This data dictionary provides background information such as data source, dates and methodology for each of the indicators included in the SEDAC Compendium of Environmental Sustainability Indicators. The compendium includes several collections of national-level sustainability indicators, as described in the following table. The compendium includes both “raw” data/variables and aggregated indices. It also includes ancillary data such as dummy variables for land locked and small island countries, population, GDP, and land area.

<table>
<thead>
<tr>
<th>Indicator Collection</th>
<th>Short Name</th>
<th>Indicator # Range</th>
<th>Source</th>
</tr>
</thead>
</table>

**Table of Contents**

Collection 1: 2006 Environmental Performance Index ................................................................. 2
Collection 2: 2005 Environmental Sustainability Index .................................................................... 17
Collection 3: 2004 Environmental Vulnerability Index .................................................................... 69
Collection 4: Rio to Johannesburg Dashboard ................................................................................ 150
Collection 5: Wellbeing of Nations ............................................................................................... 165
Collection 6: 2006 National Footprint Accounts ............................................................................ 235
Ancillary Data .......................................................................................................................... 240

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## Collection 1: 2006 Environmental Performance Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EPI2006</th>
<th>Collection</th>
<th>fecolo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>1</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Environmental Performance Index (EPI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Pilot 2006 Environmental Performance Index (EPI) centers on two broad environmental protection objectives: (1) reducing environmental stresses on human health, and (2) promoting ecosystem vitality and sound natural resource management. Derived from a careful review of the environmental literature, these twin goals mirror the priorities expressed by policymakers. Environmental health and ecosystem vitality are gauged using sixteen indicators tracked in six well-established policy categories: Environmental Health, Air Quality, Water Resources, Productive Natural Resources, Biodiversity and Habitat, and Sustainable Energy. The Pilot 2006 EPI utilizes a proximity-to-target methodology focused on a core set of environmental outcomes linked to policy goals for which every government should be held accountable. By identifying specific targets and measuring how close each country comes to them, the EPI provides a factual foundation for policy analysis and a context for evaluating performance. Issue-by-issue and aggregate rankings facilitate cross-country comparisons both globally and within relevant peer groups. The EPI is the result of collaboration among the Yale Center for Environmental Law and Policy (YCELP), Columbia University Center for International Earth Science Information Network (CIESIN), the World Economic Forum, and the Joint Research Centre (JRC) of the European Commission. The EPI represents an unweighted average of two broad objectives - Environmental Health (which includes the Environmental Health policy category) and Ecosystem Vitality and Natural Resource Management (which includes the following policy categories: Air Quality, Water Resources, Biodiversity and Habitat, Productive Natural Resources, and Sustainable Energy).</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENVHEALEPI</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
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<tbody>
<tr>
<td>Indicator #</td>
<td>2</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Environmental Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Environmental Health policy category represents a weighted average of the following indicators (weights in parentheses): Urban particulates (.13) Indoor airpollution (.22)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Drinking water (.22)
Adequate sanitation (.22)
Child mortality (.21)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator Name</th>
<th>Units</th>
<th>Source</th>
</tr>
</thead>
</table>
Methodology

The Water Resources policy category represents an unweighted average of the following indicators: Nitrogen Loading and Water Consumption.

Indicator | AIREPI | Collection | EPI 2006
Indicator # | 6 | Sub-Index
Indicator Name | Air Quality
Units | Proximity to target (0-100 range with 100 being the target)
Reference Year | 2006

Methodology

The Air Quality policy category represents an unweighted average of the following indicators: Urban Particulates and Regional Ozone.

Indicator | RESMGTEPI | Collection | EPI 2006
Indicator # | 7 | Sub-Index
Indicator Name | Productive Resource Management
Units | Proximity to target (0-100 range with 100 being the target)
Reference Year | 2006

Methodology

The Productive Resource Management policy category represents an unweighted average of the following indicators:

Timber Harvest Rate
Overfishing
Agricultural Subsidies

Indicator | MORTALITYRAW | Collection | EPI 2006
Indicator # | 8 | Sub-Index
Indicator Name | Child Mortality
Units | Deaths per 1000 population aged 1-4
Reference Year | 2000-2005

Methodology

This variable was incorporated from the UN Population Division's DEMOBASE. These data form part of the Population Division's consistent time series estimates and projections of population trends and, as such, are adjusted data derived from empirical data on mortality reported in survey results or vital statistics.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MORTALITYEPI</strong></td>
<td>Indicator #</td>
<td>9</td>
</tr>
<tr>
<td><strong>Child Mortality (proximity to target)</strong></td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
</tr>
<tr>
<td><strong>Reference Year</strong></td>
<td>2000-2005</td>
<td></td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Based on the variable MORTALITYRAW, data were converted to a proximity to target measure, with 0 deaths per 1,000 children being the target.</td>
<td></td>
</tr>
<tr>
<td><strong>INDOORRAW</strong></td>
<td>Indicator #</td>
<td>10</td>
</tr>
<tr>
<td><strong>Indoor Air Pollution</strong></td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>Percentage of households using solid fuels, adjusted for ventilation</td>
<td></td>
</tr>
<tr>
<td><strong>Reference Year</strong></td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Solid fuel use is defined as the household combustion of coal or biomass (such as dung, charcoal, wood, or crop residues). The approach taken in this guide is based on a binary classification scheme for exposure levels, separating the study population into those exposed to solid fuel use and those not exposed followed by the application of relative risks derived from a comprehensive review of the current epidemiological literature on solid fuel use. Central estimates used. For China, original data provided separately for children and adults. These values were averaged. A single value was provided covering both Ethiopia and Eritrea. This was applied to both countries. We assigned the value of 0 for both Iceland and Malta.</td>
<td></td>
</tr>
<tr>
<td><strong>INDOOREPI</strong></td>
<td>Indicator #</td>
<td>11</td>
</tr>
<tr>
<td><strong>Indoor Air Pollution (proximity to target)</strong></td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
</tr>
<tr>
<td><strong>Reference Year</strong></td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Based on the variable INDOORRAW, the data were converted to a proximity to target measure, with 0 percent of households using solid fuels without adequate ventilation being the target.</td>
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</tr>
<tr>
<td>Indicator</td>
<td>WATSUPRAW</td>
<td>Collection</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
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</tr>
<tr>
<td>Indicator #</td>
<td>12</td>
<td>Sub-Index</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Drinking Water Access</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of population with access to an improved water source</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990 and 2002</td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>“Improved” water supply technologies are: household connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection. “Not improved” are: unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality), tanker truck-provided water. It is assumed that if the user has access to an “improved source” then such source would be likely to provide 20 litres per capita per day at a distance no longer than 1000 metres. This hypothesis is being tested through National Health Surveys which are being conducted by WHO in 70 countries. (Communication of 25 March 2003 from the WHO Water, Sanitation and Health Programme). Source: World Health Organization and United Nations Children's Fund. Water Supply and Sanitation Collaborative Council. Global Water Supply and Sanitation Assessment, 2000 Report, Geneva and New York. (pp. 77- 78). Values for 1990 are used for the following countries: Argentina, New Zealand, and Saudi Arabia. The following countries provided data to the 2005 ESI: United Arab Emirates, Belgium, Ireland, Italy, Taiwan. OECD countries with missing data are set to 100: Czech Rep., France, Greece, Poland, Portugal, Spain, and Great Britain. Liechtenstein and Slovenia are also set to 100. The total population of a country may comprise either all usual residents of the country (de jure population) or all persons present in the country (de facto population) at the time of the census. For purposes of international comparisons, the de facto definition is recommended. Source: United Nations. Multilingual Demographic Dictionary, English Section. Department of Economic and Social Affairs, Population Studies, No. 29 (United Nations publication, Sales No. E.58.XIII.4).</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
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<th>Collection</th>
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</tr>
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<tbody>
<tr>
<td>Indicator #</td>
<td>13</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Drinking Water Access (proximity to target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990 and 2002</td>
<td></td>
<td></td>
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<tr>
<td>Methodology</td>
<td>Based on the variable WATSUPRAW, the data were then converted to a proximity to target measure, with a coverage of 100% being the target.</td>
<td></td>
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</tr>
<tr>
<td>Indicator</td>
<td>ACSATRAW</td>
<td>Collection</td>
<td>EPI 2006</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td>------------</td>
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</tr>
<tr>
<td>Indicator #</td>
<td>14</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Adequate Sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of population with improved access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990 and 2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>&quot;Improved&quot; sanitation technologies are: connection to a public sewer, connection to septic system, pour-flush latrine, simple pit latrine, ventilated improved pit latrine. The excreta disposal system is considered adequate if it is private or shared (but not public) and if hygienically separates human excreta from human contact. &quot;Not improved&quot; are: service or bucket latrines (where excreta are manually removed), public latrines, latrines with an open pit. The total population of a country may comprise either all usual residents of the country (de jure population) or all persons present in the country (de facto population) at the time of the census. For purposes of international comparisons, the de facto definition is recommended. Source: United Nations. Multilingual Demographic Dictionary, English Section. Department of Economic and Social Affairs, Population Studies, No. 29 (United Nations publication, Sales No. E.58.XIII.4). 2002 Values for Argentina and Malaysia are 1990 values. The following OECD countries had missing values that were set to 100: Belgium, Czech Rep., Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, New Zealand, Norway, Poland, Portugal, Korea, Spain, and Great Britain. Liechtenstein and Slovenia were also set to 100 on the basis that their per capita incomes exceeded US$14,000, which is the empirical threshold beyond which all countries have 100% coverage.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>ACSATEPI</th>
<th>Collection</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>15</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Adequate Sanitation (proximity to target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
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</tr>
<tr>
<td>Reference Year</td>
<td>1990 and 2002</td>
<td></td>
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<tr>
<td>Methodology</td>
<td>Based on the variable ACSATRAW, the data were then converted to a proximity to target measure, with a coverage of 100% being the target.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PM10RAW</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>16</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Urban Particulates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population weighted average of micrograms per cubic meter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>PM10 data: 1999, Population data 2000</td>
<td></td>
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</tr>
</tbody>
</table>

Methodology

A population weighted PM10 concentration estimate was calculated by country. Population weighting was used to account for exposure. Only cities larger than 100,000 population and national capitals were considered.

Indicator PM10EPI Collection EPI 2006
Indicator # 17 Sub-Index
Indicator Name Urban Particulates (proximity to target)
Units Proximity to target (0-100 range with 100 being the target)
Reference Year PM10 data: 1999, Population data 2000
Methodology Based on the variable PM10RAW, the data were then converted to a proximity to target measure, with an ambient concentration of 10 micrograms per cubic meter being the target.

