversity
				Trash pollution	

				Habitat destruction: subtidal hard bottom	
				Habitat destruction: subtidal soft bottom	
				Habitat destruction: intertidal	
				Alien species	
				Genetic escapes	
				Commercial fishing: high bycatch	
				Artisanal fishing: high bycatch	
				Commercial fishing: low bycatch	
				Artisanal fishing: low bycatch	
				SST	
				Ocean acidification	
				Social pressure	
	Economies	Recent change in marine revenue across sectors	Trend in Economies Status	Chemical pollution	Worldwide Governance Indicators
				Pathogen pollution	Global Competitiveness Index
				Nutrient pollution	
				Trash pollution	
				Habitat destruction: subtidal hard bottom	
				Habitat destruction: subtidal soft bottom	
				Habitat destruction: intertidal	
				Alien species	
				Genetic escapes	
				Commercial fishing: high bycatch	
				Artisanal fishing: high bycatch	
				Commercial fishing: low bycatch	
				Artisanal fishing: low bycatch	
				SST	
				Ocean acidification	
				Social pressure	

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Tourism & Recreation	Tourism & Recreation	International arrivals	Change in Status over time	Chemical pollution	CBD water
		Average length of stay		Pathogens	Worldwide Governance Indicators
		Population size		Nutrient pollution	
		Travel and Tourism Competitiveness Index (TCI)		Trash pollution	
				Social pressure	
Sense of Place	Iconic Species	Iconic species list	Change in population status	Chemical pollution	CBD water
		Iconic species distribution		Nutrient pollution	CBD habitat
		% of Iconic species of Least Concern		Trash pollution	Marine protected areas, EEZ
				Habitat destruction: subtidal hard bottom	Access to artisanal fishing
				Habitat destruction: intertidal	Fisheries management effectiveness
				Alien species	CITES signatories
				Commercial fishing high bycatch	Ecological integrity
				Artisanal fishing: high bycatch	Worldwide Governance Indicators
				Targeted harvest	
				SST	
				Ocean acidification	
				Social pressure	
	Lasting Special Places	Marine protected areas, coastal	Yearly increase in protected areas	Chemical pollution	CBD water
		% coastline protected		Nutrient pollution	CBD habitat
				Trash pollution	Worldwide Governance Indicators
				Habitat destruction: subtidal hard bottom	
				Habitat destruction: intertidal	
				Alien species	
				Social pressure	
Clean Waters	Clean Waters	Nutrient pollution	Nutrients	Nutrient pollution	CBD water
		Pathogens Pollution	Pathogens	Pathogen pollution	Worldwide Governance Indicators
		Chemical pollution	Chemicals	Chemical pollution	
		Trash pollution	Trash	Trash pollution	
				Social pressure	
Biodiversity	Species	Species threat categories	Change in population status	Chemical pollution	CBD water
		Species range maps		Nutrient pollution	CBD habitat
				Trash pollution	Marine protected areas, EEZ

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Habitat destruction: subtidal hard bottom

Management effectiveness of

					artisanal fishing
				Habitat destruction: subtidal soft bottom	Fisheries management effectiveness
				Habitat destruction: intertidal	CITES signatories
				Alien species	CBD mariculture
				Genetic escapes	CBD tourism
				Commercial fishing high bycatch	CBD alien species
				Artisanal fishing high bycatch	Worldwide Governance Indicators
				Commercial fishing low bycatch	
				Artisanal fishing: low bycatch	
				SST	
				Ocean acidification	
				UV	
				Social pressure	
	Mangroves	Area	Change in Status over time	Chemical pollution	CBD habitat
		Condition		Nutrient pollution	Marine protected areas, EEZ
				Habitat destruction: intertidal	CBD mariculture
				Social pressure	CBD tourism
					CBD alien species
					Ecological integrity
					Worldwide Governance Indicators
	Seagrass	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: intertidal	Marine protected areas, EEZ
				Alien species	CBD mariculture
				SST	CBD tourism
				Ocean acidification	CBD alien species
				Social pressure	Ecological integrity
					Worldwide Governance Indicators
	Salt marsh	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: intertidal	Marine protected areas, EEZ
				Alien species	CBD mariculture

				Social pressure	CBD tourism
					CBD alien species
					Ecological integrity
					Worldwide Governance Indicators
	Coral reefs	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: subtidal hard bottom	Marine protected areas, EEZ
				Alien species	Management effectiveness of artisanal fishing
				Artisanal fishing: high bycatch	CBD mariculture
				SST	CBD tourism
				Ocean acidification	CBD alien species
				UV	Ecological integrity
				Social pressure	Worldwide Governance Indicators
	Sea ice	Area	Change in Status over time	SST	CBD mariculture
		Condition		Social pressure	CBD tourism
					CBD alien species
					Ecological integrity
					Worldwide Governance Indicators
	Soft bottom	Area	Change in Status over time	Chemical pollution	CBD water
		Condition		Nutrient pollution	CBD habitat
				Habitat destruction: subtidal soft bottom	Marine protected areas, EEZ
				Alien species	Fisheries management effectiveness
				Commercial fishing high bycatch	CBD mariculture
				Commercial fishing low bycatch	CBD tourism
				Artisanal fishing: low bycatch	CBD alien species
				Social pressure	Ecological integrity
					Worldwide Governance Indicators

Table S23. Full list of data layers, attributes, and source references.

Data Layer	Brief Description	Dimension	Start Year	End Year	Native Resolution	Reference
Alien species	Number of alien species per marine ecoregion	Pressure	2008	2008	Ecoregion	Molnar et al. 2008
Artisanal fishing: high bycatch	Presence of artisanal blast fishing practices	Status, Trend, Pressure	2009	2009	10 km	Burke et al. 2011
Artisanal fishing: low bycatch	Presence of artisanal poison fishing practices	Pressure	2009	2009	10 km	Burke et al. 2011
Artisanal fishing: management effectiveness and opportunity	Artisanal fishing opportunity for 206 countries	Status, Resilience	2009	2009	National	Mora et al. 2009, Fig. S4
Artisanal fishing: need	Gross Domestic Product, per capita, adjusted by Purchasing Power Parity (PPPpcGDP) for 228 countries	Status, Trend	1981	2009	National	The World Factbook 2009, IndexMundi 2011
Chemical pollution: land-based inorganic	Modeled pollution from urban runoff from impervious surfaces	Status, Pressure	2000	2000	1 km	Halpern et al. 2008, USGS 2000
Chemical pollution: land-based organic	Modeled pollution from pesticides	Status, Pressure	1992	2001	1 km	Halpern et al. 2008, FAO 2004
Chemical pollution: ocean-based	Modeled pollution from shipping and ports	Status, Pressure	2002	2005	1 km	Halpern et al. 2008
Coastal human population	Human population density within 50 mi from the shore	Status, Trend, Pressure	1990	2000	2.5 arcmin	CIESIN 2005
Coastal land and ocean area	Land area within a fixed distance from the shore (50 mi) and ocean area within a fixed distance from the shore (3 nmi and 10km)	All	2008, 2011	2008, 2011	1 km	Halpern et al. 2008, ESRI 2011
Commercial fishing: high bycatch	Modeled demersal and pelagic high bycatch fishing pressure	Pressure	1999	2003	0.5 deg	Halpern et al. 2008
Commercial fishing: low bycatch	Modeled demersal and pelagic low bycatch fishing pressure	Pressure	1999	2003	0.5 deg	Halpern et al. 2008
Convention on Biological Diversity (CBD) signatories	List of 192 countries who signed CBD	Resilience	2011	2011	National	CBD 2011
Convention on Biological Diversity (CBD) survey	Answers to questions relating to alien species, habitat, mariculture, tourism, and water	Resilience	2005	2005	National	CBD 2005
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listed species	Risk of overexploitation of corals estimated by catch of CITES listed coral and shell species	Status	1950	2007	National	CITES 2011, FAO 2011

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Table S23 (cont)

Data Layer	Brief Description	Dimension	Start Year	End Year	Native Resolution	Reference
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) signatories	List of 175 countries who signed CITES	Resilience	2011	2011	National	CITES 2011
Coral reefs	Global coral habitat extent and change in condition	Status, Trend	2002, 1980	2009, 2006	0.5 km; 1 km; Sites (points)	Burke et al. 2011, Bruno and Selig 2007, Schutte et al. 2010, Halpern et al. 2008
Ecological integrity	Status of species biological diversity	Resilience	2011	2011	National (varies)	IUCN 2011
Fertilizer trends	Nitrogen fertilizer consumption by agricultural industry	Trend	2002	2008	National	FAOSTAT 2011
Fisheries catch data	Global fisheries catch statistics in yield per species	Status, Trend	1953	2006	0.5 deg	Watson et al. 2004, FAO 2011
Fisheries management effectiveness	Management effectiveness of the world's marine fisheries	Resilience	2009	2009	National	Mora et al. 2009
Genetic escapes	Mariculture Sustainability Index (MSI): native or introduced indicator	Pressure	1994	2003	National (varies)	Trujillo 2008
Global Competitiveness Index (GCI)	Composite measure of 12 aspects of economic competitiveness	Pressure, Resilience	2011	2011	National	Schwab et al. 2011
Habitat destruction: intertidal	Population density within 10 km of the shore	Pressure	2000	2000	2.5 arcmin (varies)	CIESIN 2005, Halpern et al. 2008
Habitat destruction: subtidal hard bottom	Presence of blast and poison artisanal fishing practices	Pressure	2009	2009	10 km	Burke et al. 2011
Habitat destruction: subtidal soft bottom	Presence of trawling practices in soft bottom habitats	Status, Pressure	1999	2003	0.5 deg	Halpern et al. 2008
Iconic species list	WWF Priority and Flagship Species Lists	Status, Trend	2011	2011	Global; National	WWF 2011
International arrivals	Tourism and leisure specific international arrivals	Status, Trend	2005	2009	National	UN-WTO 2009
Mangroves	Global mangrove habitat extent, from remote sensing and assessments	Status, Trend	2000, 1980	2000, 2005	1 arcsec; National	Giri et al. 2011, FAO 2007
Mariculture Sustainability Index (MSI): mariculture sustainability and mariculture regulations	Mariculture Sustainability Index (MSI): Mariculture regulations include traceability and code of practice indicators. Mariculture sustainability includes fishmeal use, waste treatment, and seed and larvae origin indicators	Resilience, Status	1994	2003	National	Trujillo 2008

Table S23 (cont)

Data Layer	Brief Description	Dimension	Start Year	End Year	Native Resolution	Reference
Mariculture yield	Production of finfish and invertebrates	Status, Trend	1950	2008	National	FAO 2011
Marine jobs: commercial fishing	Global Number of Fishers	Status, Trend	1990	2008	National	FAO Sources 2008
Marine jobs: mariculture	Global Number of Fishers database, adjusted by proportion of a country's aquaculture production that is focused on marine species	Status, Trend	1993	2008	National	FAO Sources 2008, FishStat 2009
Marine jobs: marine mammal watching	Jobs based on number of whale watchers in a country and a regional average number of whale watchers per employee. Includes all marine mammal watching.	Status, Trend	1998	2008	National	O'Connor 2009
Marine jobs: tidal energy	La Rance and Annapolis tidal plants employment data	Status, Trend	2003	2010	Points (sites)	EDF 2010, Ruth Thorbourne, pers. comm. 2011
Marine jobs: tourism	Total contribution of tourism to employment	Status, Trend	2005	2010	National	World Tourism and Travel Council (WTTC) 2011
Marine and terrestrial protected areas	Relative area of MPAs within EEZ waters or within 3 nmi of shore, and relative area of designated protected areas (CP) within 1 km of shore	Status, Trend, Resilience	2010	2010	National (varies)	IUCN and UNEP 2010
Marine revenue: aquarium trade fishing	Revenue of Aquarium Trade Fishing derived from commodities database	Status, Trend	1995	2003	National	FAO 2011
Marine revenue: commercial fishing	Total revenue from commercial marine fishing	Status, Trend	1997	2007	National	FAO FishStat 2011
Marine revenue: mariculture	Total revenue from aquaculture production of marine species	Status, Trend	1997	2007	National	FAO FishStat 2011
Marine revenue: marine mammal watching	Total revenue from marine mammal watching	Status, Trend	1998	2008	National	O'Connor 2009
Marine revenue: tidal energy	Total revenue from tide and wave electricity production	Status, Trend	2001	2008	National	UN Energy Statistics Database 2011, US Energy Information Administration 2011
Marine revenue: tourism	Total tourism revenue by country, adjusted by country's relative proportion of coastal area	Status, Trend	2005	2010	National	World Tourism and Travel Council (WTTC) 2011

Table S23 (cont)

Data Layer	Brief Description	Dimension	Start Year	End Year	Native Resolution	Reference
Marine species	IUCN threat category and spatial distribution of marine species	Status, Trend, Resilience	2011	2011	0.5 deg	Carpenter et al. 2008, Schipper et al. 2008, Polidoro et al. 2010, Collette et al. 2011, Knapp et al. 2011, Kaschner et al. 2010
Marine wages	Occupations within commercial fishing, ports and harbors, ship and boat building, tourism, and transportation and shipping	Status, Trend	1994	2003	National	Occupational Wages around the World (OWW) Database 2005
Multispecies maximum sustainable yield (mMSY)	Modeled sustainable yield from fisheries catch data	Status, Trend	1953	2006	National	Watson et al. 2004, FAO 2011
National GDP statistics	Adjustment to all revenue data layers to factor out global economic fluctuations	Status, Trend	1995	2010	National	World Bank 2011
National unemployment statistics	Adjustment to all jobs data layers to factor out global economic fluctuations (converted to 2010 USD)	Status, Trend	1990	2009	National	World Bank 2011
Natural Products exposure	Intensity of harvest for coral, ornamental fish, sponges, shells, and seaweeds and plants	Status, Trend	1950	2007, 2008	National	FAO 2011, Halpern et al. 2008
Natural Products harvest	Export (in tons) of coral, ornamental fish, fish oil, sponges, shells, and seaweeds and plants	Status, Trend	1950	2007, 2008	National	FAO 2011
Nutrient pollution	Modeled N input from fertilizer use	Status, Pressure	1993	2002	1 km	Halpern et al. 2008, FAO 2004
Ocean acidification	Change in aragonite saturation state (ASS) levels	Pressure	1870/ 2000	2009	1 deg	Halpern et al. 2008
Pathogen pollution	Coastal population density times % population without access to improved sanitation facilities	Status, Trend, Pressure	2005, 1995	2005, 2008	5 km; National	CIESIN 2005, WHO / UNICEF Joint Monitoring Programme 2008
Pesticide trends	Pesticide consumption by agricultural industry	Trend	1999	2009	National	FAO 2011
Rocky reef	Global rocky reef habitat extent	Status	2005	2005	2 arcmin; Points	Halpern et al. 2008
Salt marsh	Global salt marsh habitat extent	Status, Trend	1975	2007	National	Bridgham 2006, Dahl 2006, EEA Eionet 2008, Environment New Zealand 2007, JNCC 2004
Sea ice	Sea ice change in extent, both edge and shoreline metrics	Status, Trend	1979	2010	25 km	Fetterer et al. 2002

Table S23 (cont)

Data Layer	Brief Description	Dimension	Start Year	End Year	Native Resolution	Reference
Sea surface temperature (SST) anomalies	Sea surface temperature anomalies	Pressure	1985	2005	4 km	Halpern et al. 2008
Seagrass	Global seagrass habitat extent and change in condition	Status, Trend	1975	2010	1 km; National	UNEP-WCMA 2005, Waycott et al. 2009, Short 2011
Sector Evenness	Evenness of jobs from Shannon-Weaver diversity index	Resilience	1990	2010	National	FAO Sources 2008, WTTC 2011, O'Connor 2009, EDF 2010
Soft-bottom subtidal	Global soft-bottom subtidal habitat extent, and modeled status for change in condition	Status, Trend	2001	2005	0.5 deg	Halpern et al. 2008, SAUP 2006
Stock exploitation status	Exploitation status of fished stocks	Status, Trend	1950	2006	National	FAO 2011
Targeted harvest	Catch statistics for cetaceans and marine turtles	Pressure	2008	2009	National	FAO 2011
Total land area	Land area for 278 countries	Status, Trend, Pressure	2008, 2011	2008, 2011	National	The World Factbook 2008, ESRI 2011
Total population	Census populations for 221 countries	Status, Trend	2007	2007	National	ESRI 2011
Tourist days per stay	Average length of tourism stay per country	Status, Trend	2005	2009	National	UN-WTO 2009
Trash pollution	Trash collected on beaches (lbs/mi) for 111 countries	Status, Pressure	2011	2011	National	Ocean Conservancy 2011
Travel and Tourism Competitiveness Index (TTCI)	Sustainability of the travel and tourism industry for 139 countries	Status, Trend	2007	2011	National	World Economic Forum 2011
UV radiation	Anomalies in intensity of ultraviolet (UV) radiation	Pressure	1996	2004	1 deg	Halpern et al. 2008
Worldwide Governance Indicators (WGI)	Composite measure of Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption	Pressure, Resilience	2009	2009	National	WGI 2010

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Table S24. EEZ reporting units and regional clusters used for comparing similar countries for purposes of filling data gaps. ID codes are specific to the Index project. Three letter country codes are isocodes.

