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Supporting Online Material for

Global Biodiversity: Indicators of Recent Declines

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This PDF file includes:

Other Supporting Online Material for this manuscript includes the following:
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Data File 1

Supporting Online Material for

Global Biodiversity Declines Continue

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This PDF includes

A State-Pressure-Response model for biodiversity indicators

While the CBD framework (*S1*) has been widely used to organize the development and presentation of indicators for 2010 (*S2*), it is not easy for policy makers and other users to understand how the indicators relate to each other and can be used to monitor the effects of different policy decisions on the rate of biodiversity loss. A state-pressure-response-benefits framework, as used here, provides a more logical structure within which to develop and report on indicators (*S2–S4*). It facilitates tracking policy *responses*, their impact on the *pressures* on biodiversity and the effects on the *state* of biodiversity, as well as the ultimate consequences for *benefits* to humans. For ease of communication, we consider 'pressure' to encompass 'driver', and 'benefit' to fit within 'impact' in a driver-pressure-state-impact-response framework (*S3*). This framework is a simplification that facilitates communication of how these four factors interrelate. For particular sectors or systems, the indicators (or disaggregations of them) can be linked in an interconnected set within this framework (e.g. Fig. S1).

Methods

We examined the results from 31 measures (which we term 'indicators') that have been developed within the CBD framework (*S1*) through the 2010 Biodiversity Indicator Partnership (www.twentyten.net). Although other metrics have been proposed (e.g. *S5*),

these fall outside the framework and none have been widely adopted yet (see e.g. *S4, S6*). Trends were available for 24 indicators (20 global, 4 regional). Descriptions of the indicators, methods and data sources are provided below (in the sequence in which they appear in Table 1) for those not based entirely on published data and methods. For clarity, we reworded and/or split a number of the 'headline indicators' specified in the CBD framework; for example we treated 'Trends in extent of selected biomes, ecosystems, and habitats' as separate indicators for 'extent of mangroves', 'extent of seagrasses' and 'condition of coral reefs' (for details, see Table S1). The Climatic Impact Indicator was included in this set as a derivative of the Wild Bird Index. In Table 1, data availability subsequent to 1970 refers to those dates for which trend analysis was possible for each indicator. For example, the Living Planet Index database contains data up to 2009 for some populations, but there are too few recent data to calculate robust trends beyond 2006, so this is taken as the most recent data point. As changes in the rate of change are more easily distinguished on a logarithmic scale, we used this for Figs. 1, 2 and S2. Data used in the analyses and presented in the figures are given in the Supporting Data File.

Testing individual indicators

All 15 indicators with measurements for >13 time points (plus the disaggregated results for the Wild Bird Index; see Table 1) were analysed by structural time series analysis and the Kalman filter as implemented in TrendSpotter software (*S7, S8*). TrendSpotter can handle missing data for some years, as was the case for several indicators. For a number of indicators no standard errors of the annual values were available. We assumed that any inaccuracy in the underlying data were reflected in the inter-annual variation, given that time series were sufficiently long (>10–15 years), and therefore examined inter-annual variation to assess trends by using structural time series analysis, which enables separation of trends in the data from inter-annual noise. When inter-annual variation is large trends will not be easily signalled as significant. To examine the significance of trends over time for each indicator, model indicator values and their 95% confidence intervals were obtained for each year and used to calculate mean annual changes for the entire period and per decade (Table 1) as ((last value/first value)^(1/no. years))–1. For those indicators with too few data to be analyzed with TrendSpotter, the annual percentage change per decade was calculated as the mean of up to ten annual percentage change values per decade (which were interpolated linearly for years with missing data) in order to minimize the impact of variation in annual estimates, which was high for some of the indicators.

Trends in the rate of change were also assessed using TrendSpotter by analyzing the annual absolute increments (i.e. the absolute differences between annual index values). For comparison, we also carried out this assessment using the relative annual increments (i.e. absolute increments divided by the index of the year before). Change points were determined by identifying years in which the second derivative of the index differed significantly from zero. Fig. 1 shows the trend and 95% confidence intervals derived by TrendSpotter for those indicators with sufficient data to model, except for the Living Planet Index, Red List Index and Climatic Impact Indicator for which the values and confidence intervals are derived directly from the underlying data (see below for details). Note that the confidence intervals for some indicators (Ecological Footprint, alien species, extent of protected areas and coverage of IBAs/AZEs) are difficult to discern at the scale shown in

Fig. 1. For comparison, Fig. S2 shows the unmodeled data for each indicator.

Aggregating indicators

The purpose of calculating aggregated indices for state, pressure and response indicators was to determine the timing and direction of trend inflections, rather than to determine aggregated percentage change over time. The latter would be problematic to interpret as the indicators cover different elements of biodiversity. To achieve the former, each index was modelled using a generalized additive model (GAM) following the approach of (*S11*), from which the predicted values were used to calculate the percentage change values for each year. Index specific values were combined and aggregated into an overall index for each of state, pressure, and response: $I_t = I_{t-1}10^r$ where I is the Index value at time t, and r is the proportional rate of change of each individual indicator between years. Confidence limits were calculated using a 1,000-iteration bootstrap resampling technique, and we used the bounds of the central 950 I values for each year to represent the 95% confidence interval for the index in that year. Change points in the indices were determined by using the bootstrap to identify time points at which the second derivative of the index differed significantly from zero. We identified years where the slope of the index value on year changed significantly, which identified where the annual rate of change as a proportion changed.

We excluded the RLI from the aggregated index of state, because the RLI measures aggregate extinction risk, and hence is a measure of the rate of change of state (*S9, S10*). As subsets of the RLI formed two of the three indicators with trends relevant to the benefits humans derive from biodiversity, we did not calculate an aggregated index for benefits. Given that the current indicator set is far from complete in its coverage, we simply weighted all indicators equally. Nevertheless, we explored several separate weighting procedures to test the impact of different factors. (i) Since some indicators have subglobal coverage, we applied a weight of 0.19 for the Wild Bird Index (WBI), equating to the proportion of terrestrial surface that Europe and North America covers, 0.87 for the condition of corals (the proportion of the global reef area covered by Caribbean and Indo-Pacific reefs) and 0.07 for the number of alien species and the climatic impact indicator (the area of Europe as a proportion of the world terrestrial area). (ii) As variance differed between indicators, we tried weighting indicators by the inverse of their variance. Specifically, we calculated the mean of the absolute value of the residuals from the TrendSpotter model outputs (for those indicators with sufficient data to model in this way), or from a linear fit (for those indicators with too few data points to model), and weighted each index by the log of the inverse of this mean, rounded to the nearest integer. As an alternative, we also weighted by the log of the inverse of the absolute range of each indicator (maximum-minimum).

To examine the impact of non-independence between the WBI and Living Planet Index (LPI) (a high proportion of the populations in the former are included the latter), we recalculated the aggregated index for state excluding the WBI. Finally, as there were fewer state indicators with data available prior to 1980, we also calculated the aggregated index of state taking 1980 as the starting point.

Living Planet Index

The LPI measures trends in vertebrate population abundance over time, based on time-series data for populations of vertebrate species from published scientific literature, grey literature, and established databases such as the Global Population Dynamics Database (http://www3.imperial.ac.uk/cpb/research/patternsandprocesses/gpdd) and the Pan-European Common Bird Monitoring Scheme (http://www.ebcc.info/pecbm.html). Data were only included if (*i*) a measure of population size was available for at least two years; (*ii*) information was available on how the data were collected and the units of measurement; (*iii*) the geographic location of the population was provided; (*iv*) the data were collected using the same method on the same population throughout the time series; and (*v*) the data source was referenced and traceable (*S11*). The index was calculated using time-series data on 7190 populations of 2301 species of mammal, bird, reptile, amphibian and fish from around the globe. Two complementary methods were used to generate index values: a chain method used for time series of ≤6 data points (*S12*) and a GAM technique (*S11, S13, S14*) for times series of >6 data points. In order to calculate an index, the logarithm of the ratio of population measure for each species was calculated for successive years. Mean values were calculated for species with more than one population. The overall index was then calculated with the index value set to 1 in 1970. Insufficient data were available to continue the index beyond 2006 because of a lag in publication of data. Indices were produced weighting populations equally within species, and species weighted equally within each index. Indices for terrestrial, marine and freshwater systems were calculated as the geometric mean of tropical and temperate species. See (*S11*) for full explanation of the model simplification technique and index formulation. Underlying data are available on request from BC.

Wild Bird Index

The WBI measures the average population trends in habitat specialist bird species. Data for Europe came from the Pan-European Common Bird Monitoring Scheme administered by the European Bird Census Council (*S15*, www.ebcc.info/pecbm.html), Trends were based on data from 36 farmland, 29 forest and 14 wetland obligate species. Data for North America came from (*S16*, http://www.stateofthebirds.org/) and were based on long-term trend data from the North American Breeding Bird Survey, administered by the U.S. Geological Survey and Canadian Wildlife Service, the Christmas Bird Count run by the National Audubon Society and the Waterfowl Breeding Population and Habitat Survey, run by the U.S. Fish and Wildlife Service and Canadian Wildlife Service. Trends were based on data from 17 arid land, 24 grassland, 96 forest and 139 wetland obligate species. Trends were calculated as the geometric mean of indices for each habitat type in each region. As trends for terrestrial and wetland habitat specialists were substantially divergent, aggregated trends were also calculated separately for these two sets. Underlying data for Europe are available are available on request from the European Bird Census Council, and for North America are available at http://www.mbr-pwrc.usgs.gov/bbs/bbs.html.

Waterbird Population Status Index

The WPSI measures changes in the proportion of biogeographic waterbird populations that

are increasing, decreasing or stable, with the index value calculated as the ratio of increasing and stable populations to the total. Thus the index ranges from +1 (all populations increasing/stable) to 0 (all populations decreasing). Data were extracted from (*S17*) and refs therein on 242 shorebird populations with at least one known trend, of which 124 had known trends for the 1980s, 211 for the 1990s and 68 for the 2000s. Confidence intervals on the index were obtained applying the formula for normal approximation of a binomial distribution. Underlying data are available on request from NCD.

Red List Index

The RLI measures trends over time in the overall extinction risk of species, as measured by their category of extinction risk on the IUCN Red List (www.iucnredlist.org). Trends reflect shifts among categories owing solely to genuine improvement or deterioration in status (i.e. excluding category revisions owing to improved knowledge or revised taxonomy). An RLI value of 1.0 equates to all species being categorised as Least Concern, and hence that none are expected to go extinct in the near future. An RLI value of zero indicates that all species have gone Extinct. Methodology follows (*S9–S10* updated by *S18*). Data for birds for 1988–2008 came from (*S19*; available at www.birdlife.org/datazone/species/index.html); preliminary data for amphibians for 1980–2004 from (S*9, S20*); for mammals for 1996–2008 from (*S21*, updated by SNS), and preliminary data for corals for 1996–2008 from (*S22*). Red List assessments for all four groups are available at www.iucnredlist.org. Number of non-Data Deficient extant species = 9,785 birds, 4,555 mammals, 4,416 amphibians and 704 corals (warm water reef-building species only).

An aggregated RLI was calculated as the arithmetic mean of modelled RLIs for these four groups. RLIs for each taxonomic group were interpolated linearly for years between data points and extrapolated linearly (with a slope equal to that between the two closest assessed points, except for corals) back to 1986 and forwards to 2008 for years for which estimates were not available. The start year of the aggregated index was set as 1986 because ten years was set as a limit for extrapolation. Corals were not extrapolated linearly because declines were known to have been much steeper subsequent to 1996 (owing to extreme bleaching events) than before. Therefore the rate of decline prior to 1996 was set as the average of the rates for the other taxonomic groups. The RLIs for each taxonomic group for each year were modeled to take into account various sources of uncertainty: (*i*) Data Deficiency: Red List categories (from Least Concern to Extinct) were assigned to all Data Deficient species, with a probability proportional to the number of species in non-Data Deficient categories for that taxonomic group. (*ii*) Extrapolation uncertainty: although RLIs were extrapolated linearly based on the slope of the closest two assessed point, there is uncertainty about how accurate this slope may be. To incorporate this uncertainty, rather than extrapolating deterministically, the slope used for extrapolation was selected from a normal distribution with a probability equal to the slope of the closest two assessed points, and standard deviation equal to 60% of this slope (i.e., the CV is 60%). (*iii*) Temporal variability: the 'true' RLI likely changes from year to year, but because assessments are repeated only at multi-year intervals, the precise value for any particular year is uncertain. To make this uncertainty explicit, the RLI value for a given taxonomic group in a given year was assigned from a moving window of five years, centered on the focal year (with the

window set as 3-4 years for the first two and last two years in the series). Note that assessment uncertainty cannot yet be incorporated into the index.

Practically, these uncertainties were incorporated into the aggregated RLI as follows: Data Deficient species were allotted a category as described above, and an RLI for each taxonomic group was calculated interpolating and extrapolating as described above. A final RLI value was assigned to each taxonomic group for each year from a window of years as described above. Each such 'run' produced an RLI for the complete time period for each taxonomic group, incorporating the various sources of uncertainty. Ten thousand such runs were generated for each taxonomic group, and the mean was calculated.