Indicator OZONERAW Collection EPI 2006
Indicator # 18 Sub-Index
Indicator Name Regional Ozone
Units Ozone concentration (parts per billion)
Reference Year 1990-2004 (10 highest concentrations from this 14 year period)
Source Data on ozone concentrations up to an altitude of 70 meters above ground level from the global chemical tracer model (Mozart-2) were processed by Jungfeng Liu under the overall supervision of Denise Mauzerall, Princeton University. MOZART was developed at NCAR, the Max-Planck-Institute for Meteorology, and NOAA/GFDL. Available at: http://gctm.acd.ucar.edu/mozart/models/m2/index.shtml. There are currently 3 versions of the model. MOZART-2 is the tropospheric version that was published in Horowitz et al. [JGR, 2003]. Paper available at: http://www.gfdl.noaa.gov/~lwh/mozart/moz2_paper.pdf.
Methodology We used the Mozart Model to output daily ozone concentration estimates on a global grid measuring approximately 1.9 degrees, for a 14-year time period. For each grid cell, we calculated the average of the 10 highest daily concentrations. We then calculated two national aggregations. First, we averaged the 10 highest daily concentrations across all grid cells within a country. Second, we calculated the maximum of these maximum highest daily
averages across all grid cells within a country. We then averaged these two national values to arrive at a single composite measure of ozone concentration.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>OZONEEPI</th>
<th>Collection</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>19</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Regional Ozone (proximity to target)</td>
<td></td>
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</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
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<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990-2004 (10 highest concentrations from this 14 year period)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Based on the variable OZONERAW, the data were then converted to a proximity to target measure, with an ambient concentration of 15 parts per billion of ozone being the target.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>NLOADRAW</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>20</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Nitrogen Loading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average nitrogen concentration in a country's water bodies (milligrams per liter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>Contemporary (mean annual 1950-1995)</td>
<td></td>
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</tr>
</tbody>
</table>
| Methodology | This variable represents nitrogen loading per average flow of a nation's river basin. Though we titled the variable Nitrogen Loading, the data actually reflect potential concentrations in kg/m3 (converted to mg/L). They are potential concentrations because they do not take into account for the self-cleansing potential of land and aquatic ecosystems, which may remove up to 80% of incident loads. Total basin outflow for each river basin was redistributed as runoff equally across all 1/4 degree grid cells within each basin. Nitrogen loading and redistributed runoff were summed within the partial river basins that fell within each country. Summed nitrogen loading within each partial basin was divided by the summed runoff within the same partial basin resulting in a nitrogen concentration (NLOAD, in kg/m3) per partial basin. The average nitrogen loading in a country's rivers is an areally-weighted average of the NLOAD values for all partial basins within each country. Kg/m3 values were then converted to mg/liter to render an average concentration. Values above 660,000 mg/L were adjusted to the 9
maximum of 660,000, which reflects the concentration at which nitrogen is no longer soluble and any additional nitrogen will remain in its solid form.

**Indicator** NLOADEPI  **Collection** EPI 2006

**Indicator #** 21  **Sub-Index**

**Indicator Name** Nitrogen Loading (proximity to target)

**Units** Proximity to target (0-100 range with 100 being the target)

**Reference Year** Contemporary (mean annual 1950-1995)


**Methodology** Based on the variable NLOADRAW, the data were then converted to a proximity to target measure, with a concentration of 1 mg/L of dissolved nitrogen being the target.

**Indicator** OVRSUBRAW  **Collection** EPI 2006

**Indicator #** 22  **Sub-Index**

**Indicator Name** Water Consumption

**Units** Percentage of territory in which consumption exceeds 40% of available water

**Reference Year** Contemporary (mean annual 1950-1995)

**Source** University of New Hampshire, Water Systems Analysis Group (http://www.watsys.sr.unh.edu). Human water demand was computed using the following data sources: population per grid cell; per capita country or sub national level domestic water demand; per capita country or sub national level industrial water demand; irrigated land extent per grid cell (according to Döll, P., Siebert, S. 2000. A digital global map of irrigated areas. ICID Journal, 49(2), 55-66); and country or sub national level agricultural water demand (irrigation). Global discharge fields were computed by blending mean annual discharge observations (where available) with a climatology (1950-1995) of discharge output from the Water Balance Model based on Vörösmarty, C. J., C. A. Federer and A. L. Schloss. 1998. Evaporation functions compared on US watershed: Possible implications for global-scale water balance and terrestrial ecosystem modeling, Journal of Hydrology, 207 (3-4): 147-169.

**Methodology** An indicator of relative water demand (RWD) for each 1/4 degree grid cell was computed by dividing total human water demand (domestic + industrial + agricultural water or DIA) by renewable water supply (Q). RWD = 0.4 was established as the threshold for water stressed conditions. The percentage of territory in which water resources are oversubscribed was computed by summing the area of grid cells in each country where RWD >= 0.4. Details on the computation and use of RWD (alternatively known as the Relative Water Stress Index or RWSI) can be found in Vörösmarty, C. J., P. Green, J. Salisbury and R. B. Lammers. 2000. Global water resources: vulnerability from climate change and population growth, Science, 289:284-288 and Vörösmarty, C. J., E. M. Douglas, P. Green and C. Revenga. 2005. Geospatial Indicators of Emerging Water Stress: An Application to Africa, Ambio, 34 (3): 230-236."
**Indicator** | OVRSUBEPI | **Collection** | EPI 2006  
**Indicator #** | 23 | **Sub-Index**  
**Indicator Name** | Water Consumption (proximity to target)  
**Units** | Proximity to target (0-100 range with 100 being the target)  
**Reference Year** | Contemporary (mean annual 1950-1995)  
**Methodology** | Based on the variable OVERSUBRAW, the data were converted to a proximity to target measure, with 0% of the country's territory subject to oversubscription being the target.

**Indicator** | PWIRAW | **Collection** | EPI 2006  
**Indicator #** | 24 | **Sub-Index**  
**Indicator Name** | Wilderness Protection  
**Units** | Percentage of wild areas that are protected  
**Reference Year** | circa 2000  
**Methodology** | For each biome in a country, the following were calculated: the mean and standard deviation of Human Influence Index values, the sum of the footprint of human habitation (settlements, land use), infrastructural development (transportation and electric grid) and the population densit. The wildest parts of that biome were identified as those areas whose Human Influence Index values were less than one standard deviation below the mean. This resulted in a grid for each country that included the wildest areas by biome. Protected areas were then overlaid on the wildest areas in the country to determine the percentage of wild areas that are protected. Protected areas in the World Database on Protected Areas (WDPA) that did not include boundaries were attributed boundaries by drawing a circle around the protected area's centroid equal to the area of the protected area. Cultural heritage and urban protected areas were not removed from the protected areas layer.

**Indicator** | PWIEPI | **Collection** | EPI 2006  
**Indicator #** | 25 | **Sub-Index**  
**Indicator Name** | Wilderness Protection (proximity to target)  
**Units** | Proximity to target (0-100 range with 100 being the target)  
**Reference Year** | circa 2000  
**Methodology** | Based on the variable PWIRAW, the data were then converted to a proximity to target measure, with 90 percent coverage of wild areas being the target.
**Indicator** PACOVRAW **Collection** EPI 2006

**Indicator #** 26 **Sub-Index**

**Indicator Name** Ecoregion Protection

**Units** Score of 0 to 1 (proportion of the target of 10% reached)

**Reference Year** 2004

**Source** Protected Areas data: 2005 World Database of Protected Areas (http://maps.geog.umd.edu/WDPA/WDPA_info/English/WDPA2005.html); Ecoregions data: World Wildlife Federations map: Terrestrial Ecoregions of the World (http://worldwildlife.org/wildworld/).

**Methodology** The global target for protected areas coverage is 10% of national territory. Thus, the target is for every country to have 10% of the land area in each of its biomes under protected status. For each biome in each country we calculate 10% of its total area, and then calculate the actual land area under protected status for that biome. We then take the ratio of the land under protected status to the target of 10% of the biome's area. If the area protected is equal to or greater than 10% of the biome, then the country receives a score of 1 for that biome. If only 5% is protected, the country receives a score of 0.5. The ratios for each biome are then averaged using a simple arithmetic average.

---

**Indicator** PACOVEPI **Collection** EPI 2006

**Indicator #** 27 **Sub-Index**

**Indicator Name** Ecoregion Protection (proximity to target)

**Units** Proximity to target (0-100 range with 100 being the target)

**Reference Year** 2004


**Methodology** Based on the variable PACOVRAW, the data were converted to a proximity to target measure, with a score of 1 being (protected areas covering at least 10% of all ecoregions) being the target.

---

**Indicator** HARVESTRAW **Collection** EPI 2006

**Indicator #** 28 **Sub-Index**

**Indicator Name** Timber Harvest Rate

**Units** Percentage of standing forests harvested

**Reference Year** 2000 and 2004

Methodology
Timber harvest is represented by FAO data on Roundwood. This term is defined by the FAO's Joint Forest Sector Questionnaire Definitions as follows: All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel, including wood for charcoal and industrial roundwood (wood in the rough). It is reported in cubic metres solid volume underbarck (i.e. including bark). Standing forest is represented by total wood volume in forests measured in millions of cubic meters.

Indicator
HARVESTEPI
Collection EPI 2006
Indicator # 29 Sub-Index
Indicator Name Timber Harvest Rate (proximity to target)
Units Proximity to target (0-100 range with 100 being the target)
Reference Year 2000 and 2004
Methodology Based on the variable HARVESTRAW, the data were converted to a proximity to target measure, with a timber harvest rate of 3% of standing volume being the target.

Indicator
AGSUBRAW
Collection EPI 2006
Indicator # 30 Sub-Index
Indicator Name Agricultural Subsidies
Units Agricultural subsidies adjusted for environmental payments as percent of agricultural value added
Reference Year Average of available annual data for the period 1995-2001
Source The data on agricultural subsidies for this indicator are drawn from two sources. For countries other than the 15 original European Union member states, the data are derived from a conversion of WTO-US Department of Agriculture/Environmental Resource Service online data. See: http://www.ers.usda.gov/db/Wto/AMS_database/Default.asp?ERSTab=3 Table DS-4 (accessed October 2005). For the 15 member states of the European Union, the data are taken from the Annexes to the Commission Staff Working Document [SEC(2004)1311 – 27.10.2004] Accompanying the 33rd Financial Report on the European Agricultural Guidance and Guarantee Fund, Guarantee Section - 2003 Financial Year [COM(2004)715 final], online at http://europa.eu.int/comm/agriculture/fin/finrep03/annexe_fr.pdf (accessed 17 November 2005). The subsidies are adjusted for environmental payments, which in many cases constitute positive subsidies, and then standardized by agricultural value added. The agricultural value added figures for the EU15 countries are drawn from Eurostat online http://epp.eurostat.ec.eu.int/portal/page?_pageid=0,1136206,0_45570467&_dad=portal&_schema=PORTAL (accessed 17 November 2005), for the remaining countries the source is WTO_US Agriculture/Environmental Resource Service online (see above). Environmental Payments are drawn from Table DS-1 from the WTO-US online source (see above). For Taiwan we used an agricultural tariffs figure from the Taiwan Yearbook at
For each country, available information on governmental or supra-governmental (EU15) agricultural payments were converted to US dollars using the average applicable currency exchange rate for the corresponding year. Although quite varied over countries, these are the subsidies that have been linked in the scientific literature to more intensive agricultural production patterns and associated environmental damages. The resulting data are then adjusted for environmental payments in US dollars ("Green Box" subsidies) taken from Table DS-1 of the WTO-US source and divided by agricultural value added in US dollars. Only environmental payments were used since they represent the cleanest measure of positive environmental payments in the Green Box category. This may therefore exclude some other positive environmental payments such as land conservation programs. Some countries have negative values, which represent either net taxes, more likely from administered prices than actual taxation of producers or cases where Green Box payments exceed total AMS payments.