Geographic Region	OHI region name (isocode)	ID	Includes	Area in 1000 km2
Antarctica	Antarctica (ATA)	162		9047.0
Australia and New Zealand	Australia (AUS)	12		6958.9
	Australian Southern Ocean Territories	2	Heard Island and McDonald Islands (HMD), Macquarie Island	892.3
	Australian Tropical Territories	1	Christmas Island (CXR), Cocos Islands (CCK), Norfolk Island (NFK)	1232.8
	New Zealand (NZL)	115	Cook Islands (COK), Niue (NIU), Tokelau (TKL)	6712.8
Caribbean	Antigua and Barbuda (ATG)	87		108.5
	Bahamas (BHS)	80		598.0
	Barbados (BRB)	90		187.2
	British Caribbean Territories	85	Anguilla (AIA), Bermuda (BMU), British Virgin Islands (VGB), Cayman Islands (CYM), Montserrat (MSR), Turks and Caicos Islands (TCA)	906.4
	Cuba (CUB)	81		366.2
	Dominica (DMA)	89		28.8
	Dominican Republic (DOM)	83		270.7
	French Caribbean Territories	106	Guadeloupe (GLP), Martinique (MTQ), Saint Martin (MAF)	143.9
	Grenada (GRD)	91		26.2
	Haiti (HTI)	82		124.1
	Jamaica (JAM)	118		246.3
	Netherlands Caribbean Territories	94	Netherlands Antilles (ANT), Southern Saint-Martin	81.5
	Saint Kitts and Nevis (KNA)	86		10.3
	Saint Lucia (LCA)	88		15.5
	Saint Vincent and the Grenadines (VCT)	93		36.4
	Trinidad and Tobago (TTO)	92		77.8
	USA Caribbean Territories	84	Puerto Rico (PRI), U.S. Virgin Islands (VIR)	212.2
Central America	Belize (BLZ)	117		36.4
	Costa Rica (CRI)	96		575.9
	El Salvador (SLV)	100		94.4
	Guatemala (GTM)	102		118.5
	Honduras (HND)	99		218.6
	Mexico (MEX)	101		3283.9
	Nicaragua (NIC)	97		149.7
	Panama (PAN)	95		332.5
Eastern Africa	Comoros (COM)	20		165.7
	Djibouti (DJI)	32		7.1
	Eritrea (ERI)	31		79.3

	French Indian Ocean Territories	21	Bassas da India, Glorioso Islands, Ile Europa, Ile Tromelin, Juan de Nova Island, Mayotte (MYT),	1006.1

			Reunion (REU)	
	Kenya (KEN)	29		112.6
	Madagascar (MDG)	28		1205.8
	Mauritius (MUS)	23		1280.0
	Mozambique (MOZ)	27		575.7
	Seychelles (SYC)	22		1340.6
	Somalia (SOM)	30		836.3
	Tanzania (TZA)	152		243.0
Eastern Asia	China (CHN)	159		878.4
	Japan (JPN)	160		4040.3
	North Korea (PRK)	17		116.1
	South Korea (KOR)	16		325.4
	Taiwan (TWN)	10		342.9
Eastern Europe	Bulgaria (BGR)	54		35.1
	Poland (POL)	129		31.8
	Romania (ROU)	55		29.1
	Russia (RUS)	56		7540.4
	Ukraine (UKR)	58		133.1
Melanesia	Fiji (FJI)	14		1287.2
	New Caledonia (NCL)	3		1429.2
	Papua New Guinea (PNG)	13		2405.7
	Solomon Islands (SLB)	5		1604.5
	Vanuatu (VUT)	4		642.6
Micronesia	Clipperton Island	79	Clipperton Island	434.0
	Jarvis Island	110	Jarvis Island	318.7
	Kiribati (KIR)	161	Line Group, Phoenix Group	3459.9
	Marshall Islands (MHL)	9		2004.1
	Micronesia (FSM)	7		3011.7
	Nauru (NRU)	8		310.6
	Palau (PLW)	6		608.2
	USA Pacific Inhabited Territories	111	American Samoa (ASM), Guam (GUM), Howland Island and Baker Island, Northern Mariana Islands (MNP)	1820.6
	USA Pacific Uninhabited Territories	114	Johnston Atoll, Palmyra Atoll, Wake Island	1203.1
Middle Africa	Angola (AGO)	151		505.1
	Cameroon (CMR)	148		14.9
	Democratic Republic of the Congo (COD)	150		0.8
	Equatorial Guinea (GNQ)	77		310.6
	Gabon (GAB)	149		193.6
	Republic of the Congo (COG)	73		40.9
	Sao Tome and Principe (STP)	76		131.7
Northern Africa	Algeria (DZA)	66		127.3
	Egypt (EGY)	163		259.7
	Libya (LBY)	50		354.5
	Morocco (MAR)	45		274.4
	Sudan (SDN)	35		66.9
	Tunisia (TUN)	44		101.5
	Western Sahara (ESH)	46		301.6
Northern America	Canada (CAN)	166		5705.3
	Saint Pierre and Miquelon (SPM)	167		12.3

	United States (USA)	116	Alaska, Hawaii	8670.4
Northern Europe	British Southern Ocean Territories	68	Ascension, Falkland Islands (FLK), Saint Helena (SHN), South Georgia and the South Sandwich Islands (SGS), Tristan da Cunha	3641.9
	Denmark (DNK)	126	Faroe Islands (FRO), Greenland (GRL)	2635.4
	Estonia (EST)	53		36.3
	Finland (FIN)	125		80.8
	French Southern Ocean Territories	67	Amsterdam Island and Saint Paul Island, Crozet Islands, Kerguelen Islands	1651.0
	Iceland (ISL)	107		752.7
	Ireland (IRL)	132		409.3
	Latvia (LVA)	52		28.8
	Lithuania (LTU)	140		6.1
	Norway (NOR)	169	Bouvet Island (BVT), Svalbard and Jan Mayen (SJM)	2503.0
	Sweden (SWE)	168		156.2
	United Kingdom (GBR)	131	Guernsey (GGY), Jersey (JEY)	785.8
Polynesia	British Pacific Territories (Pitcairn)	108	Pitcairn (PCN)	839.8
	French Polynesia (PYF)	109	Wallis and Futuna (WLF)	5055.1
	Samoa (WSM)	112		132.2
	Tonga (TON)	113		668.0
	Tuvalu (TUV)	15		756.2
South America	Argentina (ARG)	123		1082.2
	Brazil (BRA)	122	Trindade	3661.7
	Chile (CHL)	170	Easter Island	3597.1
	Colombia (COL)	98		801.9
	Ecuador (ECU)	103	Galapagos Islands	1078.0
	French Guiana (GUF)	121		134.5
	Guyana (GUY)	119		136.5
	Peru (PER)	104		831.2
	Suriname (SUR)	120		128.8
	Uruguay (URY)	124		132.0
	Venezuela (VEN)	105		472.5
South-Eastern Asia	Cambodia (KHM)	18		48.0
	East Timor (TLS)	171	Oecussi Ambeno	42.2
	Indonesia (IDN)	165		5964.6
	Malaysia (MYS)	156		474.2
	Myanmar (MMR)	155		518.1
	Philippines (PHL)	11		1831.3
	Singapore (SGP)	158		0.6
	Thailand (THA)	19		306.7
	Vietnam (VNM)	157		647.1
Southern Africa	Namibia (NAM)	74		562.6
	South Africa (ZAF)	75	Prince Edward Islands	1543.6
Southern Asia	Bangladesh (BGD)	154		77.5
	British Indian Ocean Territory (IOT)	24		642.7
	India (IND)	153	Andaman and Nicobar	2301.0
	Iran (IRN)	142		165.7
	Maldives (MDV)	25		921.9
	Pakistan (PAK)	39		222.8
	Sri Lanka (LKA)	26		534.0

Southern Europe	Albania (ALB)	65		11.1
	Bosnia and Herzegovina (BIH)	172		0.0
	Croatia (HRV)	138		55.7
	Gibraltar (GIB)	43		0.5
	Greece (GRC)	63		494.0
	Italy (ITA)	135		538.8
	Malta (MLT)	51		55.6
	Portugal (PRT)	134	Azores, Madeira	1723.9
	Serbia and Montenegro (SCG)	137		7.5
	Slovenia (SVN)	139		0.2
	Spain (ESP)	133	Canary Islands	1005.6
Western Africa	Benin (BEN)	72		30.5
	Cape Verde (CPV)	41		800.9
	Gambia (GMB)	48		22.3
	Ghana (GHA)	78		227.4
	Guinea (GIN)	145		110.0
	Guinea-Bissau (GNB)	144		105.9
	Ivory Coast (CIV)	146		175.4
	Liberia (LBR)	70		248.3
	Mauritania (MRT)	47		156.5
	Nigeria (NGA)	147		182.3
	Senegal (SEN)	49		157.7
	Sierra Leone (SLE)	69		160.7
	Togo (TGO)	71		15.6
Western Asia	Bahrain (BHR)	38		7.7
	Cyprus (CYP)	64		78.9
	Georgia (GEO)	57		23.1
	Iraq (IRQ)	143		0.7
	Israel (ISR)	62		27.4
	Jordan (JOR)	164		0.1
	Kuwait (KWT)	37		11.8
	Lebanon (LBN)	61		19.3
	Oman (OMN)	34		539.5
	Qatar (QAT)	141		31.9
	Saudi Arabia (SAU)	36		221.1
	Syria (SYR)	60		10.4
	Turkey (TUR)	59		255.7
	United Arab Emirates (ARE)	40		53.9
	Yemen (YEM)	33		548.4
Western Europe	Belgium (BEL)	42		3.4
	France (FRA)	130		333.1
	Germany (DEU)	127		56.0
	Monaco (MCO)	136		0.3
	Netherlands (NLD)	128		64.0

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Table S25. Matrix of pressure rankings for all goals. Weights are color-coded for ease of reference. Scores for each sector in Livelihoods and Coastal Economies goal and each habitat are used to calculate sector- or habitat-specific pressures. All empty cells are not relevant to that goal and so treated as 'no data' (i.e., not used for calculating averages, per methods described in Section 2C). References supporting weights are provided in Table S28.

		ECOLOGICAL													PHYSICAL			SOCIAL
		Pollution				Habitat Destruction			Spp Pollution		Fishing Pressure				Climate Change			Social
GOAL	SUB-GOAL or SUB-COMPONENT	Chemicals	Human Pathogens	Nutrients	Marine Debris	Subtidal soft bottom	Subtidal hard bottom	Intertidal	Alien invasives	Genetic Escapes	Commercial High bycatch	Commercial Low bycatch	Artisanal Low bycatch	Artisanal High bycatch	SST	Ocean acidification	UV	1-WGI (All 6)
FOOD PROVISION	Fishing	1		1		2	2	1	1	1	3	1	1	2				x
	Mariculture	2		3														x
ARTISANAL OPPORUNITY		1		1			3	1	1		2	1	1	3				x
NATURAL PRODUCTS	Aq. trade	2		1			3		1				1	3	1			x
	Coral	1		2			3		1						3	1	1	x
	Fish oil	2		1		2			1			2			1			x
	Seaweed	2		2				1	1						1			x
	Sponges			1		3			1					1	1	1		x
	Shells			1		2		1	1						1	1		x
CARBON STORAGE	Mangroves	1		1				3										x
	Seagrasses	2		3				3	1						2	1		x
	Salt marshes	1		2				3	1									x
COASTAL PROTECTION	Mangroves	1		1				3										x
	Corals	1		2			3		1						3	1	1	x
	Seagrasses	2		3				3	1						2	1		x
	Salt marshes	1		2				3	1									x
	Sea ice														3			x

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Table S25 (cont)

		ECOLOGICAL													PHYSICAL			SOCIAL
		Pollution				Destruction			Pollution		Pressure				Change			Social
GOAL	SUB-GOAL or SUB-COMPONENT	Chemicals	Human Pathogens	Nutrients	Marine Debris	Subtidal soft bottom	Subtidal hard bottom	Intertidal	Alien invasives	Genetic Escapes	Commercial High bycatch	Commercial Low bycatch	Artisanal Low bycatch	Artisanal High bycatch	SST	Ocean acidification	UV	1-WGI (All 6)
SENSE OF PLACE	Special Places	2		2	3		2	3	1									x
	Iconic Species	3		1	1		2	3	1		2			2	1	1		x
LIVELIHOODS	Fishing (commercial)	2	0	1	0	2	2	1	1	1	3	1	1	2	0	0	0	x
	Mariculture	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	x
	Tourism	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	x
	Shipping & Transport	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	x
	Cetacean watching	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	x
	Aquarium trade	2	0	1	0	0	3	0	1	0	0	0	1	3	1	1	0	x
	Ports & Harbors	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	x
	Ship & Boat building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
	Energy (wave & tidal)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
TOURISM & RECREATION	Tourism & Rec	2	2	2	2													x
CLEAN WATERS		2	2	2	2													x
BIODIVERSITY	Habitats - Mangroves	1		1				3										x
	Habitats - Seagrasses	2		3				3	1						2	1		x
	Habitats - Salt marshes	1		2				3	1									x
	Habitats - Soft bottom	2		2		3			1		3	1	1					x
	Habitats - Corals	1		2			3		1					3	3	1	1	x
	Habitats - Sea-ice														3			x
	Species	2		3	1	3	2	2	1	1	3	1	1	2	1	1	1	x

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Table S26. Matrix of data used for the resilience measure for each of the goals. Versions of Fishing Resilience come from Table S3.