Marine Trophic Index

The MTI measures the average trophic level of fish catches. Methodology followed (*S23*), including assessing mean trophic level above a threshold level of 3.25 in order to eliminate highly variable and abundant small pelagic fish and to emphasize changes in the relative abundance of fish at higher trophic levels which tend to be more threatened. Territorial waters were those considered part of countries' exclusive economic zones (typically 200 nautical miles offshore); remaining marine areas (c.60%) were defined as high seas. Regional MTIs were compared for 18 FAO fisheries regions; those for the Antarctic Pacific were excluded owing to incomplete data prior to 1997. To compare direction of trends for regional MTIs, those that changed <0.1% since 1970 were defined as stable. A global index was calculated from the indices for each FAO fishery region weighted by total catches in 2006; number of catch records (1950–2006) =3473 Arctic Sea, 138366 NW Atlantic, 375204 NE Atlantic, 51612 W Central Atlantic, 84899 E Central Atlantic, 58464 Mediterranean and Black Sea, 24960 SW Atlantic, 35729 SE Atlantic, 2207 Antarctic Atlantic, 51553 W Indian, 29909 E Indian, 15347 Antarctic Indian, 53866 NW Pacific, 8443 NE Pacific, 56823 W Central Pacific, 29,273 E Central Pacific, 21362, SW Pacific, 18802 SE Pacific. The MTI assess changes assuming that the same species complex is being exploited in the same area; when fisheries expand geographically, and/or into new species complexes, the MTI increases, although the relative abundance of high trophic level species may not have increased (*S24*). Thus, the MTI tends to be biased toward optimistic results. Underlying data are available at http://www.seaaroundus.org/.

Forest extent

Data for net global forest cover for 229 territories were taken from Table 4 in (*S25*), which was based on nationally submitted data from a variety of sources. Data for gross rates of loss of humid tropical forests came from (*S26*) and were based on MODIS and Landsat satellite imagery analysed using a probability based sampling approach. Data on deforestation rates in the Brazilian Amazon came from http://www.inpe.br/noticias/arquivos/pdf/tabelaprodes_2001-2008.pdf. Data on Indonesian deforestation rates came from (*S27*).

Mangrove extent

Data came from (*S28*) and were based on 900 national or sub-national estimates. The value for 2005 has greater uncertainty because it was based on fewer national estimates.

Seagrass extent
Estimates for 1980, 1990 and 2000 were based on decadal rates of change from (*S29*) applied to an estimate of global seagrass extent of 177,000 km^2 in 2003 from (*S30*). Decadal rates of change were derived from data from 215 sites with at least two estimates of areal extent spanning periods of at least two years (*S29*).

Coral reef condition
Coral reef condition was measured as percentage cover of live hard coral. Data for the Indo-Pacific region came from (*S31*) updated with unpublished data collated by J. Bruno; data prior to 1980 were excluded owing to small sample sizes. Data for the Caribbean region came from (*S32*). *N*=5825 surveys at 2590 reefs in the Indo-Pacific (1979–2004), 3777 surveys at 1962 reefs in the Caribbean (1971–2006). A global indicator was calculated from trends for the Caribbean and Indo-Pacific weighted by 0.141 and 0.859 respectively to account for the disparity in area of reefs in each region (26000 km^2 and 158000 km^2 respectively).

Water Quality Index
The WQI, developed by the United Nations Environment Programme's Global Environment Monitoring System, is a proximity-to-target (PTT) index computed on a station by station basis using measurements of water temperature, dissolved oxygen, pH, electrical conductivity (salinity), nitrogen and phosphorous, collected and compiled from 6216 water monitoring stations worldwide. PTT scores for each parameter were derived from exceedances of annual average concentrations from targets, following winsorization of the exceedance data at the upper 95th percentile. PTT was calculated as the difference between observed values and the target divided by the range between the worst observed value and the target. PTT scores ranged from 100 (targets met) to 0 (most extreme failure to meet targets). The WQI was computed as the average of PTT scores for the variables reported at a station in one year. A WQIB of 100 indicates that targets for all of the parameters measured at a station and year were met; lower scores indicate reduced water quality. See http://www.twentyten.net/LinkClick.aspx?fileticket=c9%2fzoS1V%2bUc%3d&tabid=84&mid=776 for further details. A global index was calculated as the arithmetic mean of indices for the Americas (15 states, 358 stations), Africa (13 states, 140 stations), Asia (20 states, 326 stations), Europe (37 states, 5,299 stations) and Oceania (4 states, 93 stations). Underlying data are available on request from GMC.

Ecological Footprint
The Ecological Footprint measures human demand on the biosphere's regenerative capacity (*S33–S35*). It documents both direct and indirect human demands for resource production and waste assimilation, and compares them with the planet's ecological assets (biocapacity) (*S33–S36*). It tracks six key ecosystem services associated with particular types of land cover: plant-based food and fibre products (cropland); animal-based food and other animal products (cropland and grazing land); fish-based food products (fishing grounds); timber and other forest products (forest); absorption of anthropogenic carbon dioxide emissions (carbon uptake land); and the provision of physical space for shelter and other infrastructure (built-up area). Data from international statistical databases (e.g., UN FAO,

UN Comtrade, IEA, etc) were used to calculate national Footprint and biocapacity values for nearly 160 countries, which were summed to give global estimates (*S37–S38*). By tracking a wide range of human activities, the Ecological Footprint monitors the combined impact of anthropogenic pressures. Comparisons were made between countries classified as high (per capita gross national income of ≥$US10066 in 2005), middle ($US826-10065), and low income (≤$US825) (*S39*). Units of biocapacity are expressed as global ha (gha) where 1 gha is a hectare of land with world-average productivity. Underlying data are available at http://www.footprintnetwork.org/.

Nitrogen deposition rate

This indicator uses the annual rate of global emissions of reactive nitrogen (NOx and NH3), including from natural sources, to estimate global nitrogen deposition. Emissions estimates were based on preliminary data from the emissions database for the Intergovernmental Panel on Climate Change fifth assessment report (available on request from JNG), partly derived from the Emissions Database for Global Atmospheric Chemistry (EDGAR version 4; J. Van Aardenne, S. Monni and U. Doering *et al*., unpublished data; http://edgar.jrc.ec.europa.eu). Data for emissions from biomass burning came from the Global Fire Emissions Database (http://www.falw.vu/~gwerf/GFED/index.html).

Number and distribution of invasive alien species

This indicator measures the number of invasive alien mammal, amphibian, bird, freshwater fish, vascular plant and marine species in a stratified-random selection of 57 countries representative of different climates, continents, country sizes (km^2) and development status (*S40*). Species were designated as invasive according to standard evidence-based criteria. The indicator was based on 542 IAS and 2871 species-country records. Global trends were unavailable, but European trends were calculated as the geometric mean of indices for the number of alien species (it was not possible to distinguish those that are invasive) of (*i*) metazoans in the Mediterranean, (*ii*) freshwater animals, and (*iii*) mammals across all European countries (27 European Union member states, plus Andorra, Iceland, Liechtenstein, Moldova, Monaco, Norway, Russia, Switzerland, Ukraine, and former Yugoslavian states in the Balkans area). No species occurred in more than one dataset; data were derived from the DAISIE database (*S40*; www.europe-aliens.org).

Climatic Impact Indicator

This indicator measures the degree to which European bird population trends have responded in the direction expected from climate change (*S42*). European species were divided into species expected to undergo range expansion (92 species) and those expected to undergo range contraction (30 species) based on climate envelope modelling (with potential range change projections averaged over three Global Climate Models and two emissions scenarios; *S43–S44*). Mean population trends were calculated for these two sets of species from the data underlying the Wild Bird Index (see above). The indicator was calculated as the ratio of the index for species whose potential geographical ranges were expected to expand to that for those expected to contract because of climatic change, with species weighted by their sensitivity to that change. A positive trend indicates an increasing impact of climate change on population trends. Underlying data are available on request

from RDG.

Proportion of fish stocks that are fully exploited, over-exploited or depleted
This indicator measures the proportion of fish stocks that are fully exploited (and hence producing catches at or close to their maximum sustainable limits, with no room for further expansion), over-exploited, or depleted (and, thus, yielding less than their maximum potential owing to excess fishing pressure in the past, with no possibilities in the short or medium term of further expansion and with an increased risk of further declines and a need for rebuilding). These categories are defined by (*S45*), from where the data were derived. Data for missing years were interpolated linearly for incorporation into the aggregated pressure index. *N*=441 fish stocks, representing 76% of stock or species groups, producing 80% of the total marine catches in 2002 (*S46*). For the remaining 143 stock or species groups forming 20% of total marine catches, data were unavailable or considered unreliable (*S45*). Underlying data are available from FAO (*S45*).

Extent of Protected Areas (PAs)
This indicator measures the cumulative area of PAs. It was calculated from data for 132628 designated PAs held in the October 2009 version of the World Database on Protected Areas (WDPA; www.wdpa.org). The area of 97248 PAs with polygons was determined using GIS. An additional 35380 PAs had centroid coordinates but no polygon; of these 26302 had a documented area (submitted by national agencies) which we used; the remainder were discarded from the analysis. For 55328 PAs (45218 with polygons and 10110 with coordinates), the year of designation was unknown. For these, a year was assigned at random based on the frequency distribution of years of dated PAs in the respective country. The most recent data point for the indicator was set as 2006 based on the paucity of data in the WDPA from subsequent years, owing to delays in countries submitting data. Data on terrestrial and marine area coverage came from (*S47*). Underlying data are available at www.wdpa.org.

Coverage of biodiversity by PAs
This indicator measures the degree to which two sets of priority sites for biodiversity conservation—Important Bird Areas (IBAs) and Alliance for Zero Extincition sites (AZEs)—are covered by PAs. IBAs and AZEs are two subsets of Key Biodiversity Areas (KBAs; *S48*). IBAs are sites critical for the conservation of the world's birds, and are identified using globally standardized criteria based on populations of threatened, restricted-range, biome-restricted or congregatory species (*S49*). We examined PA coverage of 10993 IBAs in 218 countries and territories (data held in BirdLife International's World Bird Database, and available online at www.birdlife.org/datazone/sites/index.html). PA coverage was estimated from spatial overlaps between IBA polygons and PA polygons held in the WDPA, updated by local expert input by BirdLife's national partner organisations. AZEs are KBAs holding >95% of the entire world population of any Critically Endangered or Endangered species (as listed on the IUCN Red List: www.iucnred list.org) and hence are sites of imminent extinction unless they are protected (*S50*). We examined PA coverage of 561 AZE sites (v2.1 data; see www.zeroextinction.org) based on spatial overlaps between AZE polygons and PA polygons held in the WDPA, updated by input by AZE partners and

local experts.

For both IBAs and AZEs, two metrics were calculated: the percentage of sites falling completely inside PAs in IUCN management categories I-VI, and the mean area of each site that is covered by PAs of these categories. Where multiple PAs overlapped a site, the earliest year of designation of any PA and the total area of the site overlapped by any PA were used in the analysis. 1910 IBAs and 60 AZEs that were partly or completely overlapped by a PA with an unknown year of designation were randomly assigned a year with a probability based on the frequency distribution of years of dated protected sites in the relevant country. For 543 IBAs and 14 AZEs known to be overlapped partially by PAs, but to an unknown extent, the mean percentage area protected for sites in the relevant country was assigned. Aggregated indicators covering both types of sites were calculated as the mean of values for IBAs and AZEs. Annual values in Fig. 1 and decadal means in Table 1 were based on model results from TrendSpotter (see above) using the yearly values for IBA and AZE mean % area protected. Values for mean % IBA area protected, % IBAs completely protected, mean % AZE area protected and % AZEs completely protected were: 1970s: 6.6, 6.7, 5.1, 5.1; 1980s: 5.6, 5.6, 4.0, 3.9; 1990s: 2.6, 2.6, 2.5, 2.5; 2000s: 0.8, 0.6, 0.9, 0.8.

Management effectiveness of PAs

This indicator is derived using data from a number of management effectiveness evaluation methods (*S51–S52*, see also http://www.wdpa.org/ME/Default.aspx) that aim to give a balanced picture of management, including resourcing and management processes as well as outcomes. The indicator incorporates results from these different methodologies through the use of a common reporting format, which matches the wide range of indicators in individual methods to a set of 45 'headline indicators' (*S52*) and a consolidated set of 14 'summary indicators' representing broad management topics. Individual scores in the various methods were re-scaled onto a common 0–1 scale. An overall mean across the 14 summary indicators was calculated for each protected area. Mean scores of >0.66 are regarded as 'sound', 0.33–0.66 as 'basic', and <0.33 as 'clearly inadequate'. Overall proportions in each of these three categories were calculated, using the most recent score where there was more than one. *N*=4092 studies at 3080 sites. Underlying data are available on request from MH.