### Indicator AGSUBEPI

**Collection**

EPI 2006

**Indicator #**

31

**Sub-Index**

**Indicator Name**

Agricultural Subsidies (proximity to target)

**Units**

Proximity to target (0-100 range with 100 being the target)

**Reference Year**

Average of available annual data for the period 1995-2001

**Source**


**Methodology**

Based on the variable AGSUBRAW, the data were converted to a proximity to target measure, with agricultural subsidies of 0% being the target.

### Indicator OVRFSHRAW

**Collection**

EPI 2006

**Indicator #**

32

**Sub-Index**

**Indicator Name**

Productivity Overfishing

**Units**

Score between 1 and 7 with high scores corresponding to overfishing

**Reference Year**

Average for 1993-1998

**Source**


**Methodology**

This measure is drawn from the Environmental Vulnerability Index (EVI) prepared by the South Pacific Applied Geoscience Commission (SOPAC) in partnership with UNEP and other support. The indicator's categories are based on the ratio of fisheries productivity to fish catch, or specifically the ratio of tonnes of carbon per square kilometer of exclusive economic zone per year to tonnes of fish catch per kilometer square of shelf per year. The score ranges represent the following: 1=|>=3.2 millions], 2=(3.2-1.2 millions], 3=(1.2 millions - 442 thousand], 4=(442-163 thousand] , 5=(163-60 thousand], 6=(60-22 thousand], 7=(<=22 thousand]. Taiwan provided its own data.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>OVRFSHEPI</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>33</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Overfishing (proximity to target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>Average for 1993-1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Based on the variable OVERFSHRAW, the index was then converted to a proximity to target measure, with a productivity overfishing index of 1 being the target.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENEFFRAW</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>34</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Energy Efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Terajoules per million GDP (constant 2000 international PPP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1994-2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Notes from IEA 2003: Data for the most recent year are preliminary. Total primary energy consumption reported in this table includes the consumption of petroleum, dry natural gas, coal, and net hydroelectric, nuclear, and geothermal, solar, wind, and wood and waste electric power. Total primary energy consumption for each country also includes net electricity imports (electricity imports minus electricity exports) from Table S.6 . Electricity net imports are included because the net electricity consumption by energy type data noted above are really net electricity generation data that have not been adjusted to include electricity imports and exclude electricity exports. Total primary energy consumption for the United States also includes the consumption of geothermal, solar, and wood and waste energy not used for electricity generation from Table E.8. The original data are in quadrillion BTU (10^15 BTU), which are converted to Terajoule using the conversion factor: 10^15 BTU=1055055.9 Terajoule. Conversion factor taken from <a href="http://www.onlineconversion.com/energy.htm">http://www.onlineconversion.com/energy.htm</a> (accessed 17 November 2005).</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENEFFEPI</th>
<th>Collection</th>
<th>EPI 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>35</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Energy Efficiency (proximity to target)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Units
Proximity to target (0-100 range with 100 being the target)
Reference Year
1994-2003
Source
Methodology
Based on the variable ENEFFRAW, the data were converted to a proximity to target measure, with 1,650 Terajoules per million US$ GDP PPP being the target (this represents the 10th percentile most energy efficient of the original EPI data set of ~250 countries).

Indicator RENPCRAW
Collection EPI 2006
Indicator # 36
Sub-Index
Indicator Name Renewable Energy
Units Renewable energy production as percentage of total energy consumption
Reference Year 1994-2003
Methodology Hydroelectric, biomass, geothermal, solar and wind electric power production were calculated as a percent of total energy consumption. Some countries exceed 100 percent because they are net exporters of renewable energy. Note that biomass energy utilized locally (e.g., fuelwood or dung burned by low income households in the developing world) are not included in these figures.

Indicator RENPCEPI
Collection EPI 2006
Indicator # 37
Sub-Index
Indicator Name Renewable Energy (proximity to target)
Units Proximity to target (0-100 range with 100 being the target)
Reference Year 1994-2003
Methodology Based on the variable RENPCRAW, the data were converted to a proximity to target measure, with 100% renewables being the target.

Indicator CO2GDPRAW
Collection EPI 2006
Indicator # 38
Sub-Index
Indicator Name CO2 per GDP
### Units
Metric tons of carbon emissions per million GDP in constant 1995 US dollars

### Reference Year
2000

### Source

### Methodology
Total annual CO2 emissions in metric tons have been normalized by million GDP in constant 1995 US dollars for each country. For the People's Republic of Korea World Bank GDP data were not available and UN estimates of GDP at market prices, current prices, US$ for 2000 were used instead.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
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</thead>
<tbody>
<tr>
<td>CO2GDPEPI</td>
<td>EPI 2006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Proximity to GDP (proximity to target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Proximity to target (0-100 range with 100 being the target)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
</tr>
</tbody>
</table>

### Methodology
Based on the variable CO2GDPRAW, the data were converted to a proximity to target measure, with 0 tonnes per GDP being the target.

### Collection 2: 2005 Environmental Sustainability Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESI2005</td>
<td>ESI 2005</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>2005 Environmental Sustainability Index (ESI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2006</td>
</tr>
</tbody>
</table>
Methodology

The ESI score quantifies the likelihood that a country will be able to preserve valuable environmental resources effectively over the period of several decades. Put another way, it evaluates a country's potential to avoid major environmental deterioration. It represents an unweighted average of the scores for the ESI's 21 indicators.

Indicator | SYSTEM | Collection | ESI 2005
Indicator # | 41 | Sub-Index
Indicator Name | Environmental Systems Component
Units | Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])
Reference Year | 2005
Methodology | The Environmental Systems component represents an unweighted average of the following indicators: Air Quality, Biodiversity, Land, Water Quality, and Water Quantity.
Rationale | A country is more likely to be environmentally sustainable to the extent that its vital environmental systems are maintained at healthy levels, and to the extent to which levels are improving rather than deteriorating.

Indicator | STRESS | Collection | ESI 2005
Indicator # | 42 | Sub-Index
Indicator Name | Reducing Environmental Stresses
Units | Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])
Reference Year | 2005
Methodology | The Reducing Environmental Stresses component represents an unweighted average of the following indicators: Reducing Air Pollution, Reducing Ecosystem Stress, Reducing Population Pressure, Reducing Waste & Consumption Pressures, Reducing Water Stress, and Natural Resource Management.
Rationale | A country is more likely to be environmentally sustainable if the levels of anthropogenic stress are low enough to engender no demonstrable harm to its environmental systems.

Indicator | VULNER | Collection | ESI 2005
Indicator # | 43 | Sub-Index
Indicator Name | Reducing Human Vulnerability Component
Units | Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])
**Reference Year**: 2005  

**Methodology**: The Reducing Human Vulnerability component represents an unweighted average of the following indicators: Environmental Health, Basic Human Sustenance, and Reducing Environment-Related Natural Disaster Vulnerability.

**Rationale**: A country is more likely to be environmentally sustainable to the extent that people and social systems are not vulnerable to environmental disturbances that affect basic human wellbeing; becoming less vulnerable is a sign that a society is on a track to greater sustainability.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CAP</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>44</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Social and Institutional Capacity Component</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reference Year**: 2005  

**Methodology**: The Social and Institutional Capacity component represents an unweighted average of the following indicators: Environmental Governance, Eco-Efficiency, Private Sector Responsiveness, and Science and Technology.

**Rationale**: A country is more likely to be environmentally sustainable to the extent that it has in place institutions and underlying social patterns of skills, attitudes, and networks that foster effective responses to environmental challenges.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GLOBAL</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>45</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Global Stewardship Component</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (ranging from theoretical minimum of 0 [bad] to a maximum of 100 [good])</td>
<td></td>
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</tr>
</tbody>
</table>

**Reference Year**: 2005  

**Methodology**: The Global Stewardship component represents an unweighted average of the following indicators: Participation in International Collaborative Efforts, Greenhouse Gas Emissions, and Reducing Transboundary Environmental Pressures.

**Rationale**: A country is more likely to be environmentally sustainable if it cooperates with other countries to manage common environmental problems, and if it reduces negative transboundary environmental impacts on other countries to levels that cause no serious harm.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>Indicator #</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS_AIR</td>
<td>ESI 2005</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**: Air Quality Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The SYS_AIR indicator represents the unweighted average of the following variables: NO2, SO2, TSP, and INDOOR.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>Indicator #</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS_LAN</td>
<td>ESI 2005</td>
<td>47</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**: Land Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The SYS_LAN indicator represents the unweighted average of the following variables: ANTH10 and ANTH40.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>Indicator #</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS_WQL</td>
<td>ESI 2005</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**: Water Quality Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The SYS_WQL indicator represents the unweighted average of the following variables: WQ_DO, WQ_EC, WQ_PH, WQ_SS
<table>
<thead>
<tr>
<th>Indicator</th>
<th>SYS_WQN</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
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<tbody>
<tr>
<td>Indicator #</td>
<td>49</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Water Quantity Indicator</td>
<td></td>
<td></td>
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<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
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</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The SYS_WQN indicator represents the unweighted average of the following variables: WATAVL and GRDAVL.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SYS_BIO</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>50</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Biodiversity Indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
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<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
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<tr>
<td>Methodology</td>
<td>The SYS_BIO indicator represents the unweighted average of the following variables: ECORISK, PRTBRD, PRTMAM, PRTAMPH, and NBI.</td>
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</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GLO_COL</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>51</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Participation in International Collaborative Efforts Indicator</td>
<td></td>
<td></td>
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<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
<td></td>
<td></td>
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<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The GLO_COL indicator represents the unweighted average of the following variables: EIONUM, FUNDING, and PARTICIP.</td>
<td></td>
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</tr>
</tbody>
</table>
**Indicator**: GLO_GHG  
**Collection**: ESI 2005  
**Indicator #**: 52  
**Sub-Index**:  
**Indicator Name**: Greenhouse Gas Emissions Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The GLO_GHG indicator represents the unweighted average of the following variables: CO2GDP and CO2PC.

---

**Indicator**: GLO_TBP  
**Collection**: ESI 2005  
**Indicator #**: 53  
**Sub-Index**:  
**Indicator Name**: Reducing Transboundary Environmental Pressures Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The GLO_TBP indicator represents the unweighted average of the following variables: S02EXP and POLEXP.