		Ecological Resilience										Social Resilience		
		Regulations								Ecological Integrity				
GOAL	SUB-GOAL	CBD Water	Habitat Resilience	Fishing Resilience	CBD Tourism	CBD Mari-culture	CBD Alien Sp.	Trujillo Regula-tions	CITES Signa-tories	Diversity Index (coastal)	Diversity Index (EZZ)	WGI (all 6 indices)	Sector Diversity	Global Competitive-ness Index
FOOD PROVISION	Fishing		X	VERS. 2							X	X		
	Mariculture	X				X		X				X		
ARTISANAL OPPORUNITY			X	VERS. 1						X		X		
NATURAL PRODUCTS	aq. trade	X	X	VERS. 3					X	X		X		
	coral	X	X						X	X		X		
	fish oil	X	X	VERS. 1					X	X		X		
	seaweed	X							X	X		X		
	sponges		X						X	X		X		
	Shells		X						X	X		X		
CARBON STORAGE	Mangroves		X									X		
	Seagrasses	X	X									X		
	Salt Marshes	X	X									X		
COASTAL PROTECTION	Mangrove		X									X		
	Corals	X	X									X		
	Seagrasses	X	X									X		
	Salt Marshes	X	X									X		
	Sea Ice											X		
SENSE OF PLACE	Special Places	X	ALT VERS									X		
	Iconic Species	X	X	VERS. 2					X		X	X		
LIVELIHOODS	Livelihoods											X	X	X
	Economies											X		X
TOURISM & RECREATION	Tourism & Rec	X										X		
CLEAN WATERS		X										X		
BIODIVERSITY	Mangroves		X		X	X	X				X	X		
	Seagrasses	X	X		X	X	X				X	X		
	Salt Marshes	X	X		X	X	X				X	X		
	Soft Bottom	X	X	VERS. 1	X	X	X				X	X		
	Corals	X	X	VERS. 3	X	X	X				X	X		
	Sea Ice				X	X	X				X	X		
	Species	X	X	VERS. 2	X	X	X		X			X		

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Table S27. Overall Index, goal and sub-goal scores for every reporting unit (EEZ) in the world. Empty cells are goals not relevant to the country because they require resident human populations or do not have the resources locally to produce the goal. Goals (two-letter codes) and sub-goals (three-letter codes) are reported separately; LE, SP, and BD goals are the average of sub-goal scores; FP scores are the weighted average of sub-goal scores (weights provided in Table S32).

code	Country/EEZ	Index	FIS	FP	MAR	AO	NP	CS	CP	LIV	LE	ECO	TR	ICO	SP	LSP	CW	HAB	BD	SPP
	Global (area-weighted average)	60	25	24	10	87	40	75	73	84	75	67	10	70	55	41	78	88	83	79
	Global (EEZ average)	55	15	15	11	84	34	68	59	84	74	65	12	68	48	29	71	86	81	77
1	Australian Tropical Territories	67	16	16		97		93	52	89	78	66	8	67	83	100	94	78	80	82
2	Australian Southern Ocean Territories	61	14	14		97				89	78	66	8	88	45	1	95	100	91	81
3	New Caledonia	61	13	13	1	88	94	48	62	100	94	88	18	70	36	2	79	73	74	74
4	Vanuatu	49	2	2	0	76	6	64	48	100	100	100	13	70	36	1	67	84	81	78
5	Solomon Islands	54	9	9	0	70	62	49	69	100	100	100	1	70	35	0	71	75	75	75
6	Palau	59	16	15	0	80	1	64	66	75	75	75	85	67	33	0	81	98	88	77
7	Micronesia	53	15	15	0	68	8	93	80	75	65	55	5	67	33	0	79	98	86	74
8	Nauru	59	11	11		75			97	80	75	70	13	79	39	0	78	99	85	71
9	Marshall Islands	59	7	7		74	71	86	87	80	67	55	0	72	36	0	71	97	86	75
10	Taiwan	57	40	45	54	95	38	95	50	48	60	72	3	65	38	11	61	98	88	79
11	Philippines	51	0	4	18	78	40	61	69	100	72	43	0	64	45	26	69	75	74	73
12	Australia	67	52	40	3	97	40	92	59	86	77	69	1	87	82	78	93	94	87	80
13	Papua New Guinea	50	0	0	0	72	8	76	64	95	95	96	0	68	38	7	71	85	79	73
14	Fiji	53	20	20	0	72	40	54	85	68	60	52	16	64	32	0	72	78	75	73
15	Tuvalu	57	6	3	0	73			100	76	75	73	3	73	37	0	82	100	87	74
16	South Korea	50	46	54	63	96	76	0	0	79	88	97	4	77	55	33	68	41	58	74
17	North Korea	48	10	17	30	63	21		93	45	56	67	1	72	36	0	62	100	86	72
18	Cambodia	46	2	3	5	79	0	50	83	52	48	44	2	59	52	44	67	81	79	77
19	Thailand	58	0	41	62	89	50	65	41	97	74	51	6	63	57	51	81	82	80	78
20	Comoros	47	6	6		60		84	32	95	68	42	0	59	31	2	62	88	79	71
21	French Indian Ocean Territories	52	40	37	1	77	0	90	50	96	87	78	6	66	36	6	54	96	87	77
22	Seychelles	73	12	12	1	89	83	100	84	96	92	87	55	66	55	43	72	98	86	75
23	Mauritius	60	0	0	1	86	44	89	83	68	72	76	25	64	37	10	74	95	86	77
24	British Indian Ocean Territory	61	4	4		79			100	67	64	62	7	57	77	97	70	100	86	72
25	Maldives	55	0	0		77	1	85	75	100	81	63	30	66	33	0	83	90	81	72
26	Sri Lanka	46	15	14	1	74	7	74	34	71	57	44	0	62	38	15	73	97	86	74
27	Mozambique	54	11	11	0	62	7	96	67	100	100	100	0	67	51	36	67	93	84	75
28	Madagascar	51	3	2	1	60	78	66	44	69	72	76	0	65	35	4	71	83	78	73
29	Kenya	52	15	15	0	75	32	79	56	98	72	47	1	67	50	34	64	81	77	74
30	Somalia	47	1	1		54	65	46	34	96	83	71	16	66	33	0	68	63	66	70
31	Eritrea	51	7	7		66	6	84	87	96	73	51	0	61	30	0	67	92	84	76
32	Djibouti	52	3	3		74	0		97	96	93	89	2	74	38	2	76	100	89	79
33	Yemen	43	0	0		76	15	68	34	100	58	16	0	65	33	0	65	90	81	73

Note: column groups in the printed header — Goal/Sub-Goal Scores: FP (FIS, FP, MAR), AO, NP, CS, CP, LE (LIV, LE, ECO), TR, SP (ICO, SP, LSP), CW, BD (HAB, BD, SPP).

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Table S27 (cont)

Goal/Sub-Goal Scores

code	Country/EEZ	Index	FP	FIS	MAR	AO	NP	CS	CP	LE	LIV	ECO	TR	SP	ICO	LSP	CW	BD	HAB	SPP
34	Oman	63	32	32	0	90	45		99	100	69	38	9	62	49	35	84	98	88	77
35	Sudan	45	5	5		70	0	82	35	67	62	58	0	69	35	0	74	95	85	74
36	Saudi Arabia	57	46	34	5	88	23	81	34	100	96	93	3	69	43	16	76	94	87	80
37	Kuwait	50	5	3	0	97	6	86	25	100	89	78	0	56	28	0	79	97	89	81
38	Bahrain	51	8	4	0	95	15	58	49	100	61	22	53	52	26	0	74	75	78	81
39	Pakistan	45	13	13	0	75	51	29	29	100	72	45	0	74	48	22	68	57	65	72
40	United Arab Emirates	63	15	15	1	96	49	93	38	100	99	98	27	68	34	0	87	98	90	83
41	Cape Verde	58	27	27		74				100	100	100	10	73	37	0	75	99	86	73
42	Belgium	64	11	11		95	75	100	100	61	59	56	4	58	31	5	71	99	90	82
43	Gibraltar	53	1	1		96				74	67	61	25	60	30	0	67	100	87	74
44	Tunisia	59	24	23	3	89	75			99	84	69	6	73	37	0	74	97	87	77
45	Morocco	49	0	0	1	81	46			100	83	66	2	65	37	8	66	90	80	70
46	Western Sahara	51	4	4		67				92	75	59	2	63	54	44	76	99	82	65
47	Mauritania	61	28	28		72	86			94	65	37	0	70	85	100	69	97	85	74
48	Gambia	51	8	4	0	75		57	57	96	98	100	1	83	41	0	54	75	73	71
49	Senegal	40	7	7	0	72	9	34	5	98	90	82	0	68	71	74	55	51	61	71
50	Libya	46	10	9	0	81	44			59	38	16	0	66	33	0	76	100	88	76
51	Malta	63	10	13	15	94	0	87	87	99	51	4	82	66	46	26	80	93	86	80
52	Latvia	57	9	9		91	53	54	75	45	58	71	7	63	71	78	74	79	83	86
53	Estonia	72	28	28	0	95	95	100	88	70	58	47	5	64	82	100	77	98	94	90
54	Bulgaria	47	8	6	5	89	18			57	44	31	12	72	53	33	72	100	87	73
55	Romania	50	7	7		90	4			55	48	41	1	73	86	100	77	100	89	79
56	Russia	67	53	53	0	91	1	100	93	98	66	34	0	72	68	64	97	100	95	90
57	Georgia	61	7	7		86	100			99	92	85	3	72	37	3	73	100	88	75
58	Ukraine	62	16	16	1	83	90	83	83	86	62	39	1	71	52	33	68	93	84	75
59	Turkey	52	19	19	20	91	34			94	76	58	5	66	33	0	72	89	83	78
60	Syria	45	7	7		84	4			98	83	67	4	64	32	0	58	97	92	87
61	Lebanon	50	5	5		88	35			92	88	85	2	62	31	0	59	90	88	87
62	Israel	63	7	10	12	96	62	91	91	98	89	80	5	55	28	2	65	95	92	89
63	Greece	57	23	18	12	95	39			87	72	57	16	67	44	20	83	96	91	85
64	Cyprus	53	11	9	6	95	0			49	33	16	79	64	36	8	77	97	95	93
65	Albania	53	10	10	10	88	0			100	100	100	1	65	48	30	85	100	90	80
66	Algeria	41	0	0	0	85	0			65	62	59	0	67	34	1	65	89	82	74
67	French Southern Ocean Territories	57	3	3		96				77	75	73	21	51	26	0	88	100	90	80
68	British Southern Ocean Territories	51	13	13	0	97	0			76	75	74	21	59	30	1	86	95	88	81
69	Sierra Leone	36	21	21		70	0	23	5	76	87	99	0	74	37	0	53	50	61	72
70	Liberia	37	7	7		54	0	22	22	100	100	100	4	70	41	12	54	57	65	72
71	Togo	52	9	9		58	0	98	98	95	96	96	0	62	31	0	45	99	85	71
72	Benin	49	10	10		64		99	99	41	30	18	0	67	33	0	22	100	87	74

Table S27 (cont)

			Goal/Sub-Goal Scores																	
code	Country/EEZ	Index		FP		AO	NP	CS	CP		LE		TR		SP		CW		BD	
			FIS		MAR					LIV		ECO		ICO		LSP		HAB		SPP
73	Republic of the Congo	40	9	9		76	0	27	27	79	68	56	0	70	72	74	62	54	63	72
74	Namibia	61	26	26	1	95	15			100	100	100	12	66	59	53	90	97	87	76
75	South Africa	52	15	15	2	92	15	79	25	100	75	50	2	71	66	61	68	89	81	74
76	Sao Tome and Principe	50	53	53		66	9			100	97	95	1	57	29	0	61	100	88	76
77	Equatorial Guinea	51	1	1		88		81	81	8	6	3	1	64	58	52	62	92	81	70
78	Ghana	40	8	8		69	14	68	17	100	64	28	0	69	37	5	46	76	75	75
79	Clipperton Island	77							100					78	39	0	82	100	89	78
80	Bahamas	67	10	10	0	96	88	65	36	94	91	88	87	66	34	2	82	77	80	84
81	Cuba	52	20	16	1	92	4	100	23	89	74	58	8	67	52	37	71	78	79	80
82	Haiti	44	3	3		66	34	60	21	100	100	100	0	63	33	3	49	66	71	77
83	Dominican Republic	58	28	26	1	85	67	49	77	93	90	87	12	67	34	0	62	80	80	79
84	USA Caribbean Territories	61	26	25	0	94		100	43	86	79	72	5	72	51	29	67	95	87	80
85	British Caribbean Territories	63	5	5	0	93	1	79	43	93	85	78	100	73	55	36	85	86	82	78
86	Saint Kitts and Nevis	63	6	3	0	94		100	55	98	77	56	41	71	35	0	75	95	90	85
87	Antigua and Barbuda	71	7	7		93		100	33	97	99	100	96	75	52	30	73	86	84	81
88	Saint Lucia	50	7	7		93	0	26	71	65	63	61	51	73	37	1	71	70	77	85
89	Dominica	43	5	5		92	0	26	9	98	86	75	34	79	41	2	69	60	70	81
90	Barbados	53	8	8		93	3	27	48	100	100	100	60	71	36	0	72	81	80	79
91	Grenada	48	11	11		85	0	36	39	98	97	97	25	64	32	0	82	57	69	82
92	Trinidad and Tobago	63	9	9		92	96	84	76	81	59	37	13	67	43	19	71	90	85	80
93	Saint Vincent and the Grenadines	48	7	7		87	0		74	80	51	23	13	76	38	0	72	92	88	84
94	Netherlands Caribbean Territories	62	4	2	0	90	4	82	96	90	81	72	56	72	41	10	78	97	90	82
95	Panama	48	8	7	4	87	7	30	52	100	100	100	5	67	49	31	74	63	72	81
96	Costa Rica	61	12	12		87	97	46	89	56	57	57	18	68	55	42	68	84	82	80
97	Nicaragua	43	5	9	14	74	49	7	13	51	72	92	1	64	74	84	65	59	69	79
98	Colombia	52	19	16	9	85	47	51	66	86	69	52	0	64	48	32	67	59	68	77
99	Honduras	46	3	15	16	77	0	53	48	78	80	82	2	68	49	30	63	79	79	79
100	El Salvador	45	10	10	1	88	25	40	40	83	69	55	1	62	39	17	60	70	74	78
101	Mexico	55	18	18	13	88	63	61	35	47	57	66	2	63	80	97	70	81	79	77
102	Guatemala	60	8	16	18	79	12	87	87	99	99	100	2	68	80	92	55	95	85	75
103	Ecuador	60	18	28	37	85	56	52	63	100	85	71	1	66	83	100	73	76	75	74
104	Peru	44	0	0	17	89	56	37	37	61	46	32	0	70	43	17	66	64	70	75
105	Venezuela	46	0	0	7	88	0	68	40	87	58	29	0	65	68	71	60	76	75	73
106	French Caribbean Territories	54	12	12	0	95	0	98	40	98	85	72	16	70	43	15	63	96	88	80
107	Iceland	52	21	21	4	95	43		41	90	67	44	16	58	33	8	81	67	71	75
108	British Pacific Territories (Pitcairn)	63	2	2		90			100	76	75	73	20	71	35	0	91	100	90	80
109	French Polynesia	72	23	21	1	92	97	89	96	100	87	73	24	79	39	0	90	98	90	82
110	Jarvis Island	86							98					65	82	100	78	95	86	76
111	USA Pacific Inhabited Territories	64	16	16	0	95		92	51	81	76	72	39	69	42	14	75	96	86	76
112	Samoa	49	3	3	0	90	0	89	46	1	40	79	15	75	38	1	82	96	88	80
113	Tonga	49	2	2	0	87	0	66	36	100	81	62	8	76	39	2	87	86	81	77