Area of forest under sustainable management

This indicator measures the area of sustainably managed forests, including natural or semi-natural forests that are used to produce timber and non-timber forest products, and forest plantations, based on area certified under the Forest Stewardship Council (FSC). While several certification systems have been developed to assess the management of individual forests according to agreed criteria in order to enable forest products to be sold as coming from sustainable sources, the FSC scheme has the widest geographic scope and longest history. Data on the number and area of certified sites were taken from 997 FSC Forest Management certificates, with details obtained from national FSC websites and offices. It is important to note that in addition to sites certified under other schemes (which are more important in the Asia-Pacific region for example), many sustainably managed forests have not been certified because the certification process demands time and financial resources

that many forest owners, especially those for smaller sites, are unwilling or unable to commit. While there is uncertainty about the degree to which certification truly reflects sustainable management, it seems likely that the increasing area of certified forest reflects a general trend towards improved forest management. Underlying data are available from CB.

International IAS policy adoption
This measures the cumulative number of signatory countries per year to 10 international agreements relevant to the control of IAS, using the date of commitment to each agreement by each country (*S40*). The maximum cumulative number of potential signatories was 1756 for the 191 CBD signatory countries (for each of the International Plant Protection Convention, International Maritime Organisation agreements, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention on the Conservation of Migratory Species, World Trade Organisation agreements, Convention on International Civil Aviation and the Cartagena Protocol on Biosafety, plus 188 UN countries that are signatory to the CBD for the United Nations Convention on the Law of the Sea and the Ramsar Convention on Wetlands, and 43 Antarctic Treaty Nations for the Protocol on Environmental Protection to the Antarctic Treaty). See *S40* for further details on the relevance of these agreements to IAS. *N*=1434 signatories by 191 countries by the end of 2008. Development status of countries was measured using the Human Development Index (http://hdr.undp.org/en/statistics/), with high defined as HDI >0.8 and low defined as <0.8. Underlying data are available from MAM.

National IAS policy adoption
This indicator measures trends in the proportion of countries that have national legislation relevant to the control of IAS (*S40*). National legislation was only considered relevant if it addressed multiple taxonomic groups and was not primarily intended to protect agriculture. The date of inception of the relevant legislation was used to calculate the cumulative number of countries with IAS-relevant legislation per year. *N*=105 of 191 countries with IAS-relevant national legislation in 2009. Development status of countries was measured as above. Underlying data are available from MAM.

Official development assistance
This indicator measures aid contributions from the OECD Development Assistance Committee (an international forum of 22 donor governments and 15 multilateral organisations) that target the objectives of the CBD. Data were extracted from the OECD Creditor Reporting System database (http://stats.oecd.org/Index.aspx) in which donors are requested to indicate for each activity whether or not it promote the objectives of the CBD (http://www.oecd.org/dac/stats/crs/directives). Underlying data are available from AC.

LPI for utilized vertebrates
This indicator (referred to under the Wild Commodities Index in *S2*) measures mean trends for populations of vertebrate species that are utilized by humans for any purpose (food, medicine, pets, clothing, sport etc). See above for details for the LPI. Species were coded as

being used based on data held in BirdLife's World Bird Database (WBDB; available online at www.birdlife.org/datazone/species/index.html) for birds, and from the IUCN Red List (www.iucnredlist.org) and other sources for other vertebrates. *N*=5448 populations of 1394 mammal, bird, reptile, amphibian and fish species. Underlying data are available from BC.

RLI for species used for food and medicine
This indicator measures trends in the overall extinction risk of mammal, bird and amphibian species used for food and medicine. See above for details of the RLI. Data on the use of birds for food and medicine were taken from BirdLife International's World Bird Database (WBDB). Data on the use of mammals and amphibians came from the IUCN Red List. Number of non-Data Deficient extant species used for food or medicine =1413 birds, 1104 mammals and 234 amphibians. Underlying data are available at www.birdlife.org and www.iucnredlist.org.

RLI for species in international trade
This indicator measures trends in the overall extinction risk of bird species that are internationally traded. See above for details of the RLI. Data on the trade of birds and its scale were taken from the WBDB. *N*=3332 non-Data Deficient extant internationally traded species. Underlying data are available at www.birdlife.org and www.iucnredlist.org.

Indigenous knowledge (linguistic diversity)
Data for the numbers of first language speakers of each language were taken from the Ethnologue database (*S53*), UNESCO's atlas of languages in danger (*S54*) and a wide range of other sources including national statistics agencies, regional and international organizations. For the validity of the assumption that indigenous language diversity reflects indigenous knowledge about biodiversity, see (*S55*).

Number of rural poor people dependent on threatened ecosystems
This indicator represents a preliminary attempt to provide a measure relevant to the CBD headline indicator (*S1*) of 'health and well-being of communities who depend directly on local ecosystem goods and services'. It was calculated as the number of poor people (using undernourishment as a proxy) living in remote rural areas (>6 hours to nearest settlement of >50,000 people) within threatened ecoregions (those classified as critical or vulnerable; *S56*). 'Undernourished' is defined as having a dietary energy consumption continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out a light physical activity (*S57*). Raster layers for each of these datasets (*S56–S60*) were overlaid using Arc GIS and the number of poor people living in more remote rural areas within threatened ecosystems was calculated per grid cell and summed. The percentage of the population in each country comprising poor people living in more remote rural areas within threatened ecosystems was then calculated. Underlying data are available from MHM.

Additional information on indicator results
Additional detail on the current status, trends and underlying disaggregated patterns for all 31 indicators is provided in Table S3. The analysis presented in Table 1 of trends in rate of

change was based on analysis of annual absolute increments for each indicator. The results using annual relative increments were identical apart from the following indicators: number of alien species (D 1972–2006), extent of protected areas (D 1972–1982), coverage by PAs of IBAs and AZEs (D 1986–2005), area of forest under sustainable management (D 1997–2007) and national legislation tackling IAS (D 1974–1983). All but the first two relate to differences only in the timing of significant rate reduction.

The aggregated state indicator weighted to account for incomplete geographical coverage in some indicators showed additional negative trend inflections in 1973, 1975, 1976 and a positive inflection in 1986, while the geographically-weighted pressure indicator showed identical results in terms of the direction and timing of the most recent trend inflections. The aggregated index for state weighted by the inverse of variance of the contributing indicators showed several additional significant trend inflections, but the most recent (in 2004) was negative, while the aggregated indices for pressure and response weighted by the inverse of variance of the contributing indicators also showed additional significant trend inflections, but the same direction (negative) and timing (2006 and 2008 respectively) of the most recent inflections in the unweighted indices. The aggregated index for state weighted by the inverse of the range (maximum-minimum) of each contributing indicator showed a shallower decline (as expected), with the most recent switchpoint (in 1972) being negative. Finally, the aggregated state indicator showed similar results (the most recent trend inflection—in 1996—was negative) when the WBI was excluded to test whether the result was biased by a degree of non-independence between the WBI and LPI.

Representativeness, accuracy and bias

Most of the indicators have incomplete geographic coverage, with a mean of 15.6±0.2 (SEM) indicators per country (Table S4). Four are currently restricted to particular regions (mainly Europe and North America). Even for those with global or near-global coverage, data are often less representative, comprehensive and reliable from developing or less-populated countries which tend to have relatively fewer resources and capacity for biodiversity monitoring. Taking into account the various limitations of the underlying datasets, we judged indicator reliability to be highest for response (100%, 6/6 indicators with reliability subjectively scored as 'high') compared with state (10%, 1/10), pressure (20%, 2/5), or benefits (0%, 0/3) (Table S2). For several indicators it was not possible to estimate confidence intervals from the underlying data, so uncertainty remains unquantified, while for others there are too few data-points and/or too many years with missing data in the time-series to test the significance of trends and changes in these.

Furthermore, trends are unavailable for 23% of the indicators (7/31), and no adequate global indicators are available for additional key aspects of biodiversity, including: invertebrate, fungi and plant trends; grassland and wetland extent; habitat condition; primary productivity, wild genetic diversity; freshwater and terrestrial trophic integrity; ecosystem functioning (state indicators); non-nitrogen pollution; ocean acidification; exploitation in terrestrial and freshwater ecosystems; wildlife disease incidence, freshwater extraction (pressures); sustainable management of agriculture and freshwater fisheries; management of IAS; PA effectiveness trends (responses); and other ecosystem services delivered by biodiversity (benefits).

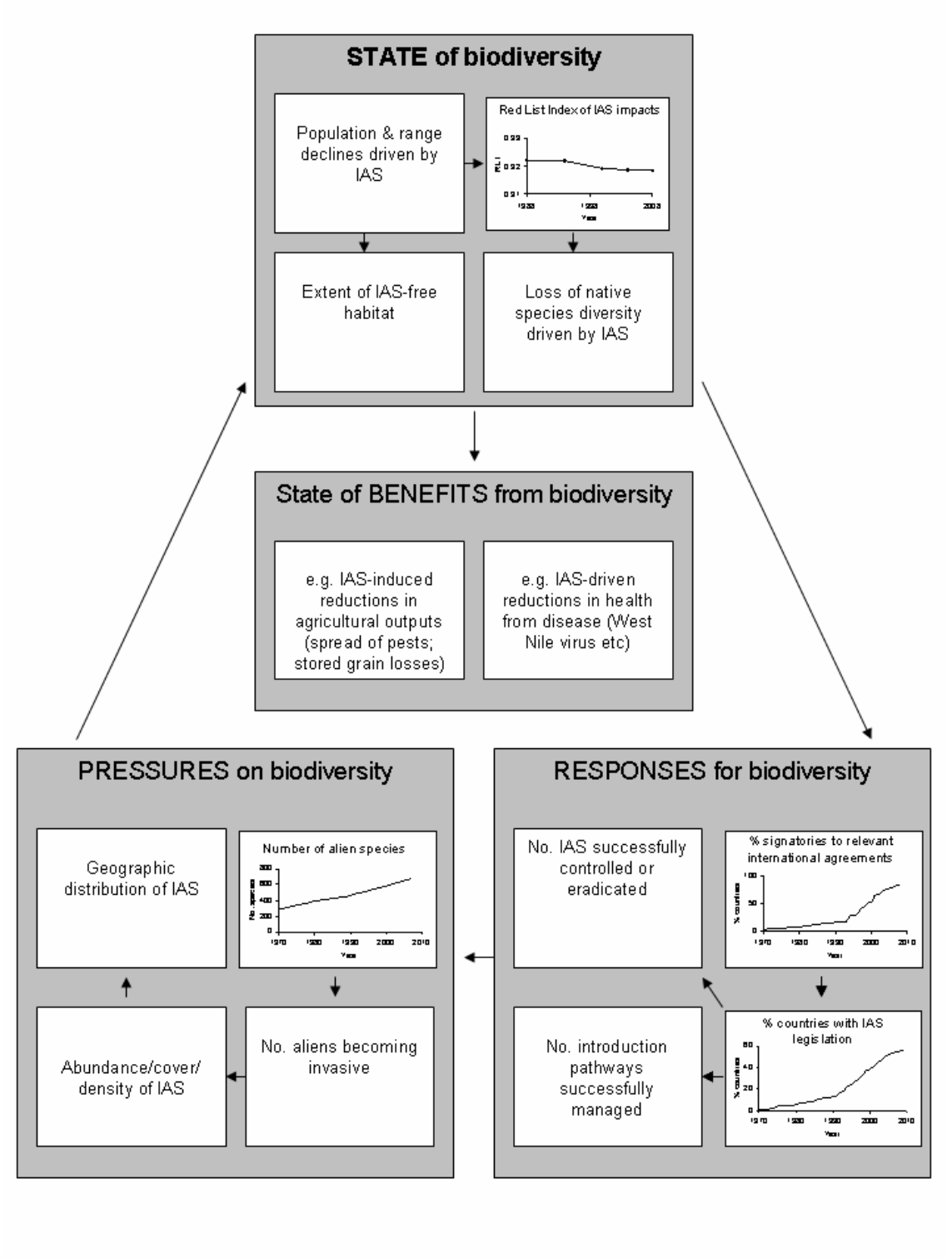
STATE of biodiversity
Population & range declines driven by IAS
Red List Index of IAS impacts
Extent of IAS-free habitat
Loss of native species diversity driven by IAS
State of BENEFITS from biodiversity
e.g. IAS-induced reductions in agricultural outputs (spread of pests; stored grain losses)
e.g. IAS-driven reductions in health from disease (West Nile virus etc)
PRESSURES on biodiversity
Geographic distribution of IAS
Number of alien species
Abundance/cover/ density of IAS
No. aliens becoming invasive
RESPONSES for biodiversity
No. IAS successfully controlled or eradicated
% signatories to relevant international agreements
No. introduction pathways successfully managed
% countries with IAS legislation

Fig. S1. Example of how biodiversity indicators for state, pressure, response and benefits can be interlinked for the threat from invasive alien species (IAS). Indicators with trend data currently available are shown as thumbnail graphs. Key gaps for indicators needed in future are shown in boxes.