---

**Indicator**: STR_AIR  
**Collection**: ESI 2005  
**Indicator #**: 54  
**Sub-Index**:  
**Indicator Name**: Reducing Air Pollution Indicator  
**Units**: Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')  
**Reference Year**: 2005  
**Methodology**: The STR_AIR indicator represents the unweighted average of the following variables: COALKM, NOXKM, SO2KM, VOCKM, and CARSKM.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>STR_ECO</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>55</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Reducing Ecosystem Stress Indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The CAP_ST indicator represents the unweighted average of the following variables: FOREST and ACEXC.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>STR_POP</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>56</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Reducing Population Pressure Indicator</td>
<td></td>
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</tr>
<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The STR_POP indicator represents the unweighted average of the following variables:GR2050 and TFR.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>STR_WAS</th>
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<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>57</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Reducing Waste &amp; Consumption Pressure Indicator</td>
<td></td>
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<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
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</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The STR_WAS indicator represents the unweighted average of the following variables: EFPC, RECYCLE, and HAZWST.</td>
<td></td>
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</tr>
<tr>
<td>Indicator</td>
<td>STR_WAT</td>
<td>Collection</td>
<td>ESI 2005</td>
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</tr>
<tr>
<td>Indicator #</td>
<td>58</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Reducing Water Stress Indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
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<td>Methodology</td>
<td>The STR_WAT indicator represents the unweighted average of the following variables: BODWAT, FERTHA, PESTHA, and WATSTR.</td>
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<th>Collection</th>
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<td>Indicator #</td>
<td>59</td>
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<tr>
<td>Indicator Name</td>
<td>Natural Resource Management Indicator</td>
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<tr>
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<td>Methodology</td>
<td>The STR_NRM indicator represents the unweighted average of the following variables: OVRFSH, FORCERT, WEFSUB, IRRSAL, and AGSUB.</td>
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<th>Collection</th>
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<td>Indicator Name</td>
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<td>The VUL.HEA indicator represents the unweighted average of the following variables: DISINT, DISRES, and U5MORT.</td>
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<td>VUL_SUS</td>
<td>Collection</td>
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<td>Indicator #</td>
<td>61</td>
<td>Sub-Index</td>
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<tr>
<td>Indicator Name</td>
<td>Basic Human Sustenance Indicator</td>
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<td>Methodology</td>
<td>The VUL_SUS indicator represents the unweighted average of the following variables: UND_NO and WATSUP.</td>
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<th>Indicator</th>
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</tr>
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<tr>
<td>Indicator #</td>
<td>62</td>
<td>Sub-Index</td>
<td></td>
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<tr>
<td>Indicator Name</td>
<td>Reducing Environment-Related Natural Disaster Vulnerability Indicator</td>
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<tr>
<td>Methodology</td>
<td>The VUL_DIS indicator represents the unweighted average of the following variables: DISCAS and DISEXP.</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>CAP_GOV</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>63</td>
<td>Sub-Index</td>
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<td>Indicator Name</td>
<td>Environmental Governance Indicator</td>
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<td>Methodology</td>
<td>The CAP_GOV indicator represents the unweighted average of the following variables: GASPGR, GRAFT, GOVEFF, PRAREA, WEFGOV, LAW, AGENDA21, CIVLIB, CGSDI, IUCN, KNWLDG, and POLIT.</td>
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<td>Indicator</td>
<td>CAP_EFF</td>
<td>Collection</td>
<td>ESI 2005</td>
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<td>Indicator #</td>
<td>64</td>
<td>Sub-Index</td>
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<tr>
<td>Indicator Name</td>
<td>Eco-Efficiency Indicator</td>
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<td>2005</td>
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<tr>
<td>Methodology</td>
<td>The CAP_EFF indicator represents the unweighted average of the following variables: ENEFF and RENPC.</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>CAP_PRI</th>
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<td>65</td>
<td>Sub-Index</td>
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<tr>
<td>Indicator Name</td>
<td>Private Sector Responsiveness Indicator</td>
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<tr>
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<td>2005</td>
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<tr>
<td>Methodology</td>
<td>The CAP_PRI indicator represents the unweighted average of the following variables: DJSGI, ECOVAL, ISO14, WEFPRI, and RESCARE.</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>CAP_ST</th>
<th>Collection</th>
<th>ESI 2005</th>
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</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>66</td>
<td>Sub-Index</td>
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</tr>
<tr>
<td>Indicator Name</td>
<td>Science and Technology Indicator</td>
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<td></td>
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<tr>
<td>Units</td>
<td>Z-score (mean is 0, +1 and -1 are plus and minus one standard deviation above the mean, high numbers are 'good')</td>
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<tr>
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<td>2005</td>
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</tr>
<tr>
<td>Methodology</td>
<td>The CAP_ST indicator represents the unweighted average of the following variables: INNOV, DAI, PECR, ENROL, and RESEARCH.</td>
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</table>
**Indicator** NO2  
**Collection** ESI 2005

**Indicators Name** Urban population weighted NO2 concentration

**Units** Micrograms per cubic meter

**Reference Year** MRYA 1993-2004

**Source**

**Methodology**
The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen.

**Rationale**
Poor ambient air quality affects both human and ecosystem health. Humans exposed to high NO2 concentrations may suffer respiratory illness and lung damage. NO2 is also a precursor to the formation of ground-level ozone and acid rain. Through reactions of NO2 with other substances such as volatile organic compounds (VOC) in the atmosphere can cause reduced visibility.

---

**Indicator** SO2  
**Collection** ESI 2005

**Indicators Name** Urban population weighted SO2 concentration

**Units** Micrograms per cubic meter

**Reference Year** MRYA 1993-2004

The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen.

Poor ambient air quality affects both human and ecosystem health. Humans exposed to high SO2 concentrations, especially asthmatics, may suffer from respiratory tract problems and permanent damage to lung tissue as a result of long-term exposure. SO2 is an important precursor to the formation of acid rain and fog, which changes the composition of soils, causes acidification of water bodies, and negatively affects animal and plant growth. In many locations, SO2 particles in the atmosphere are the largest source of haze and impaired visibility.

**Indicator**

TSP

**Collection**

ESI 2005

**Indicator #**

69

**Sub-Index**

**Indicator Name**

Urban population weighted TSP concentration

**Units**

Micrograms TSP per cubic meter

**Reference Year**

MRYA 1993-2002

**Source**

The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen. All data refer to Total Suspended Particulates (TSP) except for the EEA and some individual country data points, which refer to PM10 (aerodynamic diameter less than 10 micrometers). The conversion factor applied to convert from PM10 to TSP is 1.1. TSP value for the USA represents a crude estimate based on information shown in first chart on website, http://www.epa.gov/air/airtrends/aqtrnd01/pmatter.html and its value is not population weighted due to lack of information on the population living near the monitoring

Poor ambient air quality affects both human and ecosystem health. Many studies have linked exposure to particulate matter (PM) to adverse health effects in humans such as increased asthma attacks, chronic bronchitis, decreased lung function, and premature death. PM can travel over long distances and is a significant contributor to reduced visibility. The deposition of PM can change the nutrient composition of soils and surface waters and affects the diversity of ecosystems.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>INDOOR</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>70</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Indoor air pollution from solid fuel use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of households using solid fuels, adjusted for ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
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</tbody>
</table>
Methodology

Solid fuel use is defined as the household combustion of coal or biomass (such as dung, charcoal, wood, or crop residues). The approach taken in WHO guidelines is based on a binary classification scheme for exposure levels, separating the study population into those exposed to solid fuel use and those not exposed followed by the application of relative risks derived from a comprehensive review of the current epidemiological literature on solid fuel use. Central estimates were used. For China, original data was provided separately for children and adults and these values were averaged. A single value was provided and applied to both Ethiopia and Eritrea. Corrections are made for variation in prevailing ventilation.

Rationale

The public health community has drawn attention to the deleterious effects of indoor air pollution, especially on women who cook inside using solid fuels. High exposure to the fumes from solid fuel combustion is dangerous to human health. Solid fuel use has further consequences for deforestation and soil depletion because of dung collection.

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ECORISK</th>
<th>Collection</th>
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<td>Indicator #</td>
<td>71</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of country's territory in threatened ecoregions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of country's territory in threatened ecoregions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
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</tbody>
</table>

Methodology

The authors identify the world’s terrestrial biomes and ecoregions in which biodiversity and ecological function is at greatest risk because of extensive habitat conversion and limited habitat protection. Threatened ecoregions are ecoregions with high ratios of habitat conversion to habitat protection that are classified as vulnerable, endangered, or critical. This yields the land area of terrestrial ecosystems that is threatened, and the percent land area in each country that is in a threatened ecoregion. The original data distinguished between Gaza Strip and West Bank; between Montenegro and Serbia; between Jan Mayen and Svalbard. These have been combined by normalizing the percent area of ecoregions in crisis by their land area. Furthermore, the figures for France exclude the overseas territories of French Southern and Antarctic Lands. The figures for the United Kingdom exclude Guernsey, Jersey, and Isle of Man. The figures for the United States of America exclude Howland Island, Jarvis Island, Johnston Atoll, Midway Islands, and Wake Island.

Rationale

Species extinction is just one aspect of the threats to biodiversity. Whole biomes (plant and animal assemblages) are also at significant risk of disappearing. Habitat conversion exceeds habitat protection by a ratio of 8:1 in temperate grasslands and Mediterranean biomes, and 10:1 in more than 140 ecoregions. These regions include some of the most biologically distinctive, species rich ecosystems on earth, as well as the last home of many threatened and endangered species.

Indicator

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<thead>
<tr>
<th>Indicator</th>
<th>PRTBRD</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tr>
<td>Indicator #</td>
<td>72</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened bird species as percentage of known breeding bird species in each country</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Threatened bird species as percentage of known breeding bird species in each country</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 2002-2003</td>
<td></td>
<td></td>
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</tbody>
</table>
Source

Methodology
The number of bird species threatened divided by known breeding bird species in the country, expressed as a percent. Threatened species include those that are listed as "Critically Endangered, Endangered, or Vulnerable," but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as "data deficient"), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as "not evaluated"). The number of species that are globally listed as Critically Endangered are known to occur in the country but do not imply that the species are threatened within the country itself.

Rationale
The percent of breeding birds threatened gives an estimate of a country's success at preserving its biodiversity.