Table S27 (cont)

code	Country/EEZ	Index	FP: FIS	FP	FP: MAR	AO	NP	CS	CP	LE: LIV	LE	LE: ECO	TR	SP: ICO	SP	SP: LSP	CW	BD: HAB	BD	BD: SPP
114	USA Pacific Uninhabited Territories	80							74					65	81	98	78	91	85	79
115	New Zealand	64	16	17	20	96	48	80	86	100	71	43	15	74	60	46	77	88	85	81
116	United States	63	25	25	9	97	35	66	79	98	97	96	1	72	82	93	74	73	76	79
117	Belize	51	3	6	8	90	21	43	7	100	100	100	24	69	63	57	84	60	71	82
118	Jamaica	48	4	2	0	83	0	65	25	96	87	79	16	69	64	58	64	69	73	77
119	Guyana	56	10	10	0	81	83	71	71	60	49	38	3	72	38	4	78	87	80	73
120	Suriname	69	8	8	0	88	93	100	100	95	48	1	5	72	86	100	77	100	86	73
121	French Guiana	61	10	10		92	0	100	100	68	60	52	1	78	73	68	83	100	89	78
122	Brazil	62	41	36	9	88	29	93	86	53	51	49	0	67	81	95	76	92	84	77
123	Argentina	52	16	16	0	91	36			68	70	72	1	69	42	15	71	96	85	74
124	Uruguay	47	8	8	0	94	0			100	75	49	7	71	45	19	63	96	84	72
125	Finland	65	31	28	5	95	81		84	81	73	66	5	66	41	17	80	97	97	97
126	Denmark	69	32	32	3	97	1	100	96	87	71	56	38	68	82	97	82	96	93	90
127	Germany	73	27	26	10	95	80	100	99	98	90	82	2	50	75	100	70	97	89	80
128	Netherlands	70	32	35	46	96	71	100	100	79	66	53	4	65	75	85	67	89	85	81
129	Poland	42	10	10		94	12	66	4	62	61	61	2	63	37	11	55	67	75	82
130	France	66	87	72	46	96	75	79	49	94	81	67	27	63	46	29	60	72	75	77
131	United Kingdom	61	57	54	20	96	58	55	39	72	76	81	7	67	77	86	74	82	79	77
132	Ireland	56	0	2	32	95	71	54	54	81	68	55	29	62	32	2	75	78	77	75
133	Spain	58	60	55	47	95	47	52	52	80	66	52	34	60	34	8	76	74	74	74
134	Portugal	59	55	53	8	94	21			85	82	80	26	56	44	32	70	95	83	72
135	Italy	60	31	31	31	95	63	79	35	60	63	66	8	68	63	59	72	93	86	79
136	Monaco	59	1	1		95				95	83	71	99	43	21	0	69		43	85
137	Serbia and Montenegro	48	8	4	0	88	0			75	68	61	20	78	39	0	80	99	88	78
138	Croatia	58	18	17	7	86	49			86	71	55	24	78	44	9	82	99	89	80
139	Slovenia	66	12	17	23	94	98			100	100	100	7	82	48	15	76	99	90	82
140	Lithuania	57	10	10		94	62		73	39	68	97	1	63	60	56	59	95	89	83
141	Qatar	49	7	4	0	100	0	90	37	77	52	27	2	66	36	5	83	98	92	85
142	Iran	45	0	0	2	87	4	55	18	100	89	77	0	62	54	45	73	74	75	76
143	Iraq	49	2	2		73		80	80	98	55	12	1	58	29	0	44	90	82	74
144	Guinea-Bissau	40	2	2		67		23	5	95	52	9	0	73	86	99	59	57	63	69
145	Guinea	47	17	17		59	82	33	6	89	82	74	0	72	74	75	54	67	67	68
146	Ivory Coast	38	15	14	1	64	11	21	21	75	86	96	0	66	47	28	51	56	64	72
147	Nigeria	41	10	10	0	70	2	96	25	100	58	16	0	70	41	13	40	65	67	68
148	Cameroon	56	7	7		67	80	78	78	68	55	43	0	72	47	22	68	84	78	72
149	Gabon	47	31	31		88	0	46	46	49	41	33	3	72	73	74	76	55	62	69
150	Democratic Republic of the Congo	38	4	4		55		19	19	100	83	66	0	53	58	63	39	53	64	75
151	Angola	42	22	22		79	2	54	17	82	62	41	0	61	40	19	71	71	69	67
152	Tanzania	60	15	15	0	80	58	61	64	100	100	100	0	69	85	100	59	73	73	74
153	India	52	14	15	23	72	70	72	62	49	56	63	0	63	40	17	53	89	82	76
154	Bangladesh	61	2	20	38	73	42	100	100	100	79	59	0	68	40	13	62	100	89	78

Goal/Sub-Goal Scores

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Table S27 (cont)

code	Country/EEZ	Index	FP			AO	NP	CS	CP	LE			TR	SP			CW	BD		
			FIS	FP	MAR					LIV	LE	ECO		ICO	SP	LSP		HAB	BD	SPP
155	Myanmar	54	1	4	7	60	100	73	54	78	65	53	0	59	32	5	72	87	78	70
156	Malaysia	55	0	2	25	89	26	64	88	100	91	82	8	60	35	9	69	81	79	76
157	Vietnam	50	6	28	44	73	9	40	81	98	77	56	1	68	52	35	64	78	76	73
158	Singapore	48	7	25	43	96	11	51	26	100	87	75	14	74	37	0	67	65	71	76
159	China	53	0	63	100	89	70	51	46	46	42	38	0	64	37	10	56	74	74	74
160	Japan	69	61	56	40	93	28	96	95	50	75	100	1	70	77	84	76	96	88	79
161	Kiribati	64	54	54	0	81	8	87	91	89	94	100	1	76	57	38	79	93	83	73
162	Antarctica																			
163	Egypt	61	27	37	38	88	7	85	66	100	85	70	5	66	66	65	81	98	89	81
164	Jordan	59	4	4		79		88	63	97	79	61	3	73	37	0	90	89	85	81
165	Indonesia	54	0	2	12	73	84	49	75	79	65	51	1	66	43	21	72	74	74	74
166	Canada	70	72	63	2	96	74	55	98	76	68	59	15	76	46	15	89	93	93	94
167	Saint Pierre and Miquelon	44	10	10		88	0		0	95	95	95	6	62	31	0	85	78	77	75
168	Sweden	61	42	41	2	95	14	68	75	100	88	76	3	83	62	42	75	92	90	89
169	Norway	65	11	16	29	97	52		88	92	78	64	9	73	73	72	86	94	90	87
170	Chile	60	31	32	33	94	28			100	90	81	3	73	69	65	78	90	84	79
171	East Timor	44	0	0		71		52	29	87	70	53	0	62	31	0	66	72	73	73
172	Bosnia and Herzegovina	44	8	8		82	44			73	60	47	0	70	35	0	50	71	74	77

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Table S28. References supporting stressor weights used in pressure calculations and listed in Table S25. Color codes match rank colors in Table S25. Blank cells represent stressors not relevant to the goal.

		Pollution				Habitat Destruction			Spp Pollution	
GOAL	SUB-GOAL or SUB-COMPONENT	Chemicals	Human Pathogens	Nutrients	Marine Debris	Subtidal soft bottom	Subtidal hard bottom	Intertidal	Alien invasives	Genetic Escapes
FOOD PROVISION	Fishing	1,2,3,4,5, 26		1,6,7,8		9,10,11,12	6,13,14	6, 15	16, 17, 18	19,20,21
	Mariculture	4, 5		34, 35, 36, 37						
ARTISANAL OPPORUNITY		2, 78, 3, 26		80, 78, 6			28, 128, 30, 127	83, 84, 85, 86	87, 18	
NATURAL PRODUCTS	Aq. trade	108, 109, 110		111			54, 49, 51, 32, 110, 112, 13, 30, 127		93, 94	
	Coral	49, 51, 50		49, 50, 51, 52, 53			49, 50, 51, 54, 13, 30, 127		49, 50, 51	
	Fish oil	1, 2, 26, 3, 4, 5		1, 6, 7, 8		9, 10, 11, 12			16, 17, 18	
	Seaweed	114, 115		114, 115				114, 22	93, 94, 114	
	Sponges			116		70, 118, 119, 11			93, 94	
	Shells			116		70, 118, 119, 11		22	93, 94	
CARBON STORAGE	Mangroves	43, 44, 45		46, 45, 47				46, 48, 45		
	Seagrasses	55, 56, 57, 58, 59, 60		61, 62, 57, 58, 55, 59, 60				55, 59, 62, 60	55, 59	
	Salt marshes	63, 64, 65, 66		64,65,66				67, 64, 65, 66	64, 94	
COASTAL PROTECTION	Mangroves	43, 44, 45		45, 46, 47				45, 46, 48		
	Corals	49, 50, 51		49, 50, 51, 52, 53			49, 50, 51, 54, 13, 30, 127		49, 50, 51	
	Seagrasses	55, 56, 57, 58, 59, 60		61, 62, 57, 58, 55, 59, 60				55, 59, 62, 60	55, 59	
	Salt marshes	63, 64, 65, 66		64,65,66				67, 64, 65, 66	64, 94	
	Sea ice									
SENSE OF PLACE	Special Places	70, 71, 49, 50, 51, 43, 44, 45		70,49, 50, 51, 52, 53, 45, 46, 47	103, 79, 33		49, 50, 51, 54, 13	45, 46, 48, 67, 64, 65, 66, 55, 59, 62, 60	93, 94	
	Iconic Species	104, 70		104, 70	104, 88, 121, 99, 103, 33		104, 6, 13, 49, 54, 11	104	104, 94, 93	

Table S28 (cont)

GOAL	SUB-GOAL or SUB-COMPONENT	Chemicals	Human Pathogens	Nutrients	Marine Debris	Subtidal soft bottom	Subtidal hard bottom	Intertidal	Alien invasives	Genetic Escapes
LIVELIHOODS	Fishing (commercial)	5, 120	0	7, 8	0	9, 10, 11, 12	6, 13	6, 15	16, 17, 18	19, 20, 21
	Mariculture	5, 120	0	7, 35, 122	0	0	0	0	0	0
	Tourism	5, 123	77, 125	8, 124	125, 126, 33	0	0	0	0	0
	Shipping & Transport	0	0	0	0	0	0	0	117, 95	0
	Cetacean watching	0	0	0	103, 96	0	0	0	0	0
	Aquarium trade	108, 109, 110	0	111	0	0	54, 49, 51, 32, 110, 112, 13	0	93, 94	0
	Ports & Harbors	0	0	0	0	0	0	0	117, 95	0
	Ship & Boat building	0	0	0	0	0	0	0	0	0
	Energy (wave & tidal)	0	0	0	0	0	0	0	0	0
TOURISM & RECREATION	Tourism & Rec	73, 74, 75, 76	73, 74, 75	73, 74, 75, 76, 8	73, 74, 75, 76					
CLEAN WATERS		70, 71	72, 71	38, 39, 40, 41, 71	42, 90					
BIODIVERSITY	Habitats - Mangroves	43, 44, 45		45, 46, 47				45, 46, 48		
	Habitats - Seagrasses	55, 56, 57, 58, 59, 60		61, 62, 57, 58, 55, 59, 60				55, 59, 62, 60	55, 59	
	Habitats - Salt marshes	63, 64, 65, 66		64,65,66				67, 64, 65, 66	64, 94	
	Habitats - Soft bottom	91		91		91, 54, 92			93, 94	
	Habitats - Corals	49, 50, 51		49, 50, 51, 52, 53			49, 50, 51, 54, 13		49, 50, 51	
	Habitats - Sea-ice									
	Species	99, 100, 101		40, 99, 102, 38, 41	99, 42, 103, 33	104, 54, 105, 11	49, 54, 11	104, 22	93, 94	94

Table S28 (cont)

		Fishing Pressure				Climate Change		
GOAL	SUB-GOAL or SUB-COMPONENT	Commercial High bycatch	Commercial Low bycatch	Artisanal Low bycatch	Artisanal High bycatch	SST	Ocean acidification	UV
FOOD PROVISION	Fishing	11,1, 23, 24, 6, 15	1, 23, 6, 25, 11	6, 26, 27	1, 28, 128, 30, 31, 32, 127			
	Mariculture							
ARTISANAL OPPORUNITY		81, 80, 26, 82, 89	26	6, 26, 27	28, 128, 30, 89, 30, 82, 26, 32, 127			
NATURAL PRODUCTS	Aq. trade			49, 54, 110, 109, 13	49, 54, 113, 13, 30, 127	97, 104		
	Coral					49, 50, 51, 52, 97, 98	49, 50, 51, 97	49, 50, 51, 98
	Fish oil		1, 11, 6, 25, 11			106, 104,		
	Seaweed					106, 104,		
	Sponges				49, 54, 113	106, 104,	106	
	Shells					106, 104,	106	
CARBON STORAGE	Mangroves							
	Seagrasses					55,59, 60, 66	5,59, 60, 66	
	Salt marshes							
COASTAL PROTECTION	Mangroves							
	Corals					49, 50, 51, 104, 98	49, 50, 51	49, 50, 51, 98
	Seagrasses					55, 59, 60	55,59, 60	
	Salt marshes							
	Sea ice					68, 69		
SENSE OF PLACE	Special Places							
	Iconic Species	104, 96,			49, 54, 13	104, 106, 96	106	

Table S28 (cont)

GOAL	SUB-GOAL or SUB-COMPONENT	Commercial High bycatch	Commercial Low bycatch	Artisanal Low bycatch	Artisanal High bycatch	SST	Ocean acidification	UV
LIVELIHOODS	Fishing (commercial)	11,1, 23, 24, 6, 15	1, 23, 6, 25, 11	6, 26, 27	1, 28, 29 ,30, 31, 32, 127	0	0	0
	Mariculture	0	0	0	0	0	0	0
	Tourism	0	0	0	0	0	0	0
	Shipping & Transport	0	0	0	0	0	0	0
	Cetacean watching	96	0	0	0	0	0	0
	Aquarium trade	0	0	49, 54, 110, 109, 13	49, 54, 110, 109, 13	97, 104	97, 104	0
	Ports & Harbors	0	0	0	0	0	0	0
	Ship & Boat building	0	0	0	0	0	0	0
	Energy (wave & tidal)	0	0	0	0	0	0	0
TOURISM & RECREATION	Tourism & Rec							
CLEAN WATERS								
BIODIVERSITY	Habitats - Mangroves							
	Habitats - Seagrasses					55, 59, 60, 66	5,59, 60, 66	
	Habitats - Salt marshes							
	Habitats - Soft bottom	91, 54, 11, 96	11, 96, 54	NONE found				
	Habitats - Corals				49, 50, 51, 54, 13	49, 50, 51, 52, 97, 98	49, 50, 51, 97,	49, 50, 51, 98
	Habitats - Sea-ice					68, 69, 106		
	Species	96, 11, 105, 54, 91, 25, 107	25, 54, 11	49	49, 54	106, 104,	99, 106	49, 50, 51

Table S29. Countries (or EEZ portions of) assigned a status score = 0.25 for the fisheries sub-goal of Food Provision due to inadequate stock assessment data (N=78; see section 6A for further details). *Sea Around Us* ID codes refer to internal reporting units for that Project.

Sea Around Us ID	Country	OHI ID	OHI Region (when name is different)
8	Albania	65	
895	Amsterdam Island and Saint Paul	67	French Southern Ocean Territories
660	Anguilla	85	British Caribbean Territories
28	Antigua and Barbuda	87	
48	Bahrain	38	
50	Bangladesh	154	
56	Belgium	42	
84	Belize	117	
204	Benin	72	
70	Bosnia and Herzegovina	172	
74	Bouvet Island	169	Norway
86	British Indian Ocean Territory	24	
92	British Virgin Islands	85	British Caribbean Territories
100	Bulgaria	54	
116	Cambodia	18	
120	Cameroon	148	
136	Cayman Islands	85	British Caribbean Territories
830	Channel Islands	131	United Kingdom
896	Crozet Islands	67	French Southern Ocean Territories
180	Democratic Republic of the Congo	150	
262	Djibouti	32	
212	Dominica	89	
111	Eritrea	31	
238	Falkland Islands	68	British Southern Ocean Territories
270	Gambia	48	
268	Georgia	57	
292	Gibraltar	43	
308	Grenada	91	
332	Haiti	82	
334	Heard and McDonald Islands	2	Australian Southern Ocean Territories
344	Hong Kong	159	China
252	Ile Tromelin	21	French Indian Ocean Territories
368	Iraq	143	Iraq
376	Israel	62	
388	Jamaica	118	
400	Jordan	164	
897	Kerguelen Islands	67	French Southern Ocean Territories
414	Kuwait	37	
428	Latvia	52	
422	Lebanon	61	
440	Lithuania	140	

446	Macau	159	China
37	Macquarie Island	2	Australian Southern Ocean Territories
450	Madagascar	28	
470	Malta	51	
584	Marshall Islands	9	
474	Martinique	106	French Caribbean Territories
175	Mayotte	21	French Indian Ocean Territories
492	Monaco	136	
891	Montenegro	137	Serbia and Montenegro
500	Montserrat	85	British Caribbean Territories
104	Myanmar	155	
520	Nauru	8	
843	Navassa Island	82	Haiti
570	Niue	115	New Zealand
612	Pitcairn	108	British Pacific Territories (Pitcairn)
711	Prince Edward Islands	75	South Africa
634	Qatar	141	
178	Republic of the Congo	73	
642	Romania	55	
648	Russia (Baltic Sea Kaliningrad)	56	Russia
651	Russia (Baltic Sea St. Petersburgh)	56	Russia
659	Saint Kitts and Nevis	86	
662	Saint Lucia	88	
666	Saint Pierre and Miquelon	167	
670	Saint Vincent and the Grenadines	93	
684	Saudi Arabia (Persian Gulf)	36	Saudi Arabia
702	Singapore	158	
705	Slovenia	139	
706	Somalia	30	
533	St. Maarten (Leeward)	94	Netherlands Caribbean Territories
532	St. Maarten (Windward)	94	Netherlands Caribbean Territories
760	Syria	60	
768	Togo	71	
772	Tokelau	115	New Zealand
856	Tristan da Cunha	68	British Southern Ocean Territories
798	Tuvalu	15	
850	U.S. Virgin Islands	84	USA Caribbean Territories