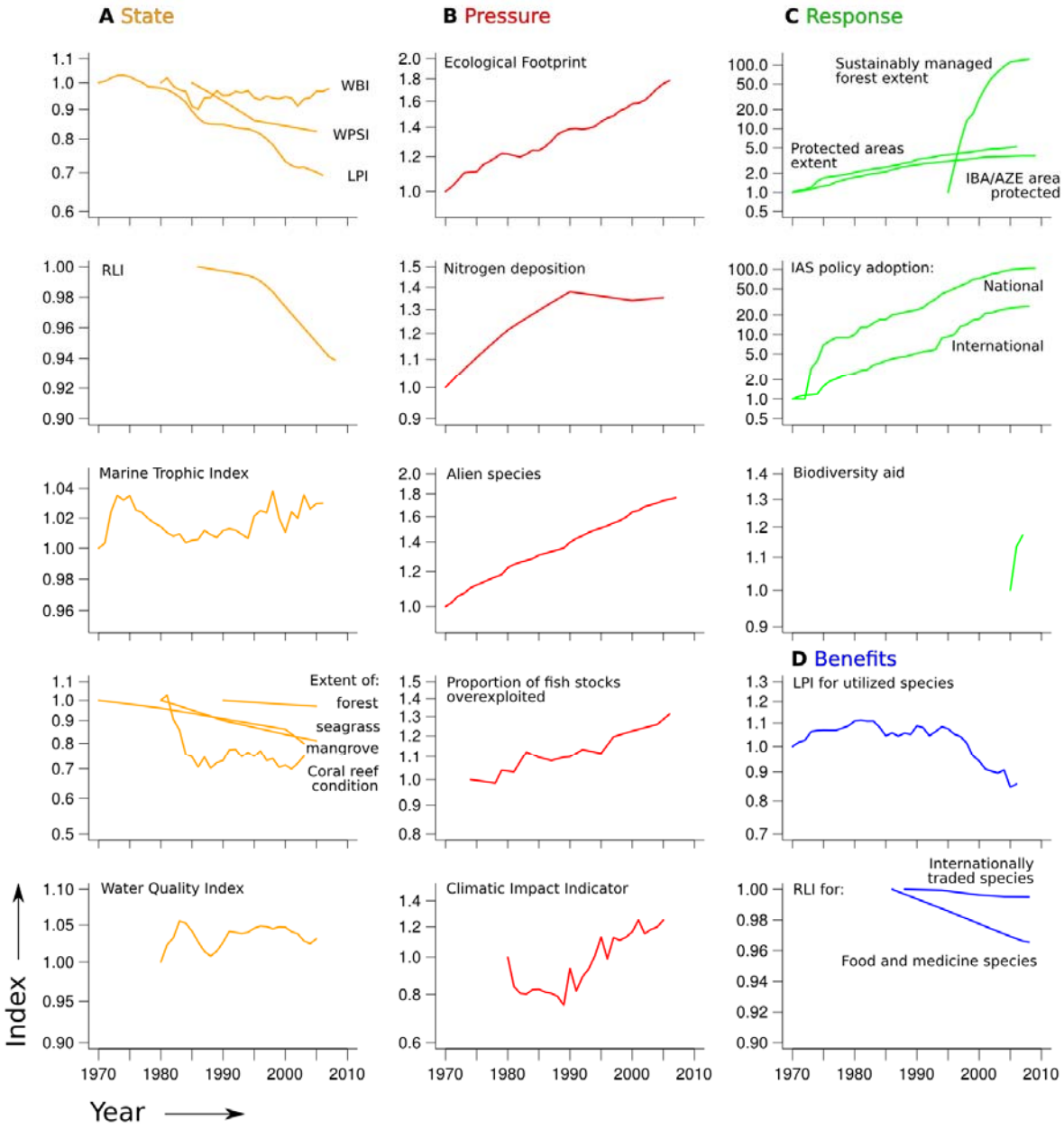

Fig. S2. Indicator trends using unmodeled data for (A) the state of biodiversity, (B) pressures upon it, (C) responses to address its loss and the (D) benefits humans derive from it. Data scaled to 1 in 1970, or for first year of data if >1970, and plotted on a logarithmic ordinate axis. WBI = Wild Bird Index, WPSI = Waterbird Population Status

Index, LPI = Living Planet Index, RLI = Red List Index, IBA = Important Bird Area, AZE = Alliance for Zero Extinction site, IAS = invasive alien species.

Table S1. Relationship between indicators in Table 1 and the CBD framework (*S1*).
*The CBD framework has seven focal areas: A. Status and trends of the components of biodiversity (covering headline indicators 1-5); B. Sustainable use (6-8); C. Threats to biodiversity (9-10); D. Ecosystem integrity, goods and services (11-17); E. Status of knowledge, innovations, and practices (18-19); F. Status of access and benefit sharing (20); G. Status of resource transfers (21-22).

	Indicator	Headline indicator in CBD framework*
State	Living Planet Index (LPI)	2. Trends in abundance & distribution of selected species, with disaggregation relevant to 7. Proportion of products derived from sustainable sources
	Wild Bird Index	2. Trends in abundance & distribution of selected species
	Waterbird population status index	2. Trends in abundance & distribution of selected species
	Red List Index (RLI)	4. Change in status of threatened species, with disaggregations relevant to 10. Trends in invasive alien species, & 7. Proportion of products derived from sustainable sources
	Marine Trophic Index	11. Marine Trophic Index
	Forest extent	1. Trends in extent of selected biomes, ecosystems & habitats
	Mangrove extent	1. Trends in extent of selected biomes, ecosystems & habitats
	Seagrass extent	1. Trends in extent of selected biomes, ecosystems & habitats
	Coral reef condition	1. Trends in extent of selected biomes, ecosystems & habitats
	Water Quality Index	12. Water quality of freshwater ecosystems
Pressure	Ecological Footprint	8. Ecological Footprint & related concepts
	Nitrogen deposition rate	9. Nitrogen deposition
	Number of invasive alien species (IAS) per country	10. Trends in invasive alien species
	River fragmentation & flow regulation	14. Connectivity / fragmentation of ecosystems
	Forest fragmentation	14. Connectivity / fragmentation of ecosystems
	Exploitation of fish stocks	7. Proportion of products derived from sustainable sources
	Climatic Impact Indicator	2. Trends in abundance & distribution of selected species
Response	Extent of Protected Areas (PAs)	3. Coverage of protected areas
	Coverage of biodiversity by PAs	3. Coverage of protected areas
	Management effectiveness of PAs	3. Coverage of protected areas
	Area of forest under sustainable management	6. Area under sustainable management
	International IAS policy adoption	10. Trends in invasive alien species
	National IAS policy adoption	10. Trends in invasive alien species
	Ex-situ crop conservation	5. Trends in genetic diversity of domesticated animals, cultivated plants, & fish species of major socioeconomic importance
	Official development assistance	21. Official development assistance provided in support of the Convention
Benefits	LPI for utilized vertebrate populations	7. Proportion of products derived from sustainable sources
	RLI for species used for food & medicine	17. Biodiversity for food & medicine
	RLI for species in international trade	7. Proportion of products derived from sustainable sources
	Genetic diversity of domesticated animals	5. Trends in genetic diversity of domesticated animals, cultivated plants, & fish species of major socioeconomic importance
	Indigenous knowledge (linguistic diversity)	18. Status & trends of linguistic diversity & nos. speakers of indigenous languages

	Number of rural poor people dependent on threatened ecosystems	16. Health & well-being of communities who depend directly on local ecosystem goods & services
	Indicators not yet developed	13. Trophic integrity of other ecosystems
		15. Incidence of human-induced ecosystem failure
		19. Other indicator of the status of indigenous & traditional knowledge
		20. Indicator of access & benefit-sharing
		22. Indicator of technology transfer

Table S2. Representativeness and sources of bias for each indicator.

Indicator	Accuracy and representativeness within the geographic scope and taxa for which data are available:		Notes
	High (based on well-sampled, representative or comprehensive data)	Medium (based on data that may be unrepresentative or biased)	
Living Planet Index		y	Data are biased to better-known species (and better-studied parts of the world, but this is controlled for in the calculation method: see *S11* for further details).
Wild Bird Index	y		Data are based on surveys at a stratified-random or stratified-semi-randomized sample of sites and are likely to be geographically well representative. See *S15, S16* for further details.
Waterbird Population Status Index		y	Data are biased to better-known populations and regions. See *S17* for further details.
Red List Index		y	Data are biased to better-known species, as Data Deficient species are excluded (and these form a significant proportion of amphibians, mammals and corals in some regions). The extent to which trends in the taxonomic groups included in the RLI are representative of other taxonomic groups is incompletely understood. See *S9, S10, S18* for further details.
Marine Trophic Index		y	Data are biased by changes in geographic distribution of fisheries within FAO areas, and quality of data reported by regions may vary (see text and *S23, S24*).
Forest extent		y	The quality of data reported by different countries to FAO is likely to vary. See *S25* for further details.
Mangrove extent		y	The quality of data reported by different countries to FAO is likely to vary, and is likely to be most accurate for developed countries where estimates are based on more standardized and representative sampling. See *S28* for further details.
Seagrass extent		y	Data are biased to better-studied regions, with significant gaps for West Africa, north-east South America, north-west Pacific, and in particular tropical Indo-Pacific (east Africa to Hawaii). See *S29, S30* for further details.
Coral reef condition		y	Data are biased to better-studied regions, with over-representation of better-surveyed areas such as the Great Barrier Reef and Philippines. See *S31, S32* for further details.

Water Quality Index		y	The number of monitoring stations and countries contributing data for each region and the duration of data time-series vary, being highest for Europe (5299 stations in 37 countries) and lowest for Africa (140 stations in 13 countries) and the Pacific (93 stations in 4 countries: largely Australia and New Zealand). Hence accuracy and representativeness is likely to be lowest for these latter two regions.
Ecological Footprint	y		Data are compiled at a global scale and across many different parameters: there is unlikely to be particularly strong bias. The global Ecological Footprint (EF) value is calculated by adding up the EF of nearly 150 nations. For each nation in each given year, the EF value is calculated based on c.5,400 data points. Most of the source datasets (from UN, IEA, etc) do not have associated standard error estimates. This impedes generating confidence intervals for EF results. However, calculations err on the side of over-reporting Biocapacity (availability of assets) and under-reporting EF (demand on assets). See *S33-S38* for further details.
Nitrogen deposition rate		y	Data are compiled at a global scale and across many different parameters: there is unlikely to be particularly strong bias, although model estimates from the developed world may be more accurate than from the developing world because fewer measurements are available for the latter. The main areas of uncertainty are in the model estimates of dry deposition, which in many areas can be as important as wet deposition. See *S61* for further details.
Alien species in Europe		y	Data are biased to better-studied countries. See *S41* for further details.
Exploitation of fish stocks		y	Data are likely to be biased towards better-documented fisheries, and representativeness is affected to an unknown extent by illegal, unregulated and unreported fishing. See *S45–S46* for further details.
Climatic Impact Indicator	y		Population trend data are based on surveys at a semi-randomised sample of sites and are likely to be geographically well representative. See *S42* for further details.
Extent of Protected Areas	y		There may be some differences between countries in how up to date and complete the data are, but accuracy is likely to be generally high.
PA coverage of IBAs/AZEs	y		Although a small number of countries (12%) are excluded from the analysis owing to incomplete data on IBAs or protection status, these are unlikely to bias the indicator.
Forest under sustainable management	y		Data are comprehensive and although there are some differences in the frequency with which national FSC websites are updated, these were cross-referenced with the central FSC website, and there are unlikely to be any major biases.
International IAS policy adoption	y		Data were based on all countries signatory to international agreements relevant to the control of IAS, and are likely to be unbiased (see *S40* for further details).

National IAS policy adoption	y		Data were based on all countries party to the CBD (n = 191, as at time of analysis) and are likely to be unbiased. Although, inter alia, national websites, National Reports to the CBD and FAOLEX (FAO legal office http://faolex.fao.org/) were used as sources to identify the existence of national IAS legislation, it is possible that these data may have omissions (see *S40* for further details).
Official development assistance	y		Data may underestimate total values of aid owing to incomplete reporting by some countries (3 in 2005 & 2006, 4 in 2007), but these omissions are unlikely to bias the trends over time.
LPI for utilized vertebrate populations		y	See above re LPI. Data on utilised species are likely to be biased towards better-studied countries.
RLI for species used for food and medicine		y	See above re RLI. Data on species used for food and medicine are likely to be biased towards better-studied countries. Numbers of species used at a local scale are likely to be underestimated. See *S62* for further details.
RLI for bird species in international trade		y	See above re RLI. Data on internationally traded species likely to be biased towards countries with better documentation of wildlife trade.

Table S3. Summary of current state and disaggregated patterns for global biodiversity indicators.