Indicator
PRTMAM
Collection
ESI 2005
Indicator #
73
Sub-Index
Indicator Name
Threatened mammal species as percentage of known mammal species in each country
Units
Threatened mammal species as percentage of known mammal species in each country
Reference Year
MRYA 2002-2003
Source
Additional and updated country data as follows. Taiwan: The Agricultural Council, Taiwan, Mammal, Animal Division, Endemic Species Research Center, http://www.tesri.gov.tw/content/animal/ani_mamal.asp, Endemic Species Research Center, The list of conserved wild animals,

Methodology
The number of mammal species threatened was divided by known mammal species in the country, and expressed as a percent. Mammals threatened were normalized by mammals known in each country. Mammals species and number threatened includes all species of mammals that are recorded as threatened and that are known to occur in a given country. Threatened species include those that are listed as "Critically Endangered, Endangered, or Vulnerable," but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as "data deficient"), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as "not evaluated"). Number of mammal species refers to the total number of mammal species identified and documented in a particular country or region, but excludes data on cetaceans. Total numbers include both endemic and non-endemic species. The total number of known species may include introduced species. The exclusion of cetaceans may therefore lead to overestimation for coastal countries with threatened whale and porpoise populations. The number of species that are globally listed as Critically Endangered are known to occur in the country but do not imply that the species are threatened within the country itself.
<table>
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<th><strong>Collection</strong></th>
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<td><strong>Indicator #</strong></td>
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<td><strong>Sub-Index</strong></td>
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<tr>
<td><strong>Indicator Name</strong></td>
<td>Threatened amphibian species as percentage of known amphibian species in each country</td>
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<td></td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>Threatened amphibian species as percentage of known breeding amphibian species in each country</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reference Year</strong></td>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>The number of amphibian species threatened divided by known amphibian species in the country, expressed as a percent. Threatened species include those that are listed as &quot;Critically Endangered, Endangered, or Vulnerable,&quot; but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as &quot;data deficient&quot;), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as &quot;not evaluated&quot;).</td>
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<tr>
<td><strong>Rationale</strong></td>
<td>The percent of amphibians threatened gives an estimate of a country's success at preserving its biodiversity.</td>
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<th><strong>Collection</strong></th>
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</tr>
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<td><strong>Indicator #</strong></td>
<td>75</td>
<td><strong>Sub-Index</strong></td>
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<tr>
<td><strong>Indicator Name</strong></td>
<td>National Biodiversity Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>Score between 0 and 1 with large values corresponding to high levels of species abundance and small values reflecting low levels of species abundance</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reference Year</strong></td>
<td>2001</td>
<td></td>
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<tr>
<td><strong>Methodology</strong></td>
<td>This index represents estimates of a country's richness and endemism in four terrestrial vertebrate classes and vascular plants; vertebrates and plants are ranked equally; index values range between 1 (maximum: Indonesia) and 0 (minimum: Greenland). The NBI includes some adjustment allowing for country size. Countries with land area less than 5,000 km² are excluded. Overseas territories and dependencies are excluded.</td>
<td></td>
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<tr>
<td><strong>Rationale</strong></td>
<td>Biodiversity cannot be measured solely in terms of threat. A country's extent of biodiversity is also important to assess. The NBI assesses a country's species richness by measuring species abundance.</td>
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</table>
Indicator | ANTH10
---|---
Indicator # | 76
Indicator Name | Percentage of total land area (including inland waters) having very low anthropogenic impact
Units | Percentage of a country's land and inland waters having very low anthropogenic impact ("wildness" score of 9 or below on the Human Impact Index 58-point scale)
Reference Year | 2004

Methodology
The HII measures anthropogenic impact of land and inland waters based on human land uses, human access from roads, railways or major rivers, electrical infrastructure, and population density. A scoring system is applied to each of 9 gridded data sets according to the degree of "wildness" of the grid tile. The 9 individual scores are then aggregated and normalized using the total area of the country. Areas that receive less than or equal to 9 points (out of a total of 58 points) on the scoring metric are included. The underlying data sets are: World Roads (US Dept. of Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set), Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of the World v3 Population Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent Data (CIESIN Gridded Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable Lights (US Dept. of Defense, Defense Meteorological Satellite Program), and Cropland Data (SAGE Navin Ramankutty, Center for Sustainability and Global Environment). The data are not directly comparable to the ANTH10 data shown in the 2002 ESI report due to improvements and changes in the underlying data sources.

Rationale
Agricultural activities and the built environment have high impacts on the natural environment. The conversion of natural vegetation for human activity has important ecological implications. The percentage of a country's land area that has low anthropogenic impact is a measure of the degree to which wild lands, which are important for biodiversity conservation, still exist in that country.

Indicator | ANTH40
---|---
Indicator # | 77
Indicator Name | Percentage of total land area (including inland waters) having very high anthropogenic impact
Units | Percentage of a country's land and inland waters having very high anthropogenic impact ("wildness" score of 36 or higher on the Human Impact Index 58-point scale)
Reference Year | 2004
Source | The Human Influence Index version 2 by the Center for International Earth Science Information Network (CIESIN) using 9 underlying public domain data sets. The underlying data sets are: World Roads (US Dept. of Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set),
Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of
the World v3 Population Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent
Data (CIESIN Gridded Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable
Lights (US Dept. of Defense, Defense Meteorological Satellite Program), and Cropland Data
(SAGE Navin Ramankutty, Center for Sustainability and Global Environment),

**Methodology**

The HII measures anthropogenic impact of land and inland waters based on human land uses,
human access from roads, railways or major rivers, electrical infrastructure, and population
density. A scoring system is applied to each of 9 gridded data sets according to the degree of
"wildness" of the grid tile. The 9 individual scores are then aggregated and normalized using
the total area of the country. Areas that receive greater or equal to 36 points (out of a total of
58) on the scoring metric are included. The underlying data sets are: World Roads (US Dept. of
Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA,
VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set), Coastlines (NIMA, coastline
data), GPW3 Population Density Data (CIESIN Gridded Population of the World v3 Population
Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent Data (CIESIN Gridded
Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable Lights (US Dept. of
Defense, Defense Meteorological Satellite Program), and Cropland Data (SAGE Navin
Ramankutty, Center for Sustainability and Global Environment). The data are not directly
comparable to the ANTH40 data shown in the 2002 ESI report due to improvements and
changes in the underlying data sources.

**Rationale**

Agricultural activities and the built environment have high impacts on the natural environment.
The conversion of natural vegetation for human activity has important ecological implications.
The percentage of a country's land area that has high anthropogenic impact is a measure of
the degree to which a country's land area is dominated by high intensity land-uses.

**Indicator**

**Indicator #**

**Indicator Name**

**Units**

**Reference Year**

**Source**

United Nations Environment Programme (UNEP), Global Environmental Monitoring System/Water
for Economic Co-operation and Development (OECD) Environmental Data Compendium 2002,
European Environment Agency (EEA) Water Base: QUALITY_LAKES_EN_V4,
http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=661 (accessed June 2004),
(accessed June 2004).

Additional and updated country data as follows. Belgium: Vlaamse Milieumaatschappij - Flemish
Environment Agency (VMM), Rudy Vannevel, Direction Générale des Ressources Naturelles
et de l'Environnement (DGRNE), Dominique Wyllock, data sent to United Nations Environment
Programme - Global Environment Monitoring System/Water Division (UNEP-GEMS/Water).
Finland: Finnish Environment Institute, Common Procedures for Exchange of Information
Institute, to be published in "Environment in the Slovak Republic (Selected indicators in 1999 -
2003)" by Statistical Office of the Slovak Republic. Taiwan: Environmental Protection
年版/3 水質/3302.htm.
Methodology

For GEMS water data: for Dissolved Oxygen (DO), three codes are chosen: 08101, 08102 and 08107. Among them, 08101 was used in the ESI 2002 report and 08107 was used only by New Zealand. The value for each country was the mean of all the stations. For those countries that had both 08101 and 08102 values, the mean of both values was calculated as the value for the country. The data range from 1994 to 2002. OECD data range from 1997 to 1999. EEA data cover the period between 2000 and 2002. For some countries, the original data contained a detection flag if the data fell below the detection limit, or the smallest concentration of a substance that can still be detected with at least 95% probability. The limit of determination was the smallest concentration of a substance that can still be determined as being different from 0 with at least 95% probability. If the limit of detection flag was set, it can be assumed with probability >=95% that the substance was not in the water. In order to do the calculations, those observations were set to 0. GEMS water data was the main data source and OECD data and EEA data were used to fill in the blanks. If a country had both OECD and EEA values, OECD data were used. For water quality of lakes, Oxygen Concentration as equivalent to DO was used. For Romania no OECD data were available and the EEA value of zero was used instead.

Rationale

A measure of eutrophication, which has an important impact on the health of aquatic resources and ecosystems. High levels correspond to low eutrophication.

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>WQ_EC</td>
<td>ESI 2005</td>
</tr>
</tbody>
</table>

Indicator #

79

Indicator Name

Electrical conductivity

Units

Micro-Siemens per centimeter

Reference Year

MRYA 1994-2002

Source


Methodology

For GEMS water data: for Electrical Conductivity (EC), three codes were chosen: 02040, 02041 and 02049. Among them, 02041 was used in the ESI 2002 report and 02049 was used only by New Zealand. The value for each country was the average across all stations. For countries that have both 02040 and 02041 values, the average of both values was calculated. OECD data do not include data for the European Community and the EEA data only cover lakes for the European Community.

Rationale

A widely used bulk measure of metals concentration and salinity. High levels of conductivity correspond to high concentrations of metals.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>WQ_PH</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>80</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Phosphorus concentration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Milligrams phosphorus per liter water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1994-2003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

For GEMS water data: for Phosphorus Concentration (PH), three codes were chosen: 15403, 15405 and 15406. Among them 15405 was used in the ESI 2002 report and 15406 was used only by New Zealand. The value for each country represents the average across all stations. 15403 values were used to fill in the blanks. For Japan, phosphorus concentration values for the 1997-1999 time period were available for both codes, but deviated substantially. Therefore, only data for code 15405 were used; the same as in the ESI 2002. The OECD data cover 1997 to 1999. The EEA data cover 2000-2002. For some countries, the original data contained a detection flag if the data fell below the detection limit, or the smallest concentration of a substance that can still be determined as being different from 0 with at least 95% probability. The limit of determination was defined as the smallest concentration of a substance that can still be determined as being different from 0 with at least 95% probability. If the limit of detection flag was set, it can be assumed with a probability >=95% that the substance was not in the water. In order to do the calculations, those observations were set to 0. Two stations in Germany, stations NW08 and NW641, had abnormally large values for PH in 2002 indicating an error. These values were not included. GEMS data took precedence over OECD and EEA data.

**Rationale**

A measure of eutrophication, which affects aquatic resources health. High levels correspond to high eutrophication.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WQ_SS</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>81</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Suspended solids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Milligrams suspended solids per liter water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1994-2003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
et de l'Environnement (DGRNE), Dominique Wyllock, data sent to United Nations Environment Programme - Global Environment Monitoring System/Water Division (UNEP-GEMS/Water).

Methodology
For GEMS water data: for Suspended Solids (SS), two codes are chosen: 10401 and 10408. A comparison of the values for the two codes yielded substantial differences. Therefore only code 10401, the same as in the ESI 2002 report, was used. To obtain data several methods were used:
10401:SUSPENDED SOLIDS, 105 DEG. Gravimetric method. If oil and grease are present, the sample is blended. If large particles, either floating or submerged, are present, they are excluded from the sample. The sample aliquot is passed through a pre-ignited and pre-weighed Whatman GF/C filter. The filter containing the residue is placed in a porcelain dish, oven-dried at 105 o C for 2.5 hours, cooled 15 minutes in a desiccator, and weighed to a constant weight. The method detection limit is 10 mg/L.
10408:SUSPENDED SOLIDS, 180 DEG. Gravimetric method. If oil and grease are present, the sample is blended. If large particles, either floating or submerged, are present, they are excluded from the sample. A sample aliquot is passed through a pre-ignited Whatman GF/C filter. The filter containing the residue is placed in a porcelain dish, oven-dried at 180 o C for 2.5 hours, cooled 15 minutes in a desiccator and weighed to a constant weight. The method detection limit is 10 mg/L.