Table S30. Index scores globally and for each country using three different weighting systems for the ten goals. Mean, minimum and maximum scores from Monte Carlo simulations are also provided.

code	Country/EEZ	Index				Monte Carlo simulations		
		Preservationist	Extractive	Non-extractive	Strongly extractive	Min	Mean	Max
	Global (area-weighted average)	67	57	57	56	50	60	70
	Global (EEZ average)	62	52	53	52	44	55	66
1	Australian Tropical Territories	74	61	62	60	53	67	79
2	Australian Southern Ocean Territories	71	58	56	58	43	61	77
3	New Caledonia	63	63	55	65	48	61	73
4	Vanuatu	57	46	48	45	35	49	63
5	Solomon Islands	60	55	50	55	43	54	66
6	Palau	65	54	62	51	47	59	70
7	Micronesia	65	47	51	44	39	53	67
8	Nauru	69	56	56	55	43	59	72
9	Marshall Islands	67	56	53	55	47	59	70
10	Taiwan	63	55	52	55	46	57	69
11	Philippines	59	48	48	48	40	51	62
12	Australia	75	62	64	61	56	68	79
13	Papua New Guinea	61	46	48	44	36	50	65
14	Fiji	60	51	50	50	42	53	63
15	Tuvalu	69	54	54	52	39	57	72
16	South Korea	45	57	47	61	36	50	64
17	North Korea	59	44	48	43	34	48	61
18	Cambodia	56	41	47	38	34	46	59
19	Thailand	63	57	55	57	47	57	67
20	Comoros	55	43	43	41	33	47	60
21	French Indian Ocean Territories	60	49	50	48	39	53	66
22	Seychelles	78	71	69	70	64	73	81
23	Mauritius	69	55	56	54	48	60	72
24	British Indian Ocean Territory	71	56	59	53	46	61	73
25	Maldives	65	49	54	46	41	55	68
26	Sri Lanka	54	40	44	38	32	46	59
27	Mozambique	66	48	53	46	40	54	69
28	Madagascar	56	49	46	49	39	51	62
29	Kenya	60	48	49	47	42	52	63
30	Somalia	51	46	44	47	36	47	57
31	Eritrea	63	45	48	43	36	51	65
32	Djibouti	66	48	53	46	33	52	70
33	Yemen	51	38	41	37	30	43	56
34	Oman	72	60	60	59	49	63	76
35	Sudan	55	38	43	35	30	45	60
36	Saudi Arabia	63	54	54	54	43	57	71
37	Kuwait	59	46	47	45	31	50	69
38	Bahrain	56	48	51	47	40	51	62
39	Pakistan	48	45	43	46	34	45	56
40	United Arab Emirates	69	61	59	60	48	63	78
41	Cape Verde	67	59	55	60	43	58	72
42	Belgium	73	61	57	60	50	64	78
43	Gibraltar	60	52	49	52	37	53	67
44	Tunisia	66	60	54	61	43	59	72
45	Morocco	58	48	46	48	34	49	63
46	Western Sahara	62	47	49	46	34	51	64
47	Mauritania	68	59	59	58	48	61	72
48	Gambia	57	51	48	52	39	51	63
49	Senegal	44	38	41	38	26	40	55
50	Libya	55	42	43	41	33	46	61
51	Malta	70	56	64	52	50	63	75
52	Latvia	64	54	56	53	47	57	68

Table S30 (cont).

code	Country/EEZ	Index: Preservationist	Index: Extractive	Index: Non-extractive	Index: Strongly extractive	Monte Carlo simulations: Min	Monte Carlo simulations: Mean	Monte Carlo simulations: Max
53	Estonia	79	68	67	67	61	72	83
54	Bulgaria	57	42	47	40	32	47	62
55	Romania	62	41	52	38	31	50	68
56	Russia	78	59	65	56	52	67	81
57	Georgia	67	62	54	64	41	61	76
58	Ukraine	68	60	56	60	51	62	73
59	Turkey	60	50	48	51	37	52	66
60	Syria	55	42	45	42	28	45	63
61	Lebanon	58	49	47	49	34	50	66
62	Israel	71	62	57	62	49	63	77
63	Greece	66	54	55	54	44	58	71
64	Cyprus	60	46	57	42	36	53	70
65	Albania	66	48	53	47	32	53	72
66	Algeria	51	37	40	36	23	41	57
67	French Southern Ocean Territories	66	55	52	55	38	57	73
68	British Southern Ocean Territories	61	47	51	46	34	51	69
69	Sierra Leone	38	36	36	37	23	36	49
70	Liberia	42	36	39	36	24	37	50
71	Togo	65	47	50	45	34	52	69
72	Benin	59	44	44	41	33	49	67
73	Republic of the Congo	45	37	42	36	27	40	54
74	Namibia	71	57	60	56	42	61	77
75	South Africa	58	47	50	46	38	52	65
76	Sao Tome and Principe	59	50	50	51	34	50	65
77	Equatorial Guinea	60	43	47	39	35	51	66
78	Ghana	46	36	38	36	28	40	52
79	Clipperton Island	81	82	75	85	65	77	86
80	Bahamas	66	68	65	69	56	67	78
81	Cuba	60	46	49	44	36	52	68
82	Haiti	49	43	41	44	31	44	57
83	Dominican Republic	62	60	54	62	48	58	69
84	USA Caribbean Territories	67	59	55	59	47	61	75
85	British Caribbean Territories	67	57	66	54	50	63	76
86	Saint Kitts and Nevis	70	60	59	58	49	63	76
87	Antigua and Barbuda	72	68	69	67	57	71	83
88	Saint Lucia	54	47	52	46	37	50	62
89	Dominica	46	42	45	42	29	43	58
90	Barbados	56	52	55	52	38	53	67
91	Grenada	53	46	48	46	34	48	61
92	Trinidad and Tobago	68	62	56	61	51	63	75
93	Saint Vincent and the Grenadines	58	42	48	40	32	48	63
94	Netherlands Caribbean Territories	72	56	62	53	49	62	75
95	Panama	54	47	48	47	34	48	63
96	Costa Rica	65	61	57	61	49	61	73
97	Nicaragua	44	43	44	44	29	43	57
98	Colombia	57	51	48	51	43	52	61
99	Honduras	54	43	46	42	34	46	58
100	El Salvador	49	44	43	44	34	45	56
101	Mexico	59	52	53	52	45	55	66
102	Guatemala	71	55	60	53	46	60	74
103	Ecuador	65	59	59	59	49	60	70
104	Peru	48	43	41	43	34	44	55
105	Venezuela	53	39	45	37	33	46	59
106	French Caribbean Territories	62	49	52	47	38	54	70
107	Iceland	56	52	48	52	41	52	65
108	British Pacific Territories (Pitcairn)	73	60	59	58	44	63	78

Table S30 (cont).

code	Country/EEZ	Index: Preservationist	Index: Extractive	Index: Non-extractive	Index: Strongly extractive	Monte Carlo simulations: Min	Monte Carlo simulations: Mean	Monte Carlo simulations: Max
109	French Polynesia	79	72	66	72	62	72	83
110	Jarvis Island	87	89	86	90	83	86	90
111	USA Pacific Inhabited Territories	69	61	59	60	51	64	75
112	Samoa	59	41	47	38	34	49	64
113	Tonga	57	44	48	42	33	49	65
114	USA Pacific Uninhabited Territories	79	78	80	78	78	80	81
115	New Zealand	71	60	60	59	53	64	74
116	United States	70	61	61	61	52	63	75
117	Belize	54	49	51	49	35	51	66
118	Jamaica	54	43	48	42	35	48	61
119	Guyana	62	54	51	54	45	56	67
120	Suriname	78	63	64	61	57	69	81
121	French Guiana	74	52	59	48	45	61	77
122	Brazil	72	56	60	53	51	63	75
123	Argentina	60	49	49	49	37	52	65
124	Uruguay	56	43	47	42	29	47	63
125	Finland	72	65	60	65	52	65	77
126	Denmark	79	61	70	58	57	69	81
127	Germany	80	70	67	70	62	73	84
128	Netherlands	77	67	65	66	59	70	80
129	Poland	46	39	39	39	27	42	56
130	France	66	69	61	71	59	66	74
131	United Kingdom	63	61	59	63	52	62	71
132	Ireland	59	56	52	56	45	56	66
133	Spain	60	60	56	61	51	59	66
134	Portugal	65	59	58	59	47	59	71
135	Italy	63	57	56	57	50	60	69
136	Monaco	57	62	56	63	41	59	74
137	Serbia and Montenegro	59	43	49	41	31	48	65
138	Croatia	66	55	56	54	45	58	70
139	Slovenia	72	68	60	70	48	66	81
140	Lithuania	64	56	54	56	46	57	68
141	Qatar	59	42	46	40	33	49	66
142	Iran	52	42	45	41	30	45	60
143	Iraq	58	46	45	45	35	49	63
144	Guinea-Bissau	42	36	41	35	25	40	53
145	Guinea	48	48	46	50	35	47	60
146	Ivory Coast	41	38	39	38	26	38	50
147	Nigeria	48	36	38	34	28	41	54
148	Cameroon	63	53	51	52	45	56	66
149	Gabon	52	42	47	40	36	47	58
150	Democratic Republic of the Congo	40	38	38	39	25	38	51
151	Angola	47	38	40	37	29	42	54
152	Tanzania	65	58	58	59	49	60	70
153	India	58	50	48	50	42	52	62
154	Bangladesh	71	57	56	55	47	61	74
155	Myanmar	60	53	48	53	42	54	66
156	Malaysia	64	53	52	52	41	55	69
157	Vietnam	58	48	50	47	36	49	62
158	Singapore	52	48	47	49	35	48	61
159	China	53	55	48	57	44	52	61
160	Japan	77	64	66	63	58	69	79
161	Kiribati	74	60	62	59	52	64	76
162	Antarctica							
163	Egypt	70	56	60	54	48	61	73
164	Jordan	68	54	53	53	44	59	72
165	Indonesia	59	53	49	53	43	54	65

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Table S30 (cont).

code	Country/EEZ	Index: Preservationist	Index: Extractive	Index: Non-extractive	Index: Strongly extractive	Monte Carlo simulations: Min	Monte Carlo simulations: Mean	Monte Carlo simulations: Max
166	Canada	74	71	66	71	60	70	80
167	Saint Pierre and Miquelon	50	41	43	41	25	44	64
168	Sweden	69	58	60	58	49	61	73
169	Norway	75	62	63	61	52	65	77
170	Chile	69	57	58	57	43	60	73
171	East Timor	49	41	40	41	30	44	56
172	Bosnia and Herzegovina	50	44	41	44	31	44	56

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Table S31. Index scores per region and globally, recalculated for the remaining nine goals with specified goal removed.

code	Country / EEZ	Index	FP	AO	NP	CS	CP	LE	TR	SP	CW	BD
	Per-region jackknife resampling											
	mean ± SE		4.64 ± 1.93	-3.52 ± 1.41	2.01 ± 3.22	-1.15 ± 2.08	-0.41 ± 2.58	-2.33 ± 2.16	5.01 ± 2.5	0.91 ± 2.17	-1.95 ± 1.35	-3.21 ± 1.22
	percent change ± SE		0.08 ± 0.03	-0.07 ± 0.04	0.04 ± 0.06	-0.02 ± 0.04	-0.01 ± 0.05	-0.05 ± 0.05	0.08 ± 0.04	0.01 ± 0.04	-0.04 ± 0.03	-0.07 ± 0.03
	Global (area-weighted average)	60	64	57	62	58	59	58	66	61	58	58
	Global (EEZ average)	55	59	51	57	53	54	53	59	55	53	52
1	Australian Tropical Territories	67	73	63	67	64	69	65	74	65	63	65
2	Australian Southern Ocean Territories	61	69	55	61	61	61	58	70	64	55	56
3	New Caledonia	61	66	58	57	62	60	57	65	63	59	59
4	Vanuatu	49	54	46	54	48	49	44	53	51	47	46
5	Solomon Islands	54	59	52	53	55	52	49	60	56	52	52
6	Palau	59	64	56	65	58	58	57	56	62	56	56
7	Micronesia	53	58	52	58	49	50	52	59	56	50	50
8	Nauru	59	66	57	59	59	54	57	66	62	56	55
9	Marshall Islands	59	64	57	57	56	55	58	65	61	57	55
10	Taiwan	57	59	53	60	53	58	57	63	59	57	54
11	Philippines	51	56	48	52	50	49	49	57	52	49	49
12	Australia	67	70	64	70	64	68	66	74	65	64	65
13	Papua New Guinea	50	56	48	55	48	49	45	56	52	48	47
14	Fiji	53	56	50	54	52	49	52	57	55	50	50
15	Tuvalu	57	65	55	57	57	51	55	65	60	54	53
16	South Korea	50	49	45	47	55	55	46	55	49	48	49
17	North Korea	48	52	46	52	48	43	47	54	50	47	44
18	Cambodia	46	51	43	52	46	42	46	51	46	44	43
19	Thailand	58	60	55	59	58	60	57	64	59	56	56
20	Comoros	47	52	45	47	42	49	44	53	49	45	43
21	French Indian Ocean Territories	52	54	50	58	48	53	48	58	54	52	49
22	Seychelles	73	79	71	72	70	71	71	75	75	73	71
23	Mauritius	60	66	57	61	56	57	58	63	62	58	57
24	British Indian Ocean Territory	61	69	58	61	61	55	60	69	59	60	57
25	Maldives	55	61	52	61	51	52	52	57	57	52	52
26	Sri Lanka	46	49	43	50	43	47	44	51	47	43	41
27	Mozambique	54	59	54	60	50	53	49	60	55	53	51
28	Madagascar	51	56	50	48	49	51	48	56	52	48	48
29	Kenya	52	56	50	54	49	52	50	58	52	51	49
30	Somalia	47	52	46	45	47	48	43	50	48	44	44
31	Eritrea	51	55	49	56	47	47	48	56	53	49	47
32	Djibouti	52	59	50	59	52	47	47	59	54	50	48
33	Yemen	43	48	39	46	40	44	41	48	44	41	39
34	Oman	63	67	59	65	63	58	62	70	64	60	60
35	Sudan	45	49	42	50	41	46	43	50	46	41	40
36	Saudi Arabia	57	59	53	60	54	59	52	63	58	54	53
37	Kuwait	50	55	45	55	46	53	46	56	53	47	46
38	Bahrain	51	56	46	55	51	51	50	51	54	49	48
39	Pakistan	45	49	42	44	47	47	42	50	45	43	43
40	United Arab Emirates	63	68	59	64	60	66	59	67	66	60	60
41	Cape Verde	58	64	56	58	58	58	51	66	62	56	54
42	Belgium	64	70	60	63	60	60	64	70	67	63	61
43	Gibraltar	53	62	46	53	53	53	51	58	57	51	48
44	Tunisia	59	65	55	57	59	59	56	67	63	57	55
45	Morocco	49	56	45	50	49	49	45	56	51	47	45
46	Western Sahara	51	59	49	51	51	51	47	60	51	47	46
47	Mauritania	61	66	60	58	61	61	61	70	58	60	58
48	Gambia	51	57	48	51	50	50	45	57	52	51	48
49	Senegal	40	44	37	44	41	44	35	45	37	39	38
50	Libya	46	52	41	47	46	46	47	53	48	42	40
51	Malta	63	68	59	70	60	60	64	60	64	61	60
52	Latvia	57	63	54	58	58	56	57	63	56	56	55
53	Estonia	72	77	70	70	69	70	74	80	71	72	70
54	Bulgaria	47	53	42	52	47	47	48	53	47	44	42
55	Romania	50	57	45	57	50	50	51	57	45	47	45
56	Russia	67	68	64	74	63	64	67	74	66	63	63
57	Georgia	61	68	57	55	61	61	56	69	64	59	57
58	Ukraine	62	67	60	59	60	60	62	69	63	62	60
59	Turkey	52	56	46	54	52	52	48	58	54	49	47
60	Syria	45	51	40	51	45	45	40	51	47	44	39