	Indicator	Explanation & parameter measured	Scale & data availability	Current state	Disaggregated patterns
State of biodiversity	Living Planet Index (LPI)	Mean population trends of vertebrates	Global trend	Vertebrate populations have declined by 31% on average since 1970.	Declines in all regions & ecosystems, but steepest in the tropics (59% decline since 1970), freshwater ecosystem (41%) and Indo-Pacific realm (65%). Palearctic populations have shown a net increase (by 43% since 1970).
	Wild Bird Index	Mean population trends of habitat specialist birds in Europe & N. America	Regional trend	Populations of habitat specialists have declined 2.6% on average since 1980, but those in terrestrial habitats have declined by 16%, while wetland specialists have increased by 40%.	Declines in both regions with available data, but with variation between habitats. In North America, habitat specialists have declined 28% in grassland since 1968, and 27% in aridlands, but only 4.2% in forest, and have increased 26% in wetlands. In Europe, forest species have declined by 2% and farmland species by 48% since 1980, but wetland specialists have increased by 38%. Waterbird increases have been driven by policy shifts from draining to protecting wetlands and sustainable management (e.g. through the North American Wetlands Conservation Act). Despite this, waterbird populations at least in North America remain below historic levels.
	Waterbird population status index	Proportion of shorebird populations that are increasing, stable or decreasing	Global trend	52% of shorebird populations worldwide are declining, compared with 41% in the 1980s	A higher proportion of migratory populations are declining (59% in the 2000s) than resident populations (44% in the 2000s); amongst migrants the highest proportion of declining populations are found on the East Asian-Australasian Flyway and the lowest proportion on the African-Eurasian East Atlantic Flyway.
	Red List Index (RLI)	Extinction risk of mammals, birds, amphibians & corals	Global trend	12-55% of species are threatened with extinction in mammals, birds, amphibians, reptiles, fish, corals, freshwater crabs, dragonflies, conifers and cycads (*S64*). Survival probability is decreasing in all groups with known trends.	Declines in all regions & ecosystems but steepest for reef-building corals (in particular owing to 'bleaching' events in the late 1990s; *S21*), in the Indo-Malayan realm for birds and mammals (owing to rapid rates of deforestation and overexploitation; *S9, S10, S19*), in the Neotropical realm for amphibians (driven by the fungal disease chytriomycosis; *S20*), and in the marine ecosystem for birds (owing in particular to bycatch on long-line fisheries; *S9,S63*). Species listed on EU Birds Directive Annex I have improved overall during 1994-2004. Net impacts of the main drivers of biodiversity loss (agriculture, over-exploitation, invasive species, forestry, pollution etc) have all been negative (*S40, S64*).
	Marine Trophic Index (MTI)	Degree to which fishing catch has shifted from top predators to lower trophic levels	Global trend	The mean trophic level of fish catches, has undergone a moderate increase (+3%) since 1970, but this masks a 4.5% decline during 1950-1969, increases in the high seas (+1.4%) compared to stability in territorial waters (+0.04%) and substantial regional variation: of 18 marine areas with available data, MTIs are declining for 50%, increasing for 44% and stable for 6%.	Mean trophic level is lowest in Arctic Sea, Antarctic Atlantic and E Indian Oceans, and highest in SW Atlantic, E Central and SW Pacific. Steepest declines since 1970 have been in SE Pacific (-4.9%), SE Atlantic (-4.8%) and Antarctic Indian (-4.6%). Large proportional increases since 1970 in Mediterranean & Black Seas (+4.6%), W Central & SW Pacific (both +4.3%) may indicate a recovery of high-trophic level species but are more likely a consequence of the spatial expansion of fisheries (*S24*). Sharp declines occurred in many areas prior to 1970.

	Forest extent	Area of forest habitat	Global trend	During 1990-2005, global net forest cover declined by 3.1% (13 million ha/yr), and primary forest declined by 4.7% (6 million ha/yr). During 2000-2005, >27 million ha (2.4%) of humid tropical forest was cleared.	Largest proportional losses were in Central America (19%), S And SE Asia (12%) and S America (6.7%). Net increase in E Asia (18%) owing to plantations in China. Of all humid tropical forest lost during 2000-2005, 48% was in Brazil, and 13% in Indonesia. Deforestation in the Brazilian Amazon slowed from 2.8 million ha in 2003–2004 to 1.3 million ha in 2007–2008 but it is unclear if this reduction will be sustained once the global recession passes. Although the rate of deforestation in Indonesia fell from 1.78 Mha/yr in the 1990s to 0.71 Mha /yr during 2000-2005, the rate has increased from a low in 2000 to over 1 Mha yr−1 in 2005.
	Mangrove extent	Area of mangroves	Global trend	Extent of mangroves declined 19% during 1980-2005, but the rate has reduced from 185,000 ha/yr in the 1980s to 118,500 ha/yr in the 1990s and 102,000 ha/yr in 2000-2005.	Declines have occurred in all regions, but steepest in Asia (25%) and North/Central America (23%). The rate of decline has reduced in all regions since the 1990s, apart from Asia where it increased from -0.89% per year during 1990-1999 to -1.0% per year during 2000-2005; Asia holds 38% of remaining mangroves, more than any other region.
	Seagrass extent	Area of seagrass	Global trend	Extent of seagrass declined 20% since 1970.	Declines in all regions with seagrass, although few data available from West Africa, north-east South America, north-west USA and Indo-Pacific.
	Coral reef condition	Coverage of live hard coral	Regional trend	Coral reefs in the Indo-Pacific and Caribbean have declined in condition by 38% on average during 1980–2004.	Condition of coral reefs declined 60% during 1971–2006 in Caribbean & 24% during in 1980–2003 Indo-Pacific. Caribbean reefs remained stable on average following declines in the 1970s and early 1980s. While condition of Indo-Pacific reefs remained steady since 1990, the number with at least 50% living coral cover declined from 66% in the early 1980s to 4% in 2004, and in the Caribbean at least, reef structural complexity has declined since the 1960s (*S65*).
	Water Quality Index	Physical and chemical quality of freshwater	Global trend	Water quality has been stable since 1980, with substantial regional variation.	Water quality has declined in Africa (-16%) and the Americas (-7.1%) and improved in Asia (+6.6%) and Oceania (+15%); but the latter is almost entirely based on data from Australia and New Zealand) and hence is unlikely to be representative of the region as a whole. Exclusion of this region gives a global trend of -3.9% during 1980-2005, which may be more realistic.
Pressures on biodiversity	Ecological Footprint	Aggregate demands that humanity's resource-consumption places on the planet's regenerative capacity	Global trend	Human demand on ecological assets has increased by 78% since 1970. In 2006, humanity demanded the equivalent of 1.4 planets worth of resources and ecological services.	Resource and ecological service demands have increased for all land types, but demand from forest (both for timber and for CO_2 uptake potential) has increased fastest. Per capita consumption is highest in North America (8.7 gha/capita) and Europe (4.5), and lowest in Africa (1.4) and Asia-Pacific (1.5). Per capita consumption averages 6.1 gha in high income countries, 1.8 in middle income countries and 1.0 in low income countries.
	Nitrogen deposition rate	Annual quantity of reactive nitrogen deposited	Global trend	Rates of nitrogen deposition have increased sharply since 1940, but leveled out since 1990, probably owing to an overall decrease in biomass burning (albeit with regional variation). Biomass burning is an important source of reactive N, with large interannual-variability, leading to variation in decadal trends estimates.	There is substantial regional variation: deposition rates are stable or decreasing in developed countries, but increasing in developing countries, especially in East and South Asia. For NHx deposition, these increases are expected to continue in the future owing to projected increases in food production, especially animal products.

	Number of invasive alien species (IAS) per country	No. documented IAS per country for a globally representative sample of countries. Trends in no. alien species in Mediterranean & mammals & freshwater species in Europe	Regional trend for aliens, global baseline for IAS	For countries with data (57), the mean no. of IAS per country is 50 (range 9-222, total 542). In Europe, there have been steady increases in the number of alien species (not necessarily invasive) in the Mediterranean (totaling 613), alien mammals (84) and alien freshwater animals (390).	Density of documented IAS is 36 times higher on islands than on continents (at a country scale), and 15 times higher in data-rich than data-poor countries. Most documented IAS are vascular plants, but mammals have the greatest proportion of IAS (no. IAS per total no. species in taxon; compared with, e.g., birds, fish and mammals). Of the countries examined, Seychelles and Barbados have the highest densities of documented IAS (1 per 13km^2 and 15km^2 respectively); Chad and Canada have the lowest (1 per 128,000 km^2 and 92,500 km^2 respectively).
	River fragmentation and flow regulation	Degree to which rivers' connectivity and flow regime have been altered by dams and reservoirs	Global trend	59% of all large river systems are moderately (23%) or strongly (36%) fragmented by dams and reservoirs (*S66*).	The most fragmented rivers are in USA, Europe, China, India and arid regions. The least disrupted rivers are in remote and less-populated regions e.g. (Alaska, Canada and Russia), and in small coastal basins in Africa and Asia. Dam building has slowed in USA and Western Europe, but is accelerating in the developing world (*S66*).
	Forest frag-mentation	Degree to which remaining forest is fragmented into small patches	Regional baseline	In the Atlantic Forest, 80% of remaining fragments are <50 ha, and nearly 50% of forest is <100 m from the edge (*S67*).	
	Exploitation of fish stocks	% of fish stocks that are over-exploited, fully exploited, or depleted	Global trend	In 2006, 52% of global marine fish stocks were fully exploited, 19% were overexploited and 8% were depleted. Only 1% were recovering, 2% were under-exploited and 18% were moderately exploited. The latter two categories combined have declined from 39% in 1974.	The NE Atlantic, W Indian Ocean and NW Pacific have the highest %s of fully exploited stocks (71-80%). The % of overexploited and depleted stocks was lowest (<10%) in NW Pacific, W Central and E Central Pacific.
	Climatic Impact Indicator	Degree to which bird population trends have responded in the direction expected from climate change	Regional trend	Since 1990, climatic change has had a strong impact on European bird population trends: populations of species projected to expand their ranges under climate change have increased, while those projected to contract their ranges have decreased.	
Responses	Extent of Protected Areas (PAs)	Combined extent of PAs	Global trend	The number of PAs has grown to 132,628 covering 25.8 million km^2 by 2009. Coverage of terrestrial area has reached 12%, but marine PAs cover only 0.5% of the oceans, and 5.9% of territorial seas (*S68*). The slowing rate of increase may partly be an artifact of time-lags in data acquisition.	Percentage of territorial (terrestrial and marine) area protected is highest in Latin America and Caribbean (21%), W Asia (17.9%) and developed regions (16.9%) and lowest for N Africa (3.7%), S Asia (5.6%) and Oceania (7.2%).

Coverage of biodiversity by PAs	Degree to which PAs cover ecoregions & key sites for biodiversity (Important Bird Areas [IBAs] and Alliance for Zero Extinction Sites [AZEs])	Global trend	Only 56% of 825 terrestrial ecoregions, and 18% of 232 marine ecoregions have >10% of their area protected. Marine PAs cover 0.5% of the oceans, and 5.9% of territorial seas. Mean area of 10993 IBAs covered by PAs reached 39% by 2009, with 26% of sites completely protected. Mean area of 561 AZEs covered by PAs reached 42% by 2009, with 35% of sites completely protected. Recent slowing of the growth in coverage of IBAs & AZEs is probably due to time-lags in PA data acquisition.	Increasing coverage in all regions ecosystems and habitats. For IBAs, mean % area protected is highest in forest (47%), grassland (43%), Australasia (47%), Asia (45%), and lowest in freshwater (40%), desert (30%), Middle East (19%) and Oceania (9%). It is higher in developed (43%) than developing (39%) countries.
Management effectiveness of PAs	Aggregate measure of management effectiveness of PAs	Global baseline	Of 3,080 PAs with data, management effectiveness was 'clearly inadequate' for 13%, 'basic' for 65% and 'sound' for just 22%. Mean score was 0.53 (range 0-1).	
Area of forest under sustainable management	Sustainability of forestry as certified by Forest Stewardship Council	Global trend	Area of Forest Stewardship Council certified forest has grown rapidly to 39.8 million km^2 by 2008.	The total area certified covers 2.4 million km^2 in Africa, 18.3 million km^2 in Europe, 1.5 million km^2 in Asia-Pacific and 17.5 million km^2 in the Americas (the latter reflecting the more rapid development of national certification standards under the FSC scheme in this region). An overall bias towards boreal and temperate forest rather reflects both the complexities of managing tropical forests and the logistic and financial costs associated with obtaining certification.
International IAS policy adoption	No. signatories to international conventions that have provision for tackling IAS	Global trend	10 international agreements with provisions for tackling IAS have been ratified by a cumulative total of 1,434 signatories by 2009 (82% of the maximum possible number of CBD signatory countries). All such countries are signatory to at least two, >90% are signatory to at least half, and 8% are signatory to all 10.	Responses have been greatest in Europe (mean 8.4 agreements per country) and Americas (7.8), and lowest in Asia (6.7) and Oceania (6.1). Response is not strongly dependant on development status (measured by Human Development Index): 8.0 agreements per country for those with high HDI vs. 7.0 for those with low HDI. The two most widely adopted conventions relevant to the prevention and control of IAS (other than the CBD) are the Convention on International Civil Aviation (98% of countries) and the International Plant Protection Convention (87%).
National IAS policy adoption	% countries with national legislation tackling IAS	Global trend	55% of countries have national legislation to manage, control and/or limit the spread and impact of IAS. The proportion increased rapidly after 1992 and is still increasing.	Legislation tackling IAS is most prevalent in Europe (76% countries) and Americas (61%) and lowest in Africa (50%) and Asia (36%). Countries with high development status were more likely to have relevant legislation (66.3% of countries with high HDI vs. 47.2% for low HDI). Global data on the implementation of legislation are unavailable, but there are numerous examples of successful eradications/control of IAS, typically invasive mammals, leading to conservation benefits for native biodiversity, e.g. pigs on Clipperton Atoll, France, (benefiting seabirds and land crabs; *S19*, *S63*), cats, goats and sheep on Natividad, Mexico (benefiting Black-vented Shearwater; *S19*) and Red Fox in SW Australia (benefiting Western Brush Wallaby; *S69*).
Ex-situ crop conservation	Proportion of genetic diversity of crops in ex-situ gene banks	Global baseline	For 200–300 crops, 70% of genetic diversity is conserved ex situ in gene banks (*S70*).	