Rationale
A measure of water quality and turbidity.

Indicator
WATAVL
Collection
ESI 2005
Indicator #
82
Sub-Index
Indicator Name
Freshwater availability per capita
Units
Thousand cubic meters per person
Reference Year
1961-1995 (long-term average)
Source
Center for Environmental System Research, Kassel University, Water GAP 2.1e, 2004 (communication)
Methodology
The total per capita water availability was measured as the sum of internal renewable water per capita (average annual surface runoff and groundwater recharge generated from endogenous precipitation, taking into account evaporation from lakes and wetlands) and per capita water inflow from other countries. These data were derived from the WaterGap 2.1 gridded hydrological model developed by the Center for Environmental Systems Research, Kassel University, Germany. A special run of the model was performed in order to derive country-level estimates of water availability in a country. It should be noted that that the size of the grid cells (0.5 x 0.5 degree) does not accurately capture small countries. However, the fact that the model itself is based on over 30 years of global hydrological data means that the data are more comparable than similar country water resources estimates published

Rationale
The per capita volume of available water resources for a country is an important indicator of environmental services and the ability to support the needs of the population.

Indicator
GRDAVL
Collection
ESI 2005
Indicator #
83
Sub-Index
Indicator Name
Internal groundwater availability per capita
**Units**

Thousand cubic meters per capita

**Reference Year**

2003

**Source**


**Methodology**

The groundwater data are divided by population data and expressed in thousand cubic meters per capita.

**Rationale**

Groundwater is an important part of the picture of a country's water resources. The more groundwater is available per capita, the higher the probability that a country can sustainably manage its groundwater resources, e.g. for agricultural production.

**Indicator**

COALKM

**Collection**

ESI 2005

**Indicator #**

84

**Indicator Name**

Coal consumption per populated land area

**Units**

Terajoules coal consumed per populated land area (at 5 or more persons per square km)

**Reference Year**

2001

**Source**


**Methodology**

The original data are in billion British Thermal Units (BTUs), which were converted to terajoules. The factor applied to convert 10^9 BTUs to terajoules is 0.9478 (Source: Energy Information Administration). The Gridded Population of the World dataset (CIESIN) was used to calculate the total land area in each country inhabited with a population density of greater than 5 persons per km2. The data set was then used as the denominator for the coal consumption.

**Rationale**

Coal fired power plants emit higher SO2 levels and other air pollutants than natural gas or oil fired plants, and the energy produced is more carbon-intensive.

**Indicator**

NOXKM

**Collection**

ESI 2005

**Indicator #**

85

**Indicator Name**

Anthropogenic NOx emissions per populated land area

**Units**

Metric tons NOx emissions per populated land area (at 5 or more persons per square km)

**Reference Year**

MRYA 1990-2003

**Source**

For NOx emissions data: United Nations Framework Convention on Climate Change (UNFCCC)
Methodology

The data were merged as follows: UNFCCC data were available in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available in thousand tonnes for 1980, 1985-2000 and the most recent year 1998-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km2).

Rationale

NOx emissions contribute to changes in ambient air quality and consequently impact human and ecosystem health.

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SO2KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection</td>
<td>ESI 2005</td>
</tr>
<tr>
<td>Indicator #</td>
<td>86</td>
</tr>
<tr>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Anthropogenic SO2 emissions per populated land area</td>
</tr>
<tr>
<td>Units</td>
<td>Metric tons SO2 per populated land area (at 5 or more persons per square km)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1990-2003</td>
</tr>
</tbody>
</table>
Methodology
The data were merged as follows: UNFCCC data were available in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available in thousand tonnes for 1980, 1985-2000 and the most recent available year 1997-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km²).

Rationale
SO2 emissions contribute to changes in ambient air quality and consequently impact human and ecosystem health.

Indicator | VOCKM | Collection | ESI 2005
Indicator # | 87 | Sub-Index
Indicator Name | Anthropogenic VOC emissions per populated land area
Units | Metric tons per populated land area (at 5 or more persons per square km)
Reference Year | MRYA 1990-2003
Source


Methodology

The data were merged as follows: UNFCCC data were available for NMVOC (non-methane volatile organic compounds) emissions in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available for VOC emissions in thousand tonnes for 1980, 1985-2000 and the most recent available year 1998-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km²). Emissions are from anthropogenic sources but UNFCCC data refer to NMVOC and the OECD data refer to VOC emissions, respectively.

Rationale

VOC emissions contribute to changes in ambient air quality and consequently impact human and ecosystem health.

Indicator CARS

Indicator # 88

Indicator Collection ESI 2005

Sub-Index

Indicator Name Vehicles in use per populated land area

Units Number of vehicles per populated land area (at 5 or more persons per square km)

Reference Year MRYA 1995-2004


Jordan: Jordan Traffic Department, Table 7.3 Number of Registered Vehicles by Type of Vehicle and Center of Registration, 2003. Lithuania: Statistics Lithuania, http://www.std.lt.


Methodology

The Gridded Population of the World dataset (CIESIN) was used to calculate the total land area in each country inhabited with a population density of greater than 5 persons per square km. This data set was then used as the denominator for the vehicles data, which includes registered cars, trucks and buses but not motorcycles.

Rationale

This is a proxy measure of air pollution from the transportation sector, which is a large sector in terms of energy use and experiences the highest growth rates.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>FOREST</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>89</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Annual average forest cover change rate from 1990 to 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average annual change rate in forest cover from 1990 to 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990 to 2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>For area statistics, FRA 2000 generated information at three scales - country (based on surveys of national inventory and mapping reports), region (FRA 2000 remote sensing survey) and world (FRA 2000 global mapping). For the estimates of area and area change, only country- and regional-level information was used, as the global forest map did not provide sufficient precision. See briefing paper by Emily Matthews (WRI, Forest Briefing No.1, March 2001). For discussion of methodological problems and other issues with this FAO effort.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>When forests are lost or severely degraded, their capacity to function as regulators for the environment is also lost, increasing flood and erosion hazards, reducing soil fertility, and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ACEXC</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>90</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Acidification exceedance from anthropogenic sulfur deposition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of total land area at risk of acidification exceedance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>From a map of acidification exceedance, the area of terrestrial ecosystems at risk were summed within each country and then the percentage of a country at risk of exceedance was calculated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Exceedance of critical SO2 loading represents an indicator for ecosystems under stress due to acidification from anthropogenic sulfur deposition. Since it takes into account both the deposition and the ability of the ecosystem to respond to stress, it is a good indicator of the ecosystems’ sustainability.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GR2050</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>91</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage change in projected population 2004-2050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage change in projected population 2004-2050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Methodology**

The projected population in 2050 was divided by the population in 2004 to calculate a percentage change in the population between the two dates.

**Rationale**

The projected change in population between 2004 and 2050 provides an indication of the trajectory of population change, which has an impact on a country's per capita natural resource availability and environmental conditions. Projections can be made with a fair degree of accuracy because of the influence of a country's current age structure and fertility on likely future growth.

**Indicator**

<table>
<thead>
<tr>
<th>TFR</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>Sub-Index</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**

Total Fertility Rate

**Units**

Average number of births per woman based on current age-specific fertility rates

**Reference Year**

2004

**Source**


**Methodology**

The average number of children a woman will have, assuming that current age-specific birth rates remain constant throughout her childbearing years (usually considered to be ages 15 to 49).

**Rationale**

Fertility contributes significantly to population growth, and thus to pressures on natural resources.

**Indicator**

<table>
<thead>
<tr>
<th>EFPC</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>Sub-Index</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**

Ecological Footprint per capita

**Units**

Hectares of biologically productive land required per capita

**Reference Year**

MRYA 1999-2000

**Source**


**Methodology**

For a full methodology of the ecological footprint calculations, please see the original source data set documentation. The data reflect information from the Ecological Footprint of Nations 2004. The reference year is 2000. For Niger, Somalia, Togo, Afghanistan, Uzbekistan, and Yemen, the 1999 data from the Living Planet Report 2002 were used.

**Rationale**

The ecological footprint is a measure of the biologically productive land that is required to sustain a country's population at current consumption levels. Countries whose footprints exceed their own arable land area are consuming at levels that are unsustainable in the long term.
**Indicator Name**: Waste recycling rates

**Units**: Percentage of solid waste recycled for 1998 for selected cities in each country for non-OECD countries and the percentage of glass, paper and cardboard recycled for OECD countries

**Reference Year**: MRYA 1996-2003


**Methodology**: If both recycling rates were available for an OECD country, the maximum of the recycling rates for glass and "paper and cardboard" was used. If neither value was available, it was classified as missing. The solid waste recycling data refer to municipal waste, waste handled by the scrapping industry and other waste from economic activities. Material that is collected for recycling by private sources is included. Internal recycling, i.e., within industrial establishments, is excluded. Recycling is defined as any reuse of material in a production process that diverts it from the waste stream, except reuse as fuel. Reprocessing as the same type of product, and for different purpose, are both included. "Recycling rates" are the ratios of the quantity collected for recycling to the apparent consumption (economic notion of domestic production of the respective material + imports - exports). Definitions may vary from country to country.

**Rationale**: Waste recycling reduces the impact on the environment by using resources more efficiently and by reducing the stream of waste for landfills and incineration.
Methodology

The data from the Basel Convention on the amounts of hazardous waste to be managed in the country (thousand tonnes) have been extended by OECD data for the following countries: USA, Japan, and New Zealand. The methodologies underlying both data sources may not be fully comparable although both source refer to "amounts to be managed in the country" (a comparison of OECD data and Basel Convention data for countries reporting to both sources indicates that substantial differences can exist). The objective lies therefore in increasing geographical coverage rather than complete comparability of the data. All Basel data refer to the year 2000, the additional 5 OECD values refer to years between 1992 and 1999. Also note a potential rounding bias due to the fact that the OECD data are reported in thousand metric tons while the Basel data are in metric tons.

Rationale

Most countries in the world are confronting real difficulties in safely disposing of their hazardous wastes. The more hazardous waste generated, the less likely that a long-term sustainable solution can be found for their proper disposal.

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BODWAT</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>96</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Industrial organic water pollutant (BOD) emissions per available freshwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Metric tons of daily BOD emissions per cubic km of available freshwater</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology

Emissions of organic water pollutants were measured by biochemical oxygen demand, which is the amount of oxygen that bacteria in the water will consume in breaking down waste. This is a standard water-treatment test for the presence of organic pollutants. The data from the World Bank, which represent daily BOD emissions in kilograms, were normalized by water availability from the WaterGap version 2.1B model (Kassel University).