Table S31 (cont.)

code	Country / EEZ	Index	FP	AO	NP	CS	CP	LE	TR	SP	CW	BD
61	Lebanon	50	56	44	52	50	50	44	56	52	48	44
62	Israel	63	69	59	63	60	60	60	69	67	63	60
63	Greece	57	63	52	60	57	57	55	63	59	54	53
64	Cyprus	53	59	47	60	53	53	56	49	55	50	47
65	Albania	53	59	48	60	53	53	46	60	53	48	47
66	Algeria	41	47	35	47	41	41	38	47	42	38	35
67	French Southern Ocean Territories	57	66	50	57	57	57	54	63	62	52	51
68	British Southern Ocean Territories	51	57	45	58	51	51	48	55	54	46	46
69	Sierra Leone	36	37	32	40	37	39	30	40	36	34	33
70	Liberia	37	40	35	41	39	39	30	41	37	35	34
71	Togo	52	57	51	58	47	47	47	58	54	53	48
72	Benin	49	54	47	49	43	43	52	55	51	53	45
73	Republic of the Congo	40	44	37	45	42	42	37	45	37	38	38
74	Namibia	61	66	56	67	61	61	55	68	61	56	57
75	South Africa	52	56	47	56	49	55	49	57	50	50	48
76	Sao Tome and Principe	50	50	48	56	50	50	44	57	53	49	45
77	Equatorial Guinea	51	57	46	51	47	47	57	57	50	50	47
78	Ghana	40	43	37	43	37	42	37	44	40	39	36
79	Clipperton Island	77	77	77	77	77	70	77	77	90	76	74
80	Bahamas	67	73	64	65	67	70	64	65	71	65	65
81	Cuba	52	56	47	57	46	55	49	57	52	50	49
82	Haiti	44	48	41	45	42	46	38	49	45	43	41
83	Dominican Republic	58	62	55	57	59	56	55	63	61	58	56
84	USA Caribbean Territories	61	66	57	61	56	64	59	68	63	61	58
85	British Caribbean Territories	63	69	59	70	61	65	60	59	64	60	61
86	Saint Kitts and Nevis	63	71	59	63	59	64	62	66	67	62	60
87	Antigua and Barbuda	71	79	68	71	67	75	67	68	73	70	69
88	Saint Lucia	50	54	45	55	52	47	48	50	51	47	47
89	Dominica	43	48	38	48	45	47	39	44	44	40	40
90	Barbados	53	58	48	58	55	53	47	52	54	50	49
91	Grenada	48	52	43	53	49	49	42	50	49	44	45
92	Trinidad and Tobago	63	69	60	59	61	61	63	68	65	62	60
93	Saint Vincent and the Grenadines	48	53	43	54	48	44	47	52	49	45	43
94	Netherlands Caribbean Territories	62	69	59	68	60	58	60	63	64	60	59
95	Panama	48	53	44	53	50	48	43	53	48	45	46
96	Costa Rica	61	67	58	57	63	58	62	66	62	60	59
97	Nicaragua	43	47	40	43	47	47	40	48	40	41	41
98	Colombia	52	56	48	52	52	50	50	58	52	50	50
99	Honduras	46	50	43	52	46	46	43	51	46	45	43
100	El Salvador	45	49	40	47	45	45	42	50	45	43	42
101	Mexico	55	59	52	54	55	57	55	61	53	54	53
102	Guatemala	60	65	58	66	57	57	56	67	58	61	58
103	Ecuador	60	64	57	61	61	60	57	67	58	59	58
104	Peru	44	49	40	43	45	45	44	49	45	42	42
105	Venezuela	46	51	41	51	43	46	44	51	43	44	42
106	French Caribbean Territories	54	59	49	60	49	55	50	58	55	53	50
107	Iceland	52	56	47	53	52	53	50	57	55	49	50
108	British Pacific Territories (Pitcairn)	63	71	59	63	63	57	61	69	67	59	59
109	French Polynesia	72	78	70	70	71	70	71	78	76	70	70
110	Jarvis Island	86	86	86	86	86	82	86	86	87	89	86
111	USA Pacific Inhabited Territories	64	70	60	64	60	65	62	67	66	62	61
112	Samoa	49	54	44	54	45	49	50	53	50	45	45
113	Tonga	49	54	45	54	47	50	45	53	50	45	45
114	USA Pacific Uninhabited Territories	80	80	80	80	80	81	80	80	79	80	78
115	New Zealand	64	69	60	65	62	61	63	69	64	62	61
116	United States	63	67	59	66	63	61	59	70	61	62	62
117	Belize	51	56	46	54	52	56	45	54	49	47	49
118	Jamaica	48	53	44	53	46	51	44	51	46	46	45
119	Guyana	56	61	54	53	55	55	57	62	58	54	54
120	Suriname	69	76	67	66	66	66	71	76	67	68	67
121	French Guiana	61	66	57	68	56	56	61	67	59	58	58
122	Brazil	62	65	60	66	59	60	64	69	60	61	60
123	Argentina	52	57	46	54	52	52	49	59	53	49	47
124	Uruguay	47	52	40	54	47	47	43	53	47	45	42
125	Finland	65	70	61	63	65	63	64	72	68	63	61
126	Denmark	69	73	66	77	66	66	69	73	68	68	67
127	Germany	73	78	70	72	70	70	71	80	72	73	71
128	Netherlands	70	74	67	70	66	67	70	77	69	70	68

Table S31 (cont.)

code	Country / EEZ	Index	FP	AO	NP	CS	CP	LE	TR	SP	CW	BD
129	Poland	42	45	36	45	39	46	39	46	42	40	38
130	France	66	65	63	65	64	68	64	70	68	67	65
131	United Kingdom	61	62	58	62	62	64	60	68	60	60	59
132	Ireland	56	62	51	54	56	56	54	59	58	54	53
133	Spain	58	59	54	60	59	59	58	61	61	57	57
134	Portugal	59	60	54	65	59	59	56	64	61	58	56
135	Italy	60	63	56	59	57	62	59	65	59	58	57
136	Monaco	59	68	53	59	59	59	55	52	65	57	61
137	Serbia and Montenegro	48	55	43	55	48	48	46	52	50	44	43
138	Croatia	58	63	54	59	58	58	56	63	60	54	53
139	Slovenia	66	73	62	62	66	66	62	75	69	65	63
140	Lithuania	57	63	53	57	57	55	56	64	57	57	53
141	Qatar	49	55	44	55	45	51	49	55	51	46	45
142	Iran	45	50	41	50	44	48	41	50	44	42	42
143	Iraq	49	55	46	49	46	46	49	55	52	50	45
144	Guinea-Bissau	40	45	36	40	42	44	38	45	34	37	37
145	Guinea	47	51	46	44	49	52	44	53	45	47	45
146	Ivory Coast	38	41	35	41	40	40	33	42	37	36	35
147	Nigeria	41	44	38	45	35	43	39	46	41	41	38
148	Cameroon	56	61	55	53	53	53	56	62	57	54	53
149	Gabon	47	49	42	52	47	47	47	52	44	44	45
150	Democratic Republic of the Congo	38	42	36	38	40	40	32	43	35	38	35
151	Angola	42	44	37	46	40	44	39	46	42	38	39
152	Tanzania	60	65	57	60	60	59	55	66	57	60	58
153	India	52	56	50	50	50	51	52	58	54	52	49
154	Bangladesh	61	65	59	63	56	56	58	67	63	60	57
155	Myanmar	54	59	53	49	52	54	53	60	56	52	51
156	Malaysia	55	61	51	58	54	51	51	60	57	53	52
157	Vietnam	50	52	47	55	51	47	47	55	50	48	47
158	Singapore	48	51	43	53	48	51	44	52	50	46	46
159	China	53	52	49	51	53	54	54	59	55	52	50
160	Japan	69	70	66	73	66	66	68	76	68	68	66
161	Kiribati	64	65	62	70	61	61	60	71	64	62	62
163	Egypt	61	63	58	67	58	60	58	67	60	59	58
164	Jordan	59	66	56	59	55	58	56	66	61	55	55
165	Indonesia	54	59	52	50	54	51	52	60	55	52	51
166	Canada	70	70	67	69	71	67	70	76	72	68	67
167	Saint Pierre and Miquelon	44	48	38	49	44	49	37	48	45	38	39
168	Sweden	61	63	57	66	60	60	58	68	61	60	58
169	Norway	65	72	62	67	65	63	64	72	65	63	62
170	Chile	60	64	55	64	60	60	55	68	58	57	56
171	East Timor	44	49	40	44	43	45	40	49	45	41	40
172	Bosnia and Herzegovina	44	49	39	44	44	44	42	50	45	43	40

Table S32. Per-country weights used to combine Fisheries (FIS) and Mariculture (MAR) sub-goals when calculating Food Provision goal scores.

ID	Region	FIS	MAR
1	Australian Tropical Territories	1.000	0.000
2	Australian Southern Ocean Territories	1.000	0.000
3	New Caledonia	0.967	0.033
4	Vanuatu	0.999	0.001
5	Solomon Islands	1.000	0.000
6	Palau	0.997	0.003
7	Micronesia	1.000	0.000
8	Nauru	1.000	0.000
9	Marshall Islands	1.000	0.000
10	Taiwan	0.672	0.328
11	Philippines	0.803	0.197
12	Australia	0.752	0.248
13	Papua New Guinea	1.000	0.000
14	Fiji	0.999	0.001
15	Tuvalu	0.500	0.500
16	South Korea	0.526	0.474
17	North Korea	0.668	0.332
18	Cambodia	0.500	0.500
19	Thailand	0.338	0.662
20	Comoros	1.000	0.000
21	French Indian Ocean Territories	0.938	0.062
22	Seychelles	0.989	0.011
23	Mauritius	0.994	0.006
24	British Indian Ocean Territory	1.000	0.000
25	Maldives	1.000	0.000
26	Sri Lanka	0.897	0.103
27	Mozambique	0.982	0.018
28	Madagascar	0.500	0.500
29	Kenya	1.000	0.000
30	Somalia	1.000	0.000
31	Eritrea	1.000	0.000
32	Djibouti	1.000	0.000
33	Yemen	1.000	0.000
34	Oman	0.999	0.001
35	Sudan	1.000	0.000
36	Saudi Arabia	0.702	0.298
37	Kuwait	0.500	0.500
38	Bahrain	0.500	0.500
39	Pakistan	1.000	0.000
40	United Arab Emirates	0.993	0.007
41	Cape Verde	1.000	0.000
42	Belgium	1.000	0.000
43	Gibraltar	1.000	0.000
44	Tunisia	0.983	0.017
45	Morocco	1.000	0.000
46	Western Sahara	1.000	0.000

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47	Mauritania	1.000	0.000
48	Gambia	0.500	0.500
49	Senegal	1.000	0.000
50	Libya	0.983	0.017
51	Malta	0.500	0.500
52	Latvia	1.000	0.000
53	Estonia	0.999	0.001
54	Bulgaria	0.500	0.500
55	Romania	1.000	0.000
56	Russia	1.000	0.000
57	Georgia	1.000	0.000
58	Ukraine	0.990	0.010
59	Turkey	0.864	0.136
60	Syria	1.000	0.000
61	Lebanon	1.000	0.000
62	Israel	0.500	0.500
63	Greece	0.579	0.421
64	Cyprus	0.516	0.484
65	Albania	0.500	0.500
66	Algeria	1.000	0.000
67	French Southern Ocean Territories	1.000	0.000
68	British Southern Ocean Territories	1.000	0.000
69	Sierra Leone	1.000	0.000
70	Liberia	1.000	0.000
71	Togo	1.000	0.000
72	Benin	1.000	0.000
73	Republic of the Congo	1.000	0.000
74	Namibia	0.999	0.001
75	South Africa	0.998	0.002
76	Sao Tome and Principe	1.000	0.000
77	Equatorial Guinea	1.000	0.000
78	Ghana	1.000	0.000
79	Clipperton Island		
80	Bahamas	0.999	0.001
81	Cuba	0.787	0.213
82	Haiti	1.000	0.000
83	Dominican Republic	0.905	0.095
84	USA Caribbean Territories	0.989	0.011
85	British Caribbean Territories	1.000	0.000
86	Saint Kitts and Nevis	0.500	0.500
87	Antigua and Barbuda	1.000	0.000
88	Saint Lucia	1.000	0.000
89	Dominica	1.000	0.000
90	Barbados	1.000	0.000
91	Grenada	1.000	0.000
92	Trinidad and Tobago	1.000	0.000
93	Saint Vincent and the Grenadines	1.000	0.000
94	Netherlands Caribbean Territories	0.500	0.500
95	Panama	0.941	0.059
96	Costa Rica	1.000	0.000

97	Nicaragua	0.515	0.485
98	Colombia	0.719	0.281
99	Honduras	0.101	0.899
100	El Salvador	0.984	0.016
101	Mexico	0.871	0.129
102	Guatemala	0.147	0.853
103	Ecuador	0.480	0.520
104	Peru	0.997	0.003
105	Venezuela	0.952	0.048
106	French Caribbean Territories	0.975	0.025
107	Iceland	0.997	0.003
108	British Pacific Territories (Pitcairn)	1.000	0.000
109	French Polynesia	0.899	0.101
110	Jarvis Island		
111	USA Pacific Inhabited Territories	0.997	0.003
112	Samoa	1.000	0.000
113	Tonga	0.996	0.004
114	USA Pacific Uninhabited Territories		
115	New Zealand	0.810	0.190
116	United States	0.962	0.038
117	Belize	0.500	0.500
118	Jamaica	0.500	0.500
119	Guyana	0.994	0.006
120	Suriname	0.994	0.006
121	French Guiana	1.000	0.000
122	Brazil	0.834	0.166
123	Argentina	1.000	0.000
124	Uruguay	1.000	0.000
125	Finland	0.876	0.124
126	Denmark	0.972	0.028
127	Germany	0.921	0.079
128	Netherlands	0.761	0.239
129	Poland	1.000	0.000
130	France	0.618	0.382
131	United Kingdom	0.904	0.096
132	Ireland	0.930	0.070
133	Spain	0.639	0.361
134	Portugal	0.952	0.048
135	Italy	0.502	0.498
136	Monaco	1.000	0.000
137	Serbia and Montenegro	0.500	0.500
138	Croatia	0.919	0.081
139	Slovenia	0.500	0.500
140	Lithuania	1.000	0.000
141	Qatar	0.500	0.500
142	Iran	0.976	0.024
143	Iraq	1.000	0.000
144	Guinea-Bissau	1.000	0.000
145	Guinea	1.000	0.000
146	Ivory Coast	0.994	0.006

147	Nigeria	0.999	0.001
148	Cameroon	1.000	0.000
149	Gabon	1.000	0.000
150	Democratic Republic of the Congo	1.000	0.000
151	Angola	1.000	0.000
152	Tanzania	0.996	0.004
153	India	0.921	0.079
154	Bangladesh	0.500	0.500
155	Myanmar	0.500	0.500
156	Malaysia	0.917	0.083
157	Vietnam	0.405	0.595
158	Singapore	0.500	0.500
159	China	0.368	0.632
160	Japan	0.768	0.232
161	Kiribati	1.000	0.000
163	Egypt	0.135	0.865
164	Jordan	1.000	0.000
165	Indonesia	0.830	0.170
166	Canada	0.881	0.119
167	Saint Pierre and Miquelon	1.000	0.000
168	Sweden	0.989	0.011
169	Norway	0.722	0.278
170	Chile	0.802	0.198
171	East Timor	1.000	0.000
172	Bosnia and Herzegovina	1.000	0.000

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Table S33. Summary of model equations and parameters used for each goal and sub-goal.