	Official development assistance	$$ per year provided as development assistance provided in support of the CBD	Global trend	At least $3.13 billion were provided in 2007 for biodiversity-related aid (reporting gaps mean this is an underestimate).	The regions receiving most aid were Asia (53%, particularly Eastern and South-central Asia), Africa (23%) and Latin America (15%).
Benefits from biodiversity	LPI for utilized vertebrate populations	Mean population trends of vertebrates used by people	Global trend	Populations of vertebrate species used by humans have declined by nearly 15% on average since 1970.	Declines in terrestrial, freshwater and marine systems, and in tropical and temperate regions.
	RLI for species used for food and medicine	Extinction risk of species used for food and medicine	Global trend	23-36% of birds, mammals and amphibians used for food or medicine are threatened with extinction. Survival probability of such species is decreasing.	Declines in all regions & ecosystems
	RLI for species in international trade	Extinction risk of internationally traded species	Global trend	8% of internationally traded birds are threatened with extinction. Survival probability of such species is decreasing.	
	Genetic diversity of domesticated animals	No. breeds of terrestrial domesticated animals	Global baseline	21% of 7,000 animal breeds (of 35 domesticated bird and animal species) are at risk of extinction; 9% are already extinct (including over 60 that are reported to have gone extinct since 2000). A further 36% are of unknown status (*S71*). Similar data are unavailable for crop varieties.	Genetic diversity of domesticated birds is at higher risk than for mammals (birds: 33% of breeds threatened, mammals: 16%) although more mammal breeds (11%) have gone extinct than birds (2%).
	Indigenous knowledge (linguistic diversity)	Nos. speakers of indigenous languages (as a proxy for levels of indigenous knowledge about biodiversity, and hence for levels of benefits gained)	Global baseline	Languages spoken by fewer than 1,000 people (22% of the current 6,900 languages) have on average lost speakers over the past 40 years and are in danger of disappearing within this century (*S53*). More generally, 36% of languages are considered endangered by UNESCO (*S54*).	Threatened languages are concentrated in tropical regions (*S72*).
	Number of rural poor people dependent on threatened ecosystems	No. people suffering from undernourishment in remote rural areas who live within vulnerable and critically endangered ecoregions	Global baseline	Over 100 million poor people (defined using undernourishment as a proxy) live in remote rural areas within vulnerable and critically endangered ecoregions, and are therefore likely to be particularly dependent upon them and the ecosystem services they provide.	The largest absolute numbers are found in Ethiopia, China and D.R. Congo (>10 million each). Eight of the ten ecoregions with the largest numbers are found in Sub-Saharan Africa. The highest percentage of such people per country are in Comoros (40%), Angola (32%) and DR Congo (30%).

Table S4. Number of countries contributing data to each indicator, and sample sizes per country for those indicators based on national sampling.

	Living Planet Index	Wild Bird Index	Waterbird Population Satus	Red List Index	Marine Trophic Index	Forest extent	Mangrove extent	Seagrass extent	Coral reef condition	Water Quality Index	Ecological Footprint	Nitrogen deposition rate	Alien species in Europe	Exploitation of fish stocks	Climatic Impact Indicator	Extent of Protected Areas (PAs)	PA coverage of IBAs/AZEs	PA coverage of IBAs/AZEs	Forest under sustainable management	International IAS policy adoption	National IAS policy adoption	Official development assistance	LPI for utilized vertebrate populations	RLI for species used for food and medicine	RLI for bird species in international trade	
Country	No populations/species (note that datasets that cover more than one country are excluded	No. species monitored	Included in assessment	No. non-Data Deficient mammal/bird/amphibian/coral species	Included in assessment	Included in assessment	No. sources with estimates	No. reef surveys	No. reefs surveyed	No. monitoring stations	Included in assessment	Included in assessment	Included in assessment	Included in assessment	No. species monitored	No. PAs	No. IBAs included in indicator	No. AZEs included in indicator	No. FSC certificates	Included in assessment	Included in assessment	Included as donor	No. populations/species	No. non-Data Deficient utilised mammal/bird/amphibian species	No. non-Data Deficient internationally traded bird	Total number of indicators
Afghanistan			y	119, 381, 6, 0		y					y	y				7	16	1		y	y			2, 192, 38	246	12
Albania	16, 16		y	73, 303, 15, 2	y	y				35	y	y	y	y		67	15			y	y		16, 16	3, 177, 19	220	16
Algeria	6, 6		y	100, 312, 12, 2	y	y				42	y	y		y		21	31			y	y		6, 6	2, 166, 33	200	15
American Samoa	2, 2		y	13, 41, 0, 273	y	y	4		2		y	y		y		7							2, 2	0, 18, 17	14	13
Andorra			y	48, 122, 4, 0	y	y						y	y	y		2	1			y				2, 64, 9	92	12
Angola	3, 3		y	266, 893, 77, 0	y	y	6				y	y		y		15	23	1		y	y		3, 3	7, 135, 103	443	16
Anguilla			y	19, 118, 1, 51	y	y	3					y		y		5	7							0, 44, 16	95	11
Antarctica	21, 4		y	10, 34, 0, 0	y							y		y		56							21, 4	0, 10, 4	8	9
Antigua & Barbuda	1, 1		y	22, 212, 2, 52	y	y	5		3		y	y		y		6	12	1		y	y		1, 1	0, 62, 19	141	16
Argentina	17, 13		y	292, 991, 144, 0	y	y				14	y	y		y		285		5	23	y	y		17, 13	4, 139, 69	328	16
Armenia			y	87, 293, 7, 0		y					y	y				10	18	2		y	y			0, 166, 21	207	12
Aruba			y	17, 220, 0, 0	y	y	2					y		y		1	4							0, 59, 15	155	11
Australia	283, 157		y	311, 684, 212, 541	y	y	12	40	3876	10	y	y		y		6984	309	18	11	y	y	y	283, 157	0, 122, 57	336	21
Austria	18, 17	78	y	90, 302, 20, 0		y				329	y	y	y		78	1080	55		12	y	y	y	18, 17	4, 173, 23	232	18
Azerbaijan	2, 2		y	100, 349, 9, 0		y					y	y				40	53			y	y		2, 2	0, 200, 24	241	12
Bahamas	3, 2		y	30, 266, 2, 53	y	y	4		88		y	y		y		43	39			y	y		3, 2	0, 70, 21	174	15
Bahrain			y	12, 225, 1, 106	y	y	2				y	y		y		3	4			y	y			0, 127, 8	140	14

Bangladesh	4, 1		y	132, 591, 34, 8	y	y	17			7	y	y		y		20	19			y	y		4, 1	15, 298, 93	389	16
Barbados	2, 1		y	21, 210, 1, 52	y	y	5		52		y	y		y		5	7	1		y	y		2, 1	0, 57, 18	141	16
Belarus	1, 1		y	72, 263, 13, 0		y					y	y	y			125	47		8	y	y		1, 1	3, 154, 18	204	14
Belgium	12, 8	79	y	69, 262, 16, 0	y	y				88	y	y	y	y	79	410	48		7	y	y	y	12, 8	4, 162, 25	204	20
Belize	29, 18		y	136, 548, 37, 53	y	y	12		204		y	y		y		82	6		1	y	y		29, 18	0, 82, 37	264	16
Benin	4, 4		y	146, 500, 36, 6	y	y	6				y	y		y		49	6			y	y		4, 4	4, 97, 83	311	15
Bermuda			y	17, 147, 0, 24	y	y	4	1			y	y		y		128	1	2						0, 52, 17	120	14
Bhutan			y	97, 607, 6, 0		y					y	y				9	23			y	y			1, 263, 63	400	11
Bolivia	3, 3		y	338, 1412, 207, 0		y				2	y	y				53	50	7	36	y	y		3, 3	8, 131, 67	430	15
Bosnia and Herzegovina			y	79, 274, 18, 0	y	y				41	y	y	y	y		39	3		3	y	y			2, 159, 18	204	16
Botswana	7, 6		y	157, 526, 42, 0		y					y	y				60	12			y	y		7, 6	5, 114, 64	322	12
Bouvet Island			y	4, 12, 0, 0	y							y		y		2	1							0, 0, 2	4	9
Brazil	377, 280		y	545, 1711, 557, 8	y	y	8			12	y	y		y		1336	235	29	134	y	y		377, 280	6, 179, 144	488	18
British Indian Ocean Territory	17, 17		y	4, 40, 0, 315	y	y	0					y		y		6	10						17, 17	0, 26, 5	24	12
Brunei Darussalam			y	122, 408, 53, 0	y	y	5		14		y	y		y		47	7			y	y			7, 137, 62	228	15
Bulgaria	8, 7	44	y	93, 334, 17, 0	y	y				139	y	y	y	y	44	920	114		6	y	y		8, 7	3, 187, 21	240	19
Burkina Faso			y	127, 444, 21, 0		y					y	y				72	10			y	y			3, 107, 57	287	11
Burundi	1, 1		y	135, 580, 23, 0		y					y	y				15	6			y	y		1, 1	1, 110, 50	327	12
Cambodia			y	154, 510, 44, 330	y	y	10			5	y	y		y		30	40			y	y			14, 262, 105	342	15
Cameroon	30, 30		y	303, 858, 185, 6	y	y	14				y	y		y		39	33	6	1	y	y		30, 30	13, 136, 134	427	17
Canada	451, 196	276	y	191, 533, 46, 0	y	y				58	y	y		y		5247	325	2	69	y	y	y	451, 196	0, 133, 55	329	19
Cape Verde			y	15, 84, 0, 7	y	y					y	y		y		3	12	1		y	y			0, 55, 21	58	14
Cayman Islands	12, 9		y	15, 231, 2, 53	y	y	5	1			y	y		y		48	10						12, 9	0, 59, 18	150	14
Central African Republic	8, 7		y	208, 700, 59, 0		y					y	y				29	8			y	y		8, 7	6, 115, 91	373	12
Chad	3, 3		y	122, 514, 13, 0		y					y	y				9	8			y	y		3, 3	2, 133, 55	307	12
Chile	31, 20		y	113, 431, 38, 45	y	y				3	y	y		y		98		7	34	y	y		31, 20	2, 95, 41	178	16
China	34, 30		y	502, 1230, 260, 88	y	y	9		246	12	y	y		y		1972	445	22	14	y	y		34, 30	52, 536, 240	743	19
Christmas Island	1, 1		y	7, 47, 0, 100	y		0					y		y		1	1		5				1, 1	0, 31, 1	29	12
Cocos (Keeling) Islands			y	12, 26, 0, 103	y							y		y		2	1							0, 19, 14	20	9
Colombia	3, 2		y	383, 1793, 588, 79	y	y	15	1	154	2	y	y		y		263	116	35		y	y		3, 2	4, 166, 88	566	18
Comoros	2, 2		y	18, 98, 0, 300	y	y	2				y	y		y		1	4	3		y	y		2, 2	0, 46, 16	53	16
Congo			y	178, 598, 58, 0	y	y	6				y	y		y		11	9			y	y			5, 86, 94	286	14
Congo, DR	6, 6		y	386, 1076, 165, 0	y	y	7			1	y	y		y		50	19		23	y	y		6, 6	10, 144, 145	503	17