Rationale

Emissions of organic pollutants from industrial activities degrade water quality by contributing to the eutrophication of water bodies. Given these considerations, the biochemical oxygen demand (BOD) emissions have been normalized per amount of freshwater available (internal water availability + inflows from other countries).
**Indicator** | FERTHA | **Collection** | ESI 2005
---|---|---|---
**Indicator #** | 97 | **Sub-Index** | ESI 2005
**Indicator Name** | Fertilizer consumption per hectare of arable land | **Units** | 100 grams fertilizer per hectare of arable land

**Methodology**
Fertilizer consumption (100 grams per hectare of arable land) measures the quantity of plant nutrients used per unit of arable land. Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). The time reference for fertilizer consumption is the crop year (July through June). Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Original source: Food and Agriculture Organization, Production Yearbook and data files.

**Rationale**
Excessive use of fertilizers from agricultural activities has a negative impact on soil and water, altering chemistry and levels of nutrients and leading to eutrophication of water bodies.

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**Indicator** | PESTHA | **Collection** | ESI 2005
---|---|---|---
**Indicator #** | 98 | **Sub-Index** | ESI 2005
**Indicator Name** | Pesticide consumption per hectare of arable land | **Units** | Kilograms pesticide consumption per hectares of arable land

Additional and updated country data as follows. Albania: Ministry of Environment, Albania. Austria: Federal Ministry of Agriculture, Forestry, Environment and Water Management, "Grüner Bericht 2004" (Green Report 2004, report on the situation of the Austrian agriculture...
Methodology

Pesticide use intensity refers to the amount of pesticide used per hectare of arable and permanent cropland. To calculate this figure, total pesticide consumption in agriculture is divided by the total area of arable and permanent cropland. Pesticide consumption is measured in metric tons of active ingredients. Pesticides are organized into eight categories, the sum of which is used to determine total pesticide consumption. The eight categories are: insecticides, mineral oils, herbicides, fungicides and bactericides, seed treatment - fungicides, seed treatment - insecticides, plant growth regulators and rodenticides. Arable and permanent cropland is comprised of both arable and permanent land in a given country for each year. Arable land is land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable. Permanent Crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee and rubber; this category includes land under flowering shrubs, fruit trees, nut trees and vines, but excludes land under trees grown for wood or timber.

Rationale

Excessive use of pesticides in agricultural activities has negative impacts on soil, water, humans and wildlife.

Indicator | WATSTR | Collection | ESI 2005
Indicator # | 99 | Sub-Index
Indicator Name | Percentage of country under severe water stress
Units | Percentage of national territory in which water consumption exceeds 40 percent of available water
Reference Year | 1961-1995 (long-term average)
Source | Center for Environmental Systems Research, University of Kassel, WaterGap 2.1, 2000 (communication).
Methodology
These data are derived from the WaterGap 2.1 gridded hydrological model developed by the Center for Environmental Systems Research, University of Kassel, Germany. The modelers derived gridcell by gridcell estimates of where water consumption exceeded 40 percent of the water available in that particular grid cell. These were then converted to land area equivalents, and the percent of the territory under severe water stress was calculated.

Rationale
The regional distribution of water availability relative to population and consumption needs is as important as its overall water availability. This variable captures the percent of the territory that is under water stress, which will affect the availability of water for environmental services and human well-being.

Indicator
OVRFSH
Collection
ESI 2005
Indicator #
100
Sub-Index
Indicator Name
Productivity overfishing
Units
Score between 1 and 7 with high scores corresponding to high degrees of overfishing
Reference Year
Average for 1993-1998
Source

Methodology
This measure is drawn from the EVI prepared by SOPAC in partnership with UNEP and other support. The indicator's cut-off values are based on the ratio of fisheries productivity to fish catch, or specifically the ratio of tonnes of carbon per square kilometer of exclusive economic zone per year to tonnes of fish catch per square kilometer of shelf per year. The score ranges represent the following: 1=(>=3.2 millions], 2=(3.2-1.2 millions], 3=(1.2 millions - 442 thousand], 4=(442-163 thousand], 5=(163-60 thousand], 6=(60-22 thousand], 7=(<=22 thousand].

Rationale
Fish stocks are an important component of marine ecosystems. Overfishing puts pressure on ecosystems and threatens biodiversity.

Indicator
FORCERT
Collection
ESI 2005
Indicator #
101
Sub-Index
Indicator Name
Percentage of total forest area that is certified for sustainable management
Units
Percentage of total forest area that is FSC or PEFC certified
Reference Year
Certifications: 2004, Total forest area: 2000
Source

Methodology
The forest area certified by either the Forest Stewardship Council (FSC) or the Pan-European Forest Certification Council (PEFC) is divided by the year 2000 total forest area. To avoid double counting, if a country has forest areas under both programs, the maximum is selected. If no data are available for FSC or PEFC certified forest area, the value is set to 0. Also, ratios exceeding 100% are set to 100. This is the case for Croatia, Liechtenstein, Finland, and Norway.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>WEFSUB</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>102</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>World Economic Forum Survey on subsidies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Survey Responses Ranging from 1 (strongly disagree) to 7 (strongly agree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Response to the statement &quot;No government subsidies for energy or materials usage are present.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Subsidies encourage wasteful consumption of energy and materials.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>IRRSAL</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>103</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Salinized area due to irrigation as percentage of total arable land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of total arable land salinized due to irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The area of land salinized due to irrigation is divided by the total arable land area for each country (benchmarked to 2000).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Soil salinization is a form of land degradation. The transport of salts to the land's surface due to irrigation renders the land unfit for production, and is therefore unsustainable in the long run.</td>
<td></td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>AGSUB</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>104</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Agricultural subsidies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Scale from 1 (lowest) to 8 (highest), with 0 being missing data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Source | For producer support estimates (PSE) data: Organisation for Economic Co-operation and Development (OECD); OECD Producer Support Estimates for 2001 as a percentage of agricultural GDP and data for China and India were provided by John Finn (World Trade

**Methodology**

The OECD data measure producer support estimates (PSE), the WTO data refer to aggregate measure of support (AMS). The WTO data were converted from national currencies to US dollars using annual average exchange rates for the year 1999 as follows: For conversion of ECU to USD, the historic weighted 12 month average was calculated using data from http://www.x-rates.com/d/USD/EUR/hist1999.html, the remaining national currencies were converted using annual average exchange rates from the World Bank WDI 2004. OECD data for the European Union of 15 member states refer to total PSE for the 15 members. A breakdown by member state was calculated as follows: The total PSE for EU15 was multiplied by each country's fraction of total EU15 agricultural production, assuming that PSE's correlate with the total value of a country's agricultural production. OECD countries, for which John Finn (WTO) provided updated PSE data as percentage of total agricultural GDP replaced older OECD data. The final data were then classified into 8 groups as follows: [0-10%)=1; [10-20%)=2; [20-30%)=3; [30-40%)=4; [40-50%)=5; [50-60%)=6; [60-70%)=7; (>70%)=8. For China and India the data were taken from their notifications to the WTO. All other countries with no information are classified as 0.

**Rationale**

Agricultural subsidies reduce environmental sustainability primarily by creating price distortions, promoting the production of input intensive crops, wasteful use of natural resource inputs, use of marginal and fragile lands, and rent-seeking behavior.

**Indicator**

DISINT

**Collection**

ESI 2005

**Indicator #**

105

**Sub-Index**

MRYA 1995-2002

**Indicator Name**

Death rate from intestinal infectious diseases

**Units**

Deaths per 100,000 population

**Source**


**Methodology**

Standardized, age-specific death rate from intestinal infectious diseases. Results calculated as follows: For ICD-9, the codes extracted are B01 and CH01 (which cover B01-B07 in ICD-9) for Armenia, Belarus, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and the former USSR (for some years), and C004-C006 for China (which cover 001-005, 008, and 009 in the detailed ICD-9). For ICD-10 the codes extracted are A00, A03-A09, and A010. The data were extracted by age group and aggregated by sex. They were then combined with annual population data by age group prepared by CIESIN for the year 2000. The data were then standardized for differences in the national age distributions using Canada's population structure in 2000 as it offers a relatively stable and suitable reference distribution. WHO code BO1 for ICD-9 includes cholera, typhoid fever, shigellosis, food poisoning, amoebiasis, intestinal infections due to other specified organism, ill-defined intestinal infections, and other. For ICD-10 the codes that most closely match B01 are typhoid fever (A010), cholera (A00), shigellosis (A03), other bacterial intestinal infections (A04), other bacterial food-borne intoxications (A05), amoebiasis (A06), other protozoal intestinal diseases (A07), viral and other specified intestinal infections (A08), and diarrhea and gastroenteritis of presumed infectious origin (A09). The codes for China and former USSR republics for the ICD-9 classifications are: typhoid and paratyphoid fevers (C004), shigellosis (C005), and other intestinal infectious diseases (C006); and infectious and parasitic diseases (CH01).
### Rationale
Indicator of the degree to which the population is affected by poor sanitation and water quality, which are related to environmental conditions.

### Indicator
**DISRES**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Sub-Index</th>
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<tbody>
<tr>
<td>106</td>
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</table>

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Indicator Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child death rate from respiratory diseases</td>
<td>Child death rate from respiratory diseases</td>
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</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths per 100,000 population aged 0-14</td>
<td>Deaths per 100,000 population aged 0-14</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Reference Year</th>
<th>Reference Year</th>
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<tr>
<th>Source</th>
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</table>

### Methodology
The final results were calculated as follows: For ICD-9, the codes extracted are B31, B320, B321, CH08 (which covers B31 and B32 in ICD-9), S310 (which covers B310-B312, B320 in ICD-9) for Armenia, Belarus, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and the former USSR (for some years), and C052 and C053 for China (which cover 460-519 and 480-486 in the detailed ICD-9). For ICD-10 the codes extracted are J03, J04, J06, J311, J312, J32, J33, J342, J35, J20, J21, J12-J16, and J18. The data were extracted by age group (0-14 years) and aggregated by sex. They were then combined with annual population data by age group prepared by CIESIN for the year 2000. WHO code B31 for ICD-9 includes acute tonsillitis, acute laryngitis and tracheitis, other acute upper respiratory infections, deflected nasal septum and nasal polyps, chronic pharyngitis, nasopharyngitis and sinusitus, chronic diseases of tonsils and adenoids, and other. The WHO code B320 for ICD-9 includes acute bronchitis and bronchiolitis. The WHO code B321 for ICD-9 includes pneumonia. For ICD-10 the codes that most closely match B31 are acute tonsillitis (J03), acute laryngitis and tracheitis (J04), acute upper respiratory infections of multiple and unspecified sites (J06), chronic pharyngitis (J312), chronic nasopharyngitis (J311), chronic sinusitis (J32), nasal polyps (J33), deviated nasal septum (J342), chronic diseases of the tonsils and adenoids (J35). The Who codes for ICD-10 that most closely match B320 are acute bronchitis (J20) and acute bronchiolitis (J21). The WHO codes for ICD-10 that most closely match B321 are viral pneumonia n.e.s. (J12), pneumonia due to streptococcus pneumoniae (J13), pneumonia due to haemophilus influenzae (J14), bacterial pneumonia n.e.s. (J15), pneumonia due to other infectious organisms n.e.s. (J16), pneumonia, organism unspecified (J18). The codes for China and the former USSR republics for ICD-9 are disease of the respiratory system (C052) and pneumonia (C053); and diseases of the respiratory system (CH08) and acute respiratory diseases (S310).