Goal	Sub-Goal	Status Model Equations	Variables
Food Provision (x_{FP})		$x_{FP} = w \cdot x_{FIS} + (1-w)x_{MAR}$ $w = \frac{B_T}{B_T + \sum_k Y_k}$	k = mariculture species Y_k= Most recent mariculture harvest above 0 B_T = Wild-caught fishing yield w = weighting factor
	Fisheries (x_{FIS})	$x_{FIS} = \left(1 - \frac{\delta B_T}{mMSY_R}\right) \cdot T_C$ $mMSY_R = 0.75 \cdot mMSY$	δB_T = absolute difference between landed biomass and *mMSY* *mMSY* = multi-species maximum sustainable yield T_C = taxonomic reporting quality correction factor B_T = Wild-caught fishing yield
	Mariculture (x_{MAR})	$x_{MAR} = \log_{10}(Y_C + 1)$ $Y_C = \frac{\sum_k (Y_k \cdot S_{M,k})}{A_C}$	Y_C = current sustainably harvested total yield k = each mariculture species $S_{M,k}$ = Sustainability score for each species k A_C = area of coastal waters (3nm strip) Y_k = yield of each species k
Artisanal Fishing Opportunities (x_{AO})		$x_{AO} = (1 - D_U) * S_{AO}$ $D_U = (1 - PPPpcGDP) * (1 - O_{AO})$	D_U = Unmet demand S_{AO} = Sustainability of fishing methods used O_{AO} = access to artisanal-scale fishing *PPPpcGDP* = purchasing power parity adjusted per capita GDP
Natural Products (x_{NP})		$x_{NP} = \frac{\sum_{p=1}^{N} (w_p \cdot x_{NP,p})}{N}$ $x_{NP,p} = H_p * S_p$ $S_p = 1 - \frac{E+R}{N_v}$, $S_{NP,t} = \frac{\sum_{k=1}^{5} N_k * w_k}{\sum_{k=1}^{5} N_k}$	*N* = number of products that have ever been harvested w_p = proportional peak dollar value of each product relative to the total peak dollar value of all products x_p = individual product score $x_{NP,p}$ = Status of each natural product H_p = harvest of a product relative to its (buffered) peak reference point S_p = sustainability of product harvest *E* = exposure term *R* = risk term N_v = 1 or 2 depending on whether or not a viability term is used $S_{NP,t}$ = Sustainability of fish oil harvest N_k = number of species in each *k* category of exploitation *w* = weight assigned to each *k* category of exploitation status

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Carbon Storage (x_{CS})

$$x_{CS} = \sum_1^k \left(\frac{C_c}{C_r} * \frac{A_k}{A_T} \right)$$

C_c = current 'condition' of habitat k
C_r = reference 'condition' of habitat k
A_k = amount of area each k habitat type covers
A_T = total area covered by all habitats assessed

Coastal Protection (x_{CP})

$$x_{CP} = \sum_1^k \left(\frac{C_c}{C_r} \cdot \frac{w_k}{w_{\max}} \cdot \frac{A_k}{A_T} \right)$$

C_c = current 'condition' of habitat k
C_r = reference 'condition' of habitat k
w = rank weight of habitat protective ability
A_k = amount of area each k protective habitat covers
A_T = total area covered by all protective habitats

Coastal Livelihoods and Economies (x_{LE})

$x_{LE} = (x_{LIV} + x_{ECO})/2$

Livelihoods (x_{LIV})

$$x_{LIV} = \frac{\left(\frac{\sum_k j_{c,k}}{\sum_k j_{r,k}} + \frac{\sum_k g_{m,k}}{\sum_k g_{r,k}} \right)}{2}$$

j = total adjusted number of direct and indirect jobs within sector k
g = average PPP-adjusted per-capita annual wages within sector k
c = current time point
r = reference time point (for j) or location (for g)
m = each country

Economies (x_{ECO})

$$x_{ECO} = \sum_1^k \frac{e_{c,k}}{e_{r,k}}$$

e = total adjusted revenue generated directly and indirectly from each sector k
c = current time point
r = reference time point

Tourism and Recreation (x_{TR})

$$x_{TR} = \log\left[\left(\frac{D_t}{V_T} * S_t \right) + 1 \right]$$

D = number of tourist-days
t = most recent year
V_T = total country population size
S = sustainability factor

Sense of Place (x_{SP})

$x_{SP} = (x_{ICO} + x_{LSP})/2$

Iconic Species (x_{ICO})

$$x_{ICO} = \frac{\sum_{i=1}^{6} (S_i \cdot w_i)}{\sum_{i=1}^{6} S_i}$$

i = each IUCN threat category
S_i = number of assessed species in category i
w_i = status weight assigned per threat category

Lasting Special Places (x_{LSP})

$$x_{LSP} = \frac{\left(\frac{\%_{CMPA}}{\%_{Ref\_CMPA}} + \frac{\%_{CP}}{\%_{Ref\_CP}} \right)}{2}$$

CMPA = coastal marine protected area
CP = coastline protected

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Clean Waters (x_{CW})		$x_{CW} = \sqrt[4]{a * u * l * d}$	a = the number of coastal people without access to sanitation rescaled to the global maximum u = 1 – (nutrient input) l = 1 – (chemical input) d = 1 – (marine debris input)
Biodiversity (x_{BD})		$X_{BD} = (x_{SPP} + x_{HAB})/2$	
	Species (x_{SPP})	$x_{SPP} = \dfrac{\sum_{c=1}^{M}\left(\left(\sum_{i=1}^{N_c} w_i \big/ N\right) \cdot A_c\right)}{A_T}$	N_c = number species in grid cell c M = number of grid cells in the assessment region A_c = total area of grid cell c A_T = total area of the assessment region w_i = status weight assigned per threat category for each i species
	Habitats (x_{HAB})	$x_{HAB} = \dfrac{\sum_{k=1}^{N}\left(\dfrac{C_{k,c}}{C_{k,r}}\right) C_k}{N}$	$C_{k,c}$ = current condition of habitat k $C_{k,r}$ = reference condition of habitat k A_k = area of habitat k A_T = total area of assessed habitats

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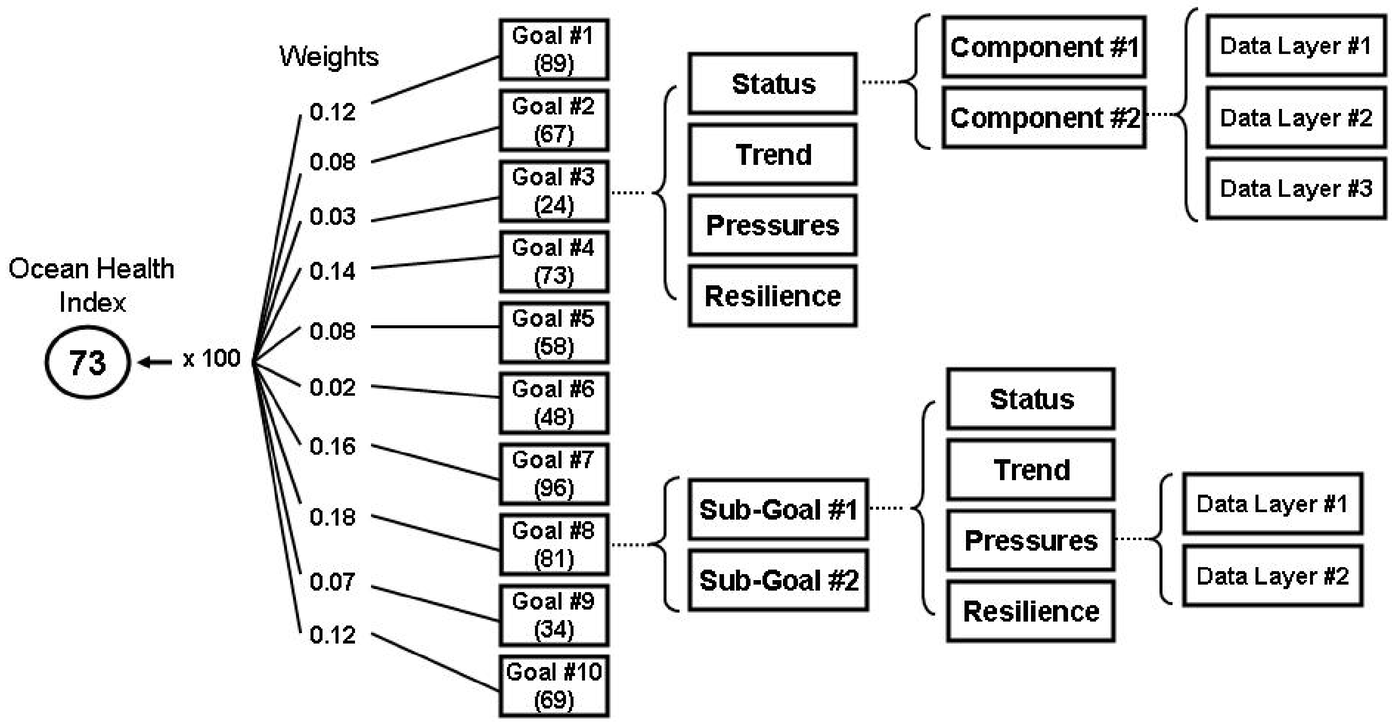

Figure S1. Flow diagram of how the Index is constructed. Goal scores are calculated by 1) combining values for the 4 dimensions, which may have more than one component, which in turn are comprised of one to several data layers (top example), or 2) averaging sub-goal scores which are each calculated by combining the 4 dimensions, which are made up of one to several data layers (bottom example). Goal scores are combined as a weighted average and multiplied by 100 to create the Index score between 0-100

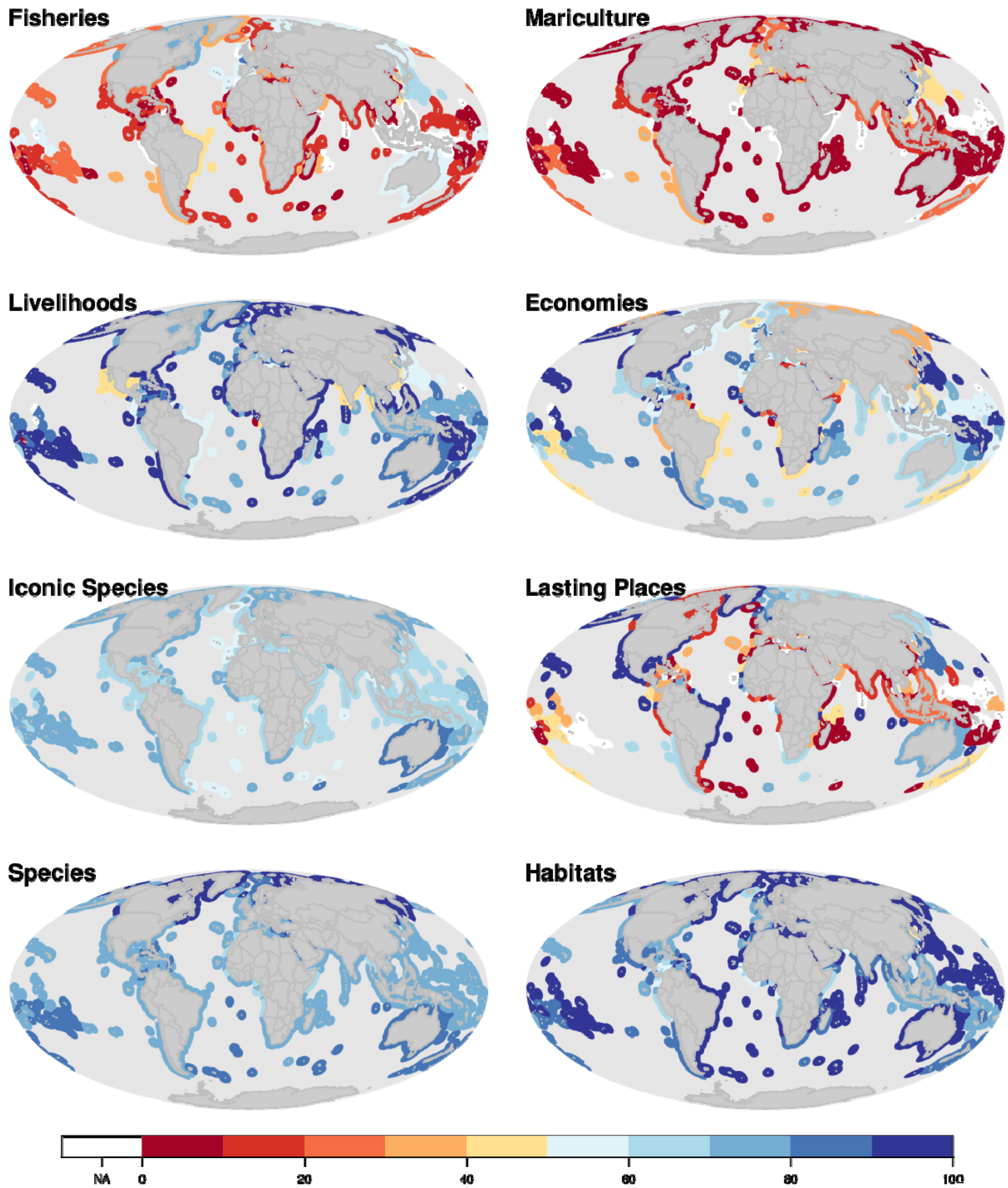

Figure S2. Maps of sub-goal scores for the four goals with sub-goals.

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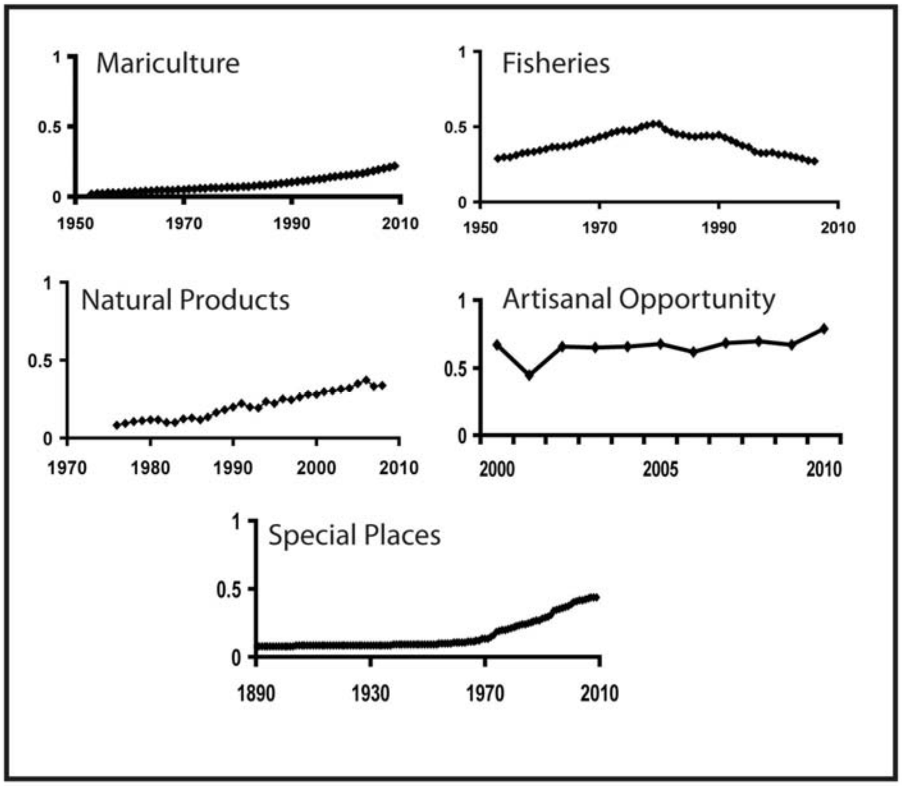

Figure S3. The global status of select goals and sub-goals in the past. Only goals for which the complete status measure could be calculated over time periods >10yrs are included.