Cook Islands	1, 1		y	12, 35, 0, 174	y	y			4		y	y		y		8		1		y	y		1, 1	0, 13, 17	7	15
Costa Rica	30, 26		y	207, 852, 170, 78	y	y	16		14		y	y		y		115	21	4	1	y	y		30, 26	1, 108, 43	333	17
Côte dIvoire	15, 14		y	227, 663, 86, 6	y	y	4				y	y		y		239	14			y	y		15, 14	3, 124, 110	364	15
Croatia	8, 7		y	95, 305, 20, 2	y	y				51	y	y	y	y		138	48			y	y		8, 7	4, 178, 27	223	16
Cuba	1, 1		y	55, 320, 60, 53	y	y	14		198	2	y	y		y		53	28	17	6	y	y		1, 1	0, 81, 26	198	18
Cyprus	6, 6		y	32, 274, 2, 2	y	y				8	y	y	y	y		50	20		7	y	y		6, 6	0, 166, 9	186	17
Czech Republic	4, 4	104	y	78, 288, 21, 0		y				72	y	y	y		104	1755	39			y	y		4, 4	4, 168, 21	225	16
Denmark	40, 34	78	y	61, 277, 13, 0	y	y		5		71	y	y	y	y	78	2457	120			y	y	y	40, 34	4, 170, 29	205	20
Djibouti	1, 1		y	74, 279, 6, 298	y	y	1				y	y		y		2	7	1	1	y	y		1, 1	0, 112, 40	178	17
Dominica	1, 1		y	24, 211, 4, 53	y	y	4		2		y	y		y		6	4	1	6	y	y		1, 1	1, 60, 19	141	17
Dominican Republic	2, 2		y	41, 248, 36, 52	y	y	5		59		y	y		y		56	21	3		y	y		2, 2	0, 71, 20	145	16
Ecuador	22, 13		y	328, 1573, 401, 24	y	y	21			3	y	y		y		104	107	17		y	y		22, 13	9, 138, 79	488	17
Egypt	14, 14		y	96, 378, 9, 286	y	y	10			7	y	y		y		27	34			y	y		14, 14	0, 190, 32	232	16
El Salvador			y	148, 498, 32, 22	y	y	15				y	y		y		46	20			y	y			0, 75, 35	233	14
Equatorial Guinea			y	165, 420, 69, 6	y	y	4				y	y		y		13	5	1	6	y	y			6, 65, 86	187	16
Eritrea			y	100, 528, 16, 303	y	y	2				y	y		y		3	14			y	y			0, 153, 44	324	14
Estonia	4, 4	82	y	63, 254, 10, 0	y	y				66	y	y	y	y	82	8611	64			y	y		4, 4	2, 153, 22	201	18
Ethiopia	20, 16		y	258, 796, 55, 0		y					y	y				43	69	4		y	y		20, 16	1, 173, 78	457	13
Falkland Islands (Malvinas)	20, 4		y	15, 134, 0, 0	y	y						y		y		29	22						20, 4	0, 43, 14	56	11
Faroe Islands	3, 3		y	16, 121, 0, 0	y	y						y		y			19		4				3, 3	0, 82, 13	93	11
Fiji	1, 1		y	18, 98, 2, 399	y	y	8		526	1	y	y		y		22	14	5	9	y	y		1, 1	0, 36, 23	31	19
Finland	95, 62	76	y	63, 265, 4, 0	y	y				460	y	y	y	y	76	6046	97			y	y	y	95, 62	3, 151, 17	205	19
France	170, 106	112	y	112, 351, 36, 3	y	y		8	6	609	y	y	y	y	112	1544	277	1		y	y	y	170, 106	4, 200, 46	250	21
French Guiana	47, 46		y	184, 702, 100, 0	y	y	4					y		y		34							47, 46	3, 89, 50	280	11
French Polynesia	3, 1		y	11, 81, 0, 185	y	y	0		134		y	y		y		4	32						3, 1	0, 29, 17	17	14
French Southern Territories	24, 15		y	11, 49, 0, 0	y							y		y		1	21						24, 15	0, 18, 9	9	10
Gabon	1, 1		y	168, 597, 83, 6	y	y	9				y	y		y		22	7			y	y		1, 1	7, 101, 91	287	15
Gambia			y	125, 443, 23, 6	y	y	11				y	y		y		4	13			y	y			3, 116, 71	297	14
Georgia			y	102, 279, 11, 0	y	y					y	y		y		31	31			y	y			0, 154, 26	195	13
Germany	165, 90	101	y	96, 308, 20, 0	y	y				191	y	y	y	y	101	14388	542		87	y	y	y	165, 90	4, 180, 36	236	20
Ghana	24, 13		y	235, 667, 73, 6	y	y	3			4	y	y		y		298	40	1		y	y		24, 13	3, 128, 111	370	17
Gibraltar	2, 1		y	39, 160, 3, 2	y	y						y		y		1	2						2, 1	1, 91, 18	110	11
Greece	24, 22		y	99, 345, 22, 2	y	y				117	y	y	y	y		762	196	1	2	y	y	y	24, 22	3, 196, 27	244	19
Greenland	66, 32		y	29, 77, 0, 0	y	y						y		y		7	55						66, 32	0, 43, 26	56	11
Grenada			y	24, 112, 3, 53	y	y	7		2		y	y		y		2	6	1		y	y			0, 33, 17	79	15

Guadeloupe			y	25, 192, 5, 78	y	y	7				y	y		y		20	9							1, 49, 14	121	12
Guam	16, 16		y	13, 97, 0, 0	y	y	2		68		y	y		y		16	2						16, 16	0, 70, 19	62	14
Guatemala	1, 1		y	204, 702, 130, 1	y	y	11		7	4	y	y		y		240	21	8	30	y	y		1, 1	0, 96, 42	311	18
Guinea	2, 1		y	207, 616, 64, 6	y	y	17				y	y		y		102	18	1		y	y		2, 1	2, 126, 99	351	16
Guinea-Bissau	1, 1		y	114, 457, 15, 6	y	y	15				y	y		y		8	9			y	y		1, 1	2, 121, 73	306	15
Guyana			y	208, 787, 109, 2	y	y	6				y	y		y		3				y	y			2, 96, 52	298	13
Haiti			y	40, 257, 50, 53	y	y	5		5		y	y		y		8	10	7		y	y			0, 73, 20	153	15
Heard Island and McDonald Islands			y	5, 27, 0, 0	y							y		y		1	1							0, 10, 2	6	9
Honduras			y	194, 695, 122, 75	y	y	10		71		y	y		y		67	23	14	10	y	y			0, 94, 46	296	16
Hong Kong	1, 1		y	34, 212, 23, 0	y				42	2		y		y		102	2			y			1, 1	5, 160, 31	156	13
Hungary	4, 4	85	y	78, 280, 18, 0		y				127	y	y	y		85	131	38		6	y	y		4, 4	4, 169, 20	217	17
Iceland	51, 34		y	20, 108, 0, 0	y	y				1	y	y	y	y		79	61			y	y		51, 34	0, 70, 16	89	16
India	152, 43		y	381, 1173, 167, 355	y	y	24			72	y	y		y		553	465	15	1	y	y		152, 43	25, 471, 208	658	18
Indonesia	4, 4		y	553, 1546, 236, 559	y	y	25		2070	22	y	y		y		468	227	30	10	y	y		4, 4	22, 313, 261	653	19
Iran, Islamic Republic of	5, 5		y	165, 471, 20, 109	y	y	5			15	y	y		y		144	105	3		y	y		5, 5	1, 238, 61	292	17
Iraq			y	79, 380, 5, 102	y	y					y	y		y			42			y	y			0, 203, 28	249	12
Ireland	20, 20	49	y	43, 207, 3, 0	y	y				98	y	y	y	y	49	82	106		5	y	y	y	20, 20	1, 137, 26	158	20
Israel	7, 7		y	104, 381, 7, 283	y	y				2	y	y	y	y		222	15	1		y	y		7, 7	0, 195, 35	237	17
Italy	111, 77	109	y	108, 349, 42, 2	y	y				491	y	y	y	y	109	772	156	1	16	y	y	y	111, 77	3, 200, 33	255	21
Jamaica			y	38, 186, 21, 53	y	y	8		188		y	y		y		71	16	5		y	y			0, 50, 19	107	15
Japan	15, 12		y	124, 439, 55, 435	y	y	3	1	442	26	y	y		y		276	167	10	26	y	y	y	15, 12	5, 252, 48	298	21
Jordan			y	79, 326, 4, 281	y	y				2	y	y		y		11	17			y	y			0, 164, 28	203	14
Kazakhstan	5, 2		y	150, 440, 10, 0		y					y	y				77	121			y	y		5, 2	4, 232, 35	294	12
Kenya	96, 38		y	341, 1012, 90, 270	y	y	12			10	y	y		y		287	62	3	1	y	y		96, 38	4, 172, 131	526	18
Kiribati			y	11, 35, 0, 349	y	y	2		14		y	y		y		12				y	y			0, 22, 18	14	14
Korea, Democratic People's Republic of			y	75, 326, 15, 0	y	y		1			y	y		y		31	33			y	y			5, 200, 32	229	14
Korea, Republic of	46, 25		y	64, 370, 15, 1	y	y				3	y	y		y		40	40			y	y		46, 25	4, 228, 32	256	15
Kuwait			y	31, 291, 0, 102	y	y	3				y	y		y		4	8		1	y	y			0, 154, 23	181	15
Kyrgyzstan			y	70, 328, 2, 0		y					y	y				29		1	14	y	y			1, 184, 22	227	12
Lao People's Democratic	2, 2		y	200, 684, 72, 0		y				18	y	y				25	26			y	y		2, 2	20, 307, 118	436	13
Latvia	7, 7	81	y	64, 266, 12, 0	y	y				112	y	y	y	y	81	676	71			y	y		7, 7	2, 158, 22	208	18
Lebanon			y	67, 287, 6, 2	y	y					y	y		y		5	10			y	y			1, 162, 23	190	13
Lesotho	1, 1		y	62, 244, 18, 0		y					y	y				1	6			y	y		1, 1	2, 63, 26	152	12
Liberia	1, 1		y	164, 531, 54, 6	y	y	9				y	y		y		16	9	1	1	y	y		1, 1	2, 113, 85	285	17

Libyan Arab Jamahiriya			y	79, 266, 4, 2	y	y					y	y		y		8	8		43	y	y			1, 151, 24	168	14
Liechtenstein			y	55, 172, 10, 0		y				1	y	y	y			40	2		2	y	y			2, 106, 11	141	14
Lithuania	3, 3		y	66, 242, 11, 0	y	y				131	y	y	y	y		249	44			y	y		3, 3	2, 141, 21	193	16
Luxembourg			y	54, 181, 14, 0		y				4	y	y	y			25	16			y	y	y		3, 119, 14	149	14
Macao			y	3, 41, 8, 0	y							y		y			1			y				4, 33, 3	36	9
Macedonia, former Yugoslav Republic	1, 1		y	76, 323, 14, 0		y				22	y	y				39	20			y	y		1, 1	3, 186, 16	233	13
Madagascar	10, 8		y	165, 240, 192, 326	y	y	16				y	y		y		54	73	16	9	y	y		10, 8	3, 93, 90	99	17
Malawi	3, 3		y	181, 630, 76, 0		y					y	y				94	22	1		y	y		3, 3	4, 120, 65	347	13
Malaysia	71, 31		y	288, 695, 179, 531	y	y	16		1074	7	y	y		y		603	55	3		y	y		71, 31	19, 255, 128	389	18
Maldives			y	15, 85, 0, 238	y	y	0				y	y		y			1			y	y			0, 52, 18	51	14
Mali	5, 4		y	134, 558, 22, 0		y				7	y	y				10	17			y	y		5, 4	1, 136, 50	338	13
Malta	4, 4		y	25, 203, 2, 2	y	y				2	y	y	y	y		119	11			y	y		4, 4	0, 132, 7	141	16
Marshall Islands			y	12, 59, 0, 330	y	y	0		20		y	y		y		1	6			y	y			0, 36, 18	26	15
Martinique			y	21, 225, 4, 1	y	y	5				y	y		y		19	10							1, 63, 12	145	12
Mauritania	5, 4		y	97, 458, 7, 6	y	y	3				y	y		y		3	24			y	y		5, 4	2, 156, 55	295	15
Mauritius	15, 8		y	11, 52, 0, 307	y	y	2				y	y		y		25	16	3	50	y	y		15, 8	0, 26, 7	26	17
Mayotte			y	6, 83, 0, 299	y	y	2					y		y		2	5							0, 42, 5	50	11
Mexico	70, 60		y	498, 1060, 326, 85	y	y	16	1	118	14	y	y		y		207	165	51		y	y		70, 60	6, 160, 78	451	18
Micronesia, Federated States of			y	14, 122, 0, 408	y	y	1		102		y	y		y		8	16	3		y	y			0, 73, 21	60	16
Moldova, Republic			y	69, 231, 12, 0		y					y	y	y			63	12			y	y			2, 141, 18	175	12
Monaco			y	35, 22, 2, 2	y	y						y	y	y		3				y	y			1, 10, 9	16	12
Mongolia	5, 3		y	135, 347, 5, 0		y					y	y				51	41			y	y		5, 3	2, 197, 34	240	12
Montenegro	8, 7		y	87, 309, 16, 0	y					See Serbia	y	y		y		6	5			y	y		8, 7	3, 178, 20	228	14
Montserrat			y	13, 205, 2, 52		y	3				y	y				18	3	1						0, 57, 0	137	11
Morocco	89, 54		y	119, 333, 12, 2	y	y				8	y	y		y		30	46			y	y		89, 54	2, 178, 49	213	15
Mozambique	6, 4		y	217, 667, 67, 309	y	y	15				y	y		y		46	16	1	2	y	y		6, 4	4, 134, 99	370	17
Myanmar	3, 2		y	268, 1007, 59, 321	y	y	14				y	y		y		50	55	3		y	y		3, 2	20, 403, 156	606	16
Namibia	36, 23		y	188, 592, 45, 0	y	y					y	y		y		31	19		2	y	y		36, 23	4, 135, 88	341	15
Nauru			y	9, 19, 0, 322	y	y	2				y	y		y					13	y	y			0, 11, 15	9	13
Nepal	11, 5		y	175, 809, 41, 0		y					y	y				19	27			y	y		11, 5	13, 364, 95	526	12
Netherlands	24, 20	93	y	73, 269, 16, 0	y	y		7	126	42	y	y	y	y	93	1948	105			y	y	y	24, 20	3, 167, 31	207	20
Netherlands Antilles			y	24, 244, 1, 54	y	y	3					y		y		14	19	1	23					0, 67, 19	173	13
New Caledonia			y	22, 120, 0, 382	y	y	6		144		y	y		y		50		4	8					0, 43, 23	51	14