### Rationale
Indicator of the degree to which children are impacted by poor air quality.

### Indicator
**U5MORT**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Sub-Index</th>
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<tbody>
<tr>
<td>107</td>
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</table>

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Indicator Name</th>
</tr>
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<tbody>
<tr>
<td>Children under five mortality rate per 1,000 live births</td>
<td>Children under five mortality rate per 1,000 live births</td>
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</table>

<table>
<thead>
<tr>
<th>Units</th>
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<tr>
<td>Children under five mortality rate per 1,000 live births</td>
<td>Children under five mortality rate per 1,000 live births</td>
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<thead>
<tr>
<th>Reference Year</th>
<th>Reference Year</th>
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<tbody>
<tr>
<td>MRYA 2002-2004</td>
<td>MRYA 2002-2004</td>
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<thead>
<tr>
<th>Source</th>
<th>Source</th>
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</table>
Methodology

Deaths between birth and age five divided by live births (in thousands).

Rationale

Under-5 mortality rate is a measure of the vulnerability of the most vulnerable population group.

Indicator | UND_NO | Collection | ESI 2005
Indicator # | 108 | Sub-Index
Indicator Name | Percentage of undernourished in total population
Units | Percentage of undernourished in total population
Reference Year | MRYA 1999-2001

Methodology

The value of 1% was allocated to the following countries: Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Israel, Italy, Japan, South Korea, The Netherlands, Norway, New Zealand, Portugal, Sweden, and the United States of America. These countries are not covered in the FAO State of Food Insecurity in the World 2003 report but are considered to have a small proportion of undernourished people.

Rationale

This indicator represents the population vulnerability to malnutrition, famine or diseases, in addition to showing the incapacity of an economy to supply an adequate amount of food and to manage food resources.

Indicator | WATSUP | Collection | ESI 2005
Indicator # | 109 | Sub-Index
Indicator Name | Percentage of population with access to improved drinking water source
Units | Percentage of population with access to improved drinking water source
Reference Year | MRYA 1991-2004
Proportion of population with sustainable access to an improved water source, whole Area (UNICEF-WHO)

The percentage of population with access to improved sources of drinking water supply is directly related to the capacity of a country to provide a healthy environment, reducing the risks associated with water-borne diseases and exposure to pollutants.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DISCAS</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>110</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average number of deaths per million inhabitants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1980-2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The UNDP compiled these measures by aggregating and normalizing information from the OFDA/CRED International Disasters Data Base, Center for Research on the Epidemiology of Disasters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Vulnerability to natural disasters is a function of the exposure to hazards (how often and how severe they are), the sensitivity to such hazards (how big the linkages are to social systems), and the resilience within a society to hazard impacts. By averaging deaths from environmentally-related natural disasters, this measure provides a useful summary of overall human vulnerability to environmental change.</td>
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</table>

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<thead>
<tr>
<th>Indicator</th>
<th>DISEXP</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>111</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Environmental Hazard Exposure Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>An index of population-weighted exposure to high levels of environmentally-related natural hazards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>To calculate the environmental hazard exposure index, data from Dilley et al. were used. Data on exposure to landslides, droughts, cyclones and floods were put into a consistent GIS database. The world's land area was classified into degrees of exposure to these four hazards. Those grid cells falling into the highest three deciles of exposure were flagged. The number of high-exposure hazards was summed for each grid cell. The values range from 0-4. The resulting gridted data set was then overlaid with a gridded population data set for the year 2000. Each person was assigned a score equal to the number of high-exposure hazards identified in that grid cell. We calculated the sum of personal exposure scores, and divided by</td>
<td></td>
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</tbody>
</table>
the total population, by country. The theoretically possible range was 0-4. The actual index ranged from 0 to 2.04.

**Rationale**

Vulnerability to natural disasters is a function of the exposure to hazards (how often and how severe they are), the sensitivity to such hazards (how big the linkages are to social systems), and the resilience within a society to hazard impacts. This measure provides a useful proxy of the exposure term.

**Indicator**

**GASPR**

**Collection**

ESI 2005

**Indicator #**

112

**Sub-Index**

**Indicator Name**

Ratio of gasoline price to world average

**Units**

Ratio of gasoline price to world average price

**Reference Year**

2002

**Source**


**Methodology**

Pump price for super gasoline (US dollars per liter): Fuel prices refer to the pump prices of the most widely sold grade of gasoline expressed in US dollars. The ratio of the gas price to the world average in the same time period was used to normalize the data.

**Rationale**

Unsubsidized gasoline prices are an indicator that appropriate price signals are being sent and that environmental externalities have been internalized. High taxes on gasoline act as an incentive for public transportation use and development of alternative fuels.

**Indicator**

**GRAFT**

**Collection**

ESI 2005

**Indicator #**

113

**Sub-Index**

**Indicator Name**

Corruption measure

**Units**

Standardized scale (z-score); with high scores corresponding to effective control of corruption

**Reference Year**

2002

**Source**


**Methodology**

Multi-pronged, experiential surveys of households, firms and public officials were used to measure social and economic costs of corruption. The quality of public service delivery, business, environmental, and public sector vulnerability were also examined, and the indicators on institutions, expenditure flows, and procurement were then added to yield the standardized score.

**Rationale**

Corruption contributes to lax enforcement of environmental regulations and an ability on the part of producers and consumers to evade responsibility for the environmental harms they cause.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>GOVEFF</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
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<tbody>
<tr>
<td>Indicator #</td>
<td>114</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Government effectiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized score (z-score), with high values corresponding to high levels of effectiveness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The World Bank aggregates 25 sources of information on governmental effectiveness to produce comparable indicators.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Governmental effectiveness is defined in this data set as &quot;quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.&quot; It is relevant for environmental sustainability because basic governmental competence enhances a society's ability to monitor and respond to environmental challenges.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>PRAREA</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>115</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of total land area under protected status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of total land area under protected status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Marine protected areas were subtracted from the total area of protected areas in order to limit the focus to land-based ecosystem protection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>The percentage of land area dedicated to protected areas represents an investment by the country in biodiversity conservation.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>WEFGOV</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>116</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>World Economic Forum Survey on environmental governance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Principal components of several survey questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003/4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology
This represents principal components of survey questions addressing several aspects of environmental governance: air pollution regulations, chemical waste regulations, clarity and stability of regulations, flexibility of regulations, environmental regulatory innovation, leadership in environmental policy, consistency of regulation enforcement, environmental regulatory stringency, toxic waste disposal regulations, and water pollution regulations (questions Q1101-Q1111).

Rationale
Effective governance is vital for environmental sustainability.

Indicator | LAW | Collection | ESI 2005
Indicator # | 117 | Sub-Index
Indicator Name | Rule of law
Units | Standardized score (z-score), where high values correspond to high degrees of rule of law.
Reference Year | 2002
Methodology
The indicators measuring rule of law are defined as the extent to which agents have confidence in and abide by the rules of society. They are: perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.
Rationale
The rule of law is important in terms of establishing the "rules of the game" for the civil society, the private sector, and government; for ensuring that violations of environmental regulations are enforced; and for promoting stable expectations that facilitate long-range planning.

Indicator | AGENDA21 | Collection | ESI 2005
Indicator # | 118 | Sub-Index
Indicator Name | Local Agenda 21 initiatives per million people
Units | Number of Local Agenda 21 initiatives per million people
Reference Year | 2001
Methodology
For each country, the number of existing Local Agenda 21 initiatives was counted and divided by the total country population.
Rationale
Local Agenda 21 (LA21) is an international sustainability planning process that provides an opportunity for local governments to work with their communities to create a sustainable
The number of Local Agenda 21 initiatives in a country measures the degree to which civil society is engaged in environmental governance.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CIVLIB</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>119</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Civil and Political Liberties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average of political and civil liberties indices, each ranging from 1 (high levels of liberties) to 7 (low levels of liberties)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Each country and territory was awarded from 0 to 4 raw points for each of 10 questions grouped into three subcategories in a political rights checklist, and for each of 15 questions grouped into four subcategories in a civil liberties checklist. The total raw points in each checklist correspond to two final numerical ratings of 1 to 7. These two ratings are then averaged to determine a status category of Free, Partly Free, or Not Free.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>In countries that guarantee freedom of expression, rights to organize, rule of law, economic rights, and multi-party elections, there is more likely to be a vigorous public debate about values and issues relevant to environmental quality, and legal safeguards that encourage innovation.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>CSDMIS</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>120</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of variables missing from the CGSDI &quot;Rio to Joburg Dashboard&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of variables missing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The CGSDI (Consultative Group on Sustainable Development Indicators) published the &quot;From Rio to Johannesburg&quot; Dashboard. The index contains 60 indicators for more than 200 countries and is a tool for the assessment of the 10 years since the Rio Summit. The percentage of variables in the list of the CGSDI for which data are available for each country is calculated. Data coverage for the following variables was evaluated: Population, CO2 Fuel emissions, Other GHG, Urban air pollution (TSP), Arable and permanent crop Land area, Fertilizer consumption, Use of pesticides, Forest area, Population in coastal area, Withdrawal of ground and surface water, BOD in water bodies, Protected areas, Population living below poverty line (1ppp$/day), Gini coefficient, Unemployment total, Female/Male manufacturing wages, Prevalence of child malnutrition, Child mortality rate, Life expectancy at birth, Access to adequate sanitation, Access to safe water, WHO Index of overall health system attainment, Immunization, DPT or measles, Contraceptive prevalence, Persistence to Grade 5, Total adult literacy rate, Floor area in main city, Number of homicides, Population growth rate, percent population in urban areas, Income per capita, Investment, Current account balance, Value of external debt present, Aid given or received, Intensity of metals &amp; minerals use, Commercial energy use, Renewable energy resources, Energy intensity of GDP, Municipal waste generated, Hazardous waste generated, Nuclear waste generated, Waste recycling paper or</td>
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</table>

57
glass, Internet hosts, Telephone mainlines, Research and development expenditure. Not calculated for Taiwan.

**Rationale**
The greater the number of missing variables, the poorer the data availability in that country. Environmental monitoring and data systems are vital for tracking progress towards environmental sustainability.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>IUCN</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>IUCN member organizations per million population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of member organizations per million population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The number of IUCN member organizations is divided by the country's population (in millions). Countries for which no data on IUCN memberships is available are counted as having no memberships.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>IUCN is the oldest international environmental membership organization, currently with more than 1000 members (governmental and NGO) worldwide, including the most significant environmental NGOs in each country.</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Indicator</th>
<th>KNWLDG</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>122</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Knowledge creation in environmental science, technology, and policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average rank between 1 and 78 of three individual regressions with small values corresponding to above average performance</td>
<td></td>
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</tr>
</tbody>
</table>
Methodology

Publication of scientific knowledge in the top-rated peer-reviewed journals in the fields of environmental