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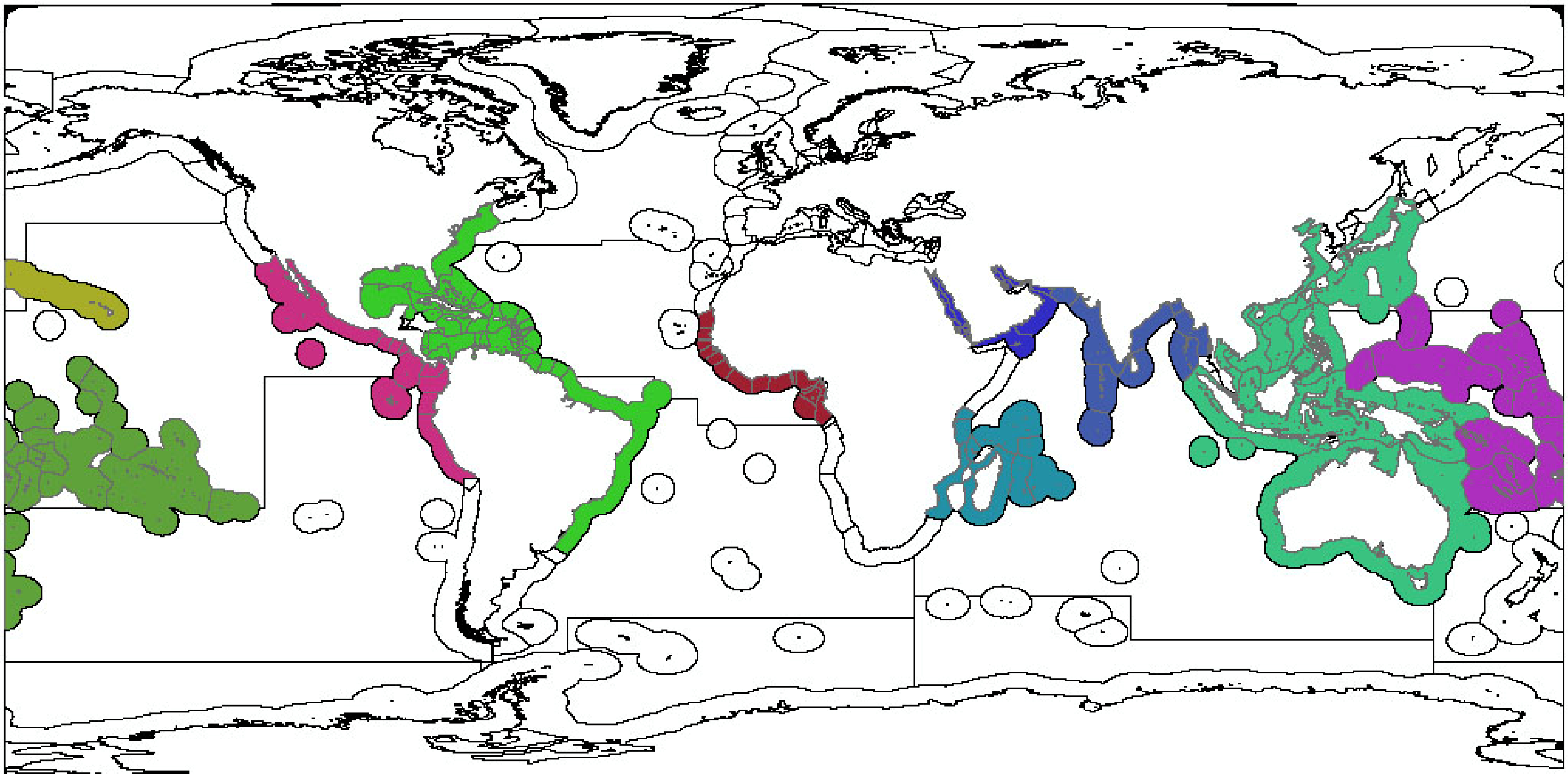

Figure S4. Georegions used for gap filling coral reef data, when needed.

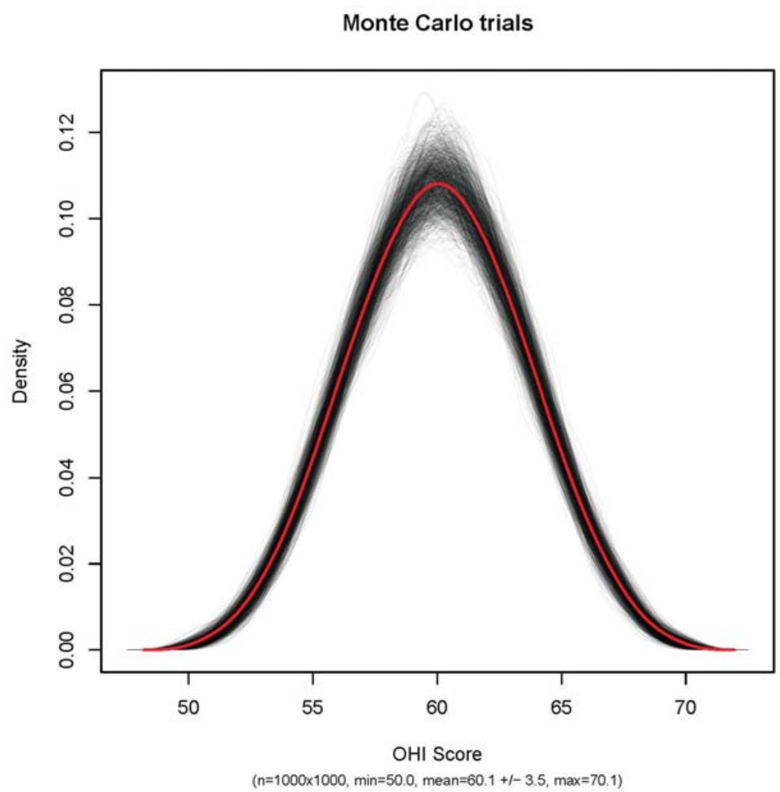

Figure S5. Histogram density plots of results from Monte Carlo simulations of weights (α_i) in Eq. S6, used to calculate the overall Index score. Results shown are the distribution of the global, area-weighted Index scores. Each line represents a simulation of 1,000 different weight vectors, with the red line as the mean density across 1,000 different trials. See section 4 for details.

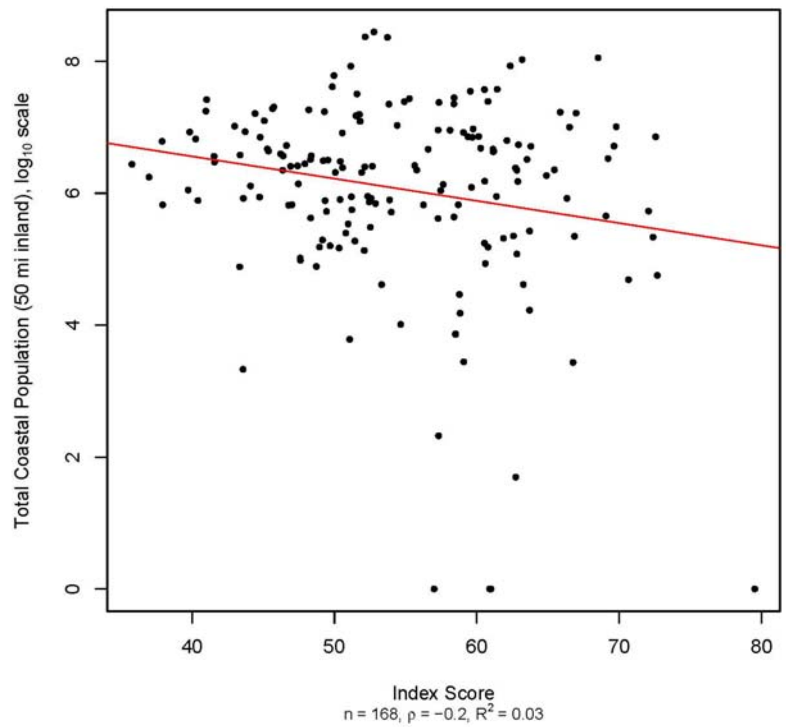

Figure S6. Relationship between coastal (within 50 mi of shore) human population and Index scores for the 168 reporting regions with coastal populations.

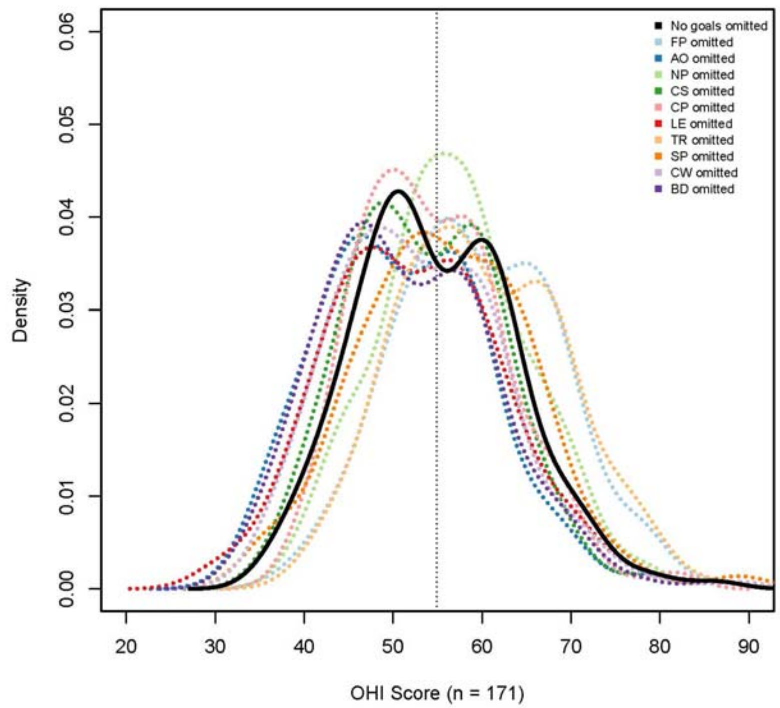

Figure S7. Distribution of per-country Index scores with jackknife resampling. Figure shows value of the Index with that goal removed and equal weighting. Solid black line is the Index scores with all 10 goals included (Fig. 5).

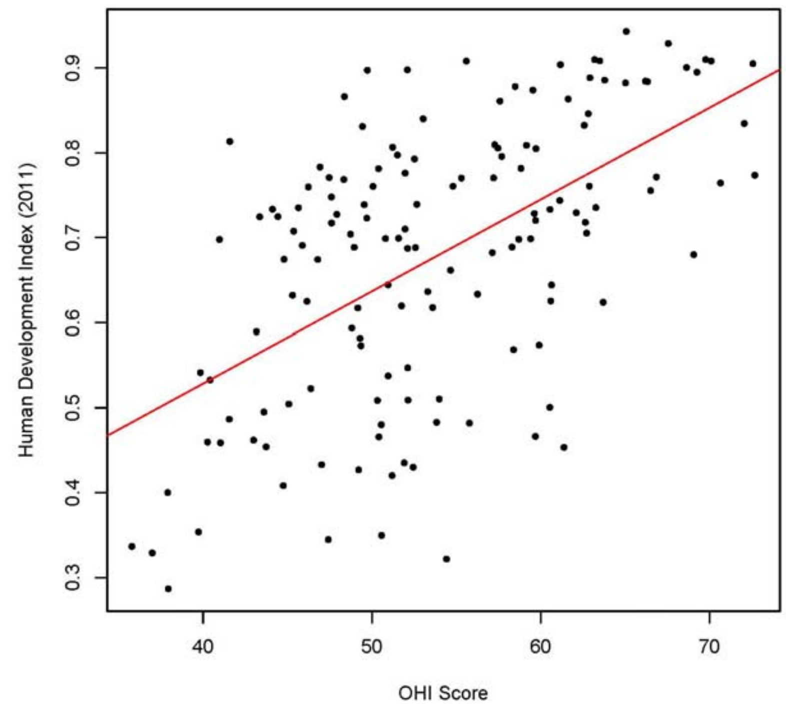

Figure S8. Relationship between region Index scores and the Human Development Index rankings from 2010 (Ref [49]). Pearson's $r = 0.57$, $p < 0.0001$; $N = 141$.

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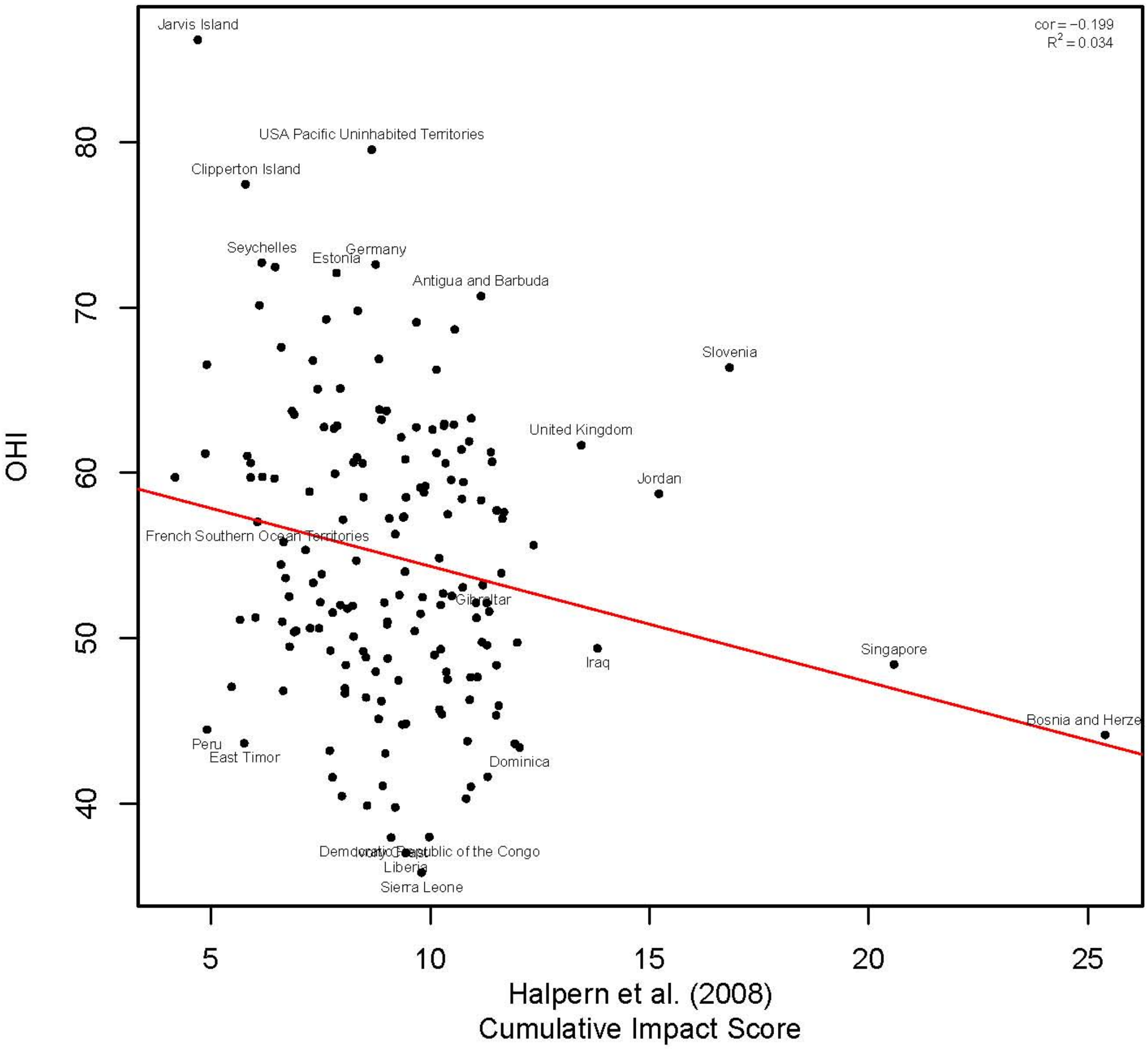

Figure S9. Relationship between Index scores and the average cumulative impact score per region. Cor = -0.20; Pearson's r = 0.18, p = 0.009; N = 171. Sample countries are labeled on the plot.

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