New Zealand	31, 21		y	24, 204, 4, 13	y	y	5	2		81	y	y		y		3893		6		y	y	y	31, 21	0, 60, 23	70	18
Nicaragua			y	185, 675, 71, 74	y	y	8				y	y		y		83	33			y	y			1, 95, 45	289	14
Niger	2, 2		y	125, 426, 8, 0		y					y	y				6	16			y	y		2, 2	1, 110, 54	271	12
Nigeria	16, 16		y	263, 844, 103, 6	y	y	15		18		y	y		y		965	26	2		y	y		16, 16	9, 158, 124	441	16
Niue			y	12, 24, 0, 186		y	1				y	y				3			3	y	y			0, 11, 18	8	12
Norfolk Island			y	1, 39, 0, 62	y							y		y		1	2							0, 14, 0	12	9
Northern Mariana Islands			y	15, 115, 0, 254	y	y	1		24			y		y		10	11		2					0, 76, 21	69	13
Norway	406, 103	55	y	70, 258, 6, 0	y	y				211	y	y	y	y	55	2268	52			y	y	y	406, 103	3, 153, 35	202	19
Oman	1, 1		y	64, 330, 3, 166	y	y	3				y	y		y		6	33	1		y	y		1, 1	0, 162, 38	203	16
Pakistan	63, 13		y	176, 609, 18, 96	y	y	13			7	y	y		y		151	55	1		y	y		63, 13	4, 298, 86	367	17
Palau			y	16, 114, 1, 411	y	y	2		84			y		y		14	8			y	y			0, 70, 19	67	14
Palestinian Territory, Occupied			y	27, 231, 2, 0		y						y					5		16					0, 120, 6	153	8
Panama	21, 2		y	219, 875, 172, 85	y	y	11		196	3	y	y		y		53	53	2	3	y	y		21, 2	1, 98, 46	330	18
Papua New Guinea	8, 2		y	224, 691, 152, 527	y	y	13		214	1	y	y		y		48		7	3	y	y		8, 2	9, 109, 133	269	18
Paraguay	1, 1		y	154, 687, 71, 0		y					y	y				33			11	y	y		1, 1	4, 91, 39	248	12
Peru	28, 28		y	409, 1775, 329, 0	y	y	9			1	y	y		y		61	116	29		y	y		28, 28	14, 153, 105	499	17
Philippines	2, 2		y	163, 542, 86, 536	y	y	49		2524	4	y	y		y		379	106	11		y	y		2, 2	10, 209, 76	256	18
Pitcairn			y	12, 24, 0, 60	y	y						y		y			4		22					0, 9, 17	4	10
Poland	24, 14	104	y	91, 288, 16, 0	y	y				153	y	y	y	y	104	1596	140		7	y	y		24, 14	2, 169, 28	221	19
Portugal	7, 5	75	y	79, 308, 19, 0	y	y		1		13	y	y	y	y	75	54	90	2		y	y	y	7, 5	1, 186, 36	212	21
Puerto Rico	23, 13		y	27, 270, 19, 1	y	y	12				y	y		y		53	20	4					23, 13	0, 80, 18	174	14
Qatar			y	14, 230, 0, 106	y	y	2				y	y		y		3	5			y	y			0, 128, 11	142	14
Réunion			y	9, 44, 0, 283	y	y						y		y		24	8		6					0, 28, 8	23	12
Romania	10, 10		y	95, 320, 19, 0	y	y				142	y	y	y	y		913	33		65	y	y		10, 10	4, 186, 24	233	17
Russian Federation	329, 118		y	284, 629, 28, 0	y	y				43	y	y	y	y		7927	775	2		y	y		329, 118	6, 333, 89	409	17
Rwanda	3, 3		y	183, 626, 35, 0		y					y	y				5	7			y	y		3, 3	3, 109, 70	336	12
Saint Helena	5, 4		y	12, 55, 0, 0	y	y						y		y		20	8						5, 4	0, 27, 16	13	11
Saint Kitts and Nevis			y	21, 205, 2, 51	y	y	3		1		y	y		y		2	3			y	y			1, 58, 16	137	14
Saint Lucia	1, 1		y	21, 217, 2, 53	y	y	5		41		y	y		y		27	5			y	y		1, 1	0, 60, 15	141	15
Saint Pierre and Miquelon			y	13, 198, 0, 0	y	y						y		y		6	2							0, 54, 16	146	10
Saint Vincent and the Grenadines			y	22, 209, 3, 53	y	y	2		15			y		y		2	15		1	y	y			0, 59, 18	139	14
Samoa	1, 1		y	14, 45, 0, 272	y	y	3		28		y	y		y		10		1		y	y		1, 1	0, 20, 19	16	16

San Marino			y	28, 19, 4, 0		y						y	y							y	y			2, 10, 6	15	9
Sao Tome and Principe			y	16, 85, 7, 6	y	y	0				y	y		y			5			y	y			0, 26, 13	47	13
Saudi Arabia	1, 1		y	77, 387, 6, 304	y	y	2				y	y		y		24	39		13	y	y		1, 1	0, 175, 31	232	16
Senegal	8, 8		y	174, 544, 31, 6	y	y	10			8	y	y		y		113	17			y	y		8, 8	3, 147, 93	348	16
Serbia			y	92, 309, 21, 0	y	y				151 (inclu	y	y	y	y		86	35		2	y	y			3, 178, 21	228	16
Seychelles	8, 4		y	12, 93, 11, 304	y	y	1				y	y		y		19	20	4		y	y		8, 4	0, 51, 6	48	16
Sierra Leone	1, 1		y	176, 578, 49, 6	y	y	10				y	y		y		39	10		23	y	y		1, 1	2, 117, 89	316	16
Singapore			y	59, 308, 26, 502	y	y	10		62		y	y		y		7	3			y	y			9, 160, 43	209	15
Slovakia	5, 4	98	y	85, 293, 19, 0		y				57	y	y			98	1120	40			y	y		5, 4	4, 172, 22	229	15
Slovenia	9, 8		y	87, 285, 20, 2	y	y				36	y	y	y	y		446	26		10	y	y		9, 8	4, 165, 22	216	17
Solomon Islands			y	54, 227, 16, 481	y	y	3		22		y	y		y		4		3	8	y	y			3, 58, 44	87	16
Somalia	1, 1		y	154, 559, 30, 306	y	y	2				y	y		y		3	24	2		y			1, 1	1, 134, 63	328	15
South Africa	140, 82		y	268, 759, 108, 92	y	y	4			29	y	y		y		940	103	4		y	y		140, 82	5, 157, 111	407	17
South Georgia & S Sandwich Islands	15, 13		y	10, 94, 0, 0	y	y						y		y		5	2						15, 13	0, 34, 7	38	11
Spain	448, 218	99	y	104, 381, 34, 2	y	y		4		429	y	y	y	y	99	480	391			y	y	y	448, 218	3, 213, 38	260	20
Sri Lanka			y	104, 377, 102, 284	y	y	12			21	y	y		y		234	70	4		y	y			3, 205, 69	238	16
Sudan	2, 2		y	258, 922, 22, 283	y	y	2			2	y	y		y		21	22			y	y		2, 2	2, 190, 101	506	16
Suriname	5, 4		y	189, 696, 95, 0	y	y	5				y	y		y		15	13			y	y		5, 4	2, 86, 52	283	15
Svalbard and Jan Mayen	8, 7		y	13, 54, 0, 0	y							y	y	y		24	14						8, 7	0, 33, 11	43	11
Swaziland	5, 4		y	117, 461, 44, 0		y					y	y				4	3		1	y	y		5, 4	4, 89, 52	288	13
Sweden	105, 88	95	y	70, 276, 11, 0	y	y		6		312	y	y	y	y	95	4078	83		22	y	y	y	105, 88	3, 161, 28	212	21
Switzerland	11, 8	95	y	83, 284, 21, 0		y				7	y	y	y		95	2142	31		26	y	y	y	11, 8	4, 167, 19	220	18
Syrian Arab Republic	1, 1		y	92, 346, 6, 2	y	y					y	y		y		12	25			y	y		1, 1	1, 183, 29	225	14
Taiwan, Province of China	15, 7		y	75, 382, 34, 434	y				124			y		y		33	53						15, 7	6, 228, 50	261	11
Tajikistan	1, 1		y	68, 327, 1, 0		y					y	y				15	18			y	y		1, 1	0, 172, 22	218	12
Tanzania, United Republic of	94, 48		y	336, 1049, 158, 270	y	y	11			9	y	y		y		552	75	7		y	y		94, 48	4, 166, 131	532	17
Thailand	22, 13		y	282, 912, 118, 504	y	y	34		470	25	y	y		y		206	61		3	y	y		22, 13	27, 369, 151	548	18
Timor-Leste			y	38, 235, 5, 0	y	y	4		8		y	y		y		6	16			y	y			0, 96, 29	144	15
Togo			y	164, 545, 33, 6	y	y	4				y	y		y		88	4			y	y			3, 108, 87	325	14
Tokelau			y	1, 10, 0, 204	y	y	0				y	y		y		1								0, 5, 4	3	11
Tonga			y	13, 47, 0, 216	y	y	3		8		y	y		y		13	7			y	y			0, 22, 19	19	15
Trinidad and Tobago			y	99, 415, 33, 53	y	y	4		6		y	y		y		59	7	2		y	y			2, 78, 29	220	15

Tunisia	8, 6		y	79, 304, 7, 2	y	y				6	y	y		y		38	46			y	y		8, 6	1, 164, 26	191	15
Turkey	83, 40		y	143, 388, 28, 2	y	y				14	y	y		y		92	184	4		y	y		83, 40	2, 212, 36	255	16
Turkmenistan	3, 3		y	87, 371, 3, 0		y					y	y				18	50			y	y		3, 3	0, 199, 26	241	12
Turks and Caicos Islands			y	8, 249, 0, 50	y	y	3					y		y		33	9							0, 65, 8	165	11
Tuvalu			y	4, 17, 0, 342	y	y	2		8		y	y		y		1				y	y			0, 11, 6	8	14
Uganda	68, 47		y	302, 990, 60, 0		y				7	y	y				35	33	1	2	y	y		68, 47	5, 154, 108	497	15
Ukraine	136, 50		y	112, 318, 19, 0	y	y					y	y	y	y		4326	165		17	y	y		136, 50	3, 184, 27	237	16
United Arab Emirates			y	39, 299, 2, 108	y	y	2				y	y		y		10	19			y	y			0, 154, 27	182	14
United Kingdom	339, 198	76	y	66, 263, 8, 0	y	y			141	445	y	y	y	y	76		315	3	103	y	y	y	339, 198	3, 167, 30	197	20
United States	893, 368	276	y	410, 855, 258, 58	y	y	4	121	2784	220	y	y		y		23127				y		y	893, 368	0, 204, 82	437	18
United States Minor Outlying Islands			y	4, 85, 0, 276	y							y		y		8	1		31					0, 28, 5	48	10
Uruguay	1, 1		y	86, 405, 45, 0	y	y				5	y	y		y		20	22		101	y	y		1, 1	3, 80, 37	165	16
Uzbekistan	4, 4		y	82, 349, 1, 0		y					y	y				13	48			y	y		4, 4	0, 190, 24	231	12
Vanuatu			y	18, 82, 0, 372	y	y	5		6		y	y		y		19				y	y			0, 31, 18	33	14
Venezuela	8, 8		y	321, 1346, 222, 55	y	y	6		32		y	y		y		231	72	18	2	y	y		8, 8	3, 130, 77	461	17
Viet Nam	7, 3		y	259, 823, 106, 389	y	y	16		458	54	y	y		y		116	58	7	1	y	y		7, 3	23, 390, 165	521	19
Virgin Islands, British	1, 1		y	17, 144, 5, 51	y	y	3					y		y		33	3						1, 1	0, 45, 16	105	12
Virgin Islands, U.S.	3, 3		y	18, 148, 5, 1	y	y	7	1				y		y		13	9						3, 3	0, 47, 16	103	13
Wallis and Futuna			y	11, 35, 0, 301	y	y	1					y		y		1								0, 15, 17	14	10
Yemen			y	78, 343, 6, 318	y	y	2				y	y		y		1	57			y	y			0, 148, 37	201	14
Zambia	30, 16		y	222, 731, 81, 0		y					y	y				623	40			y	y		30, 16	6, 128, 81	392	12
Zimbabwe	35, 22		y	198, 624, 63, 0		y					y	y				239	20	2	4	y	y		35, 22	5, 123, 72	369	14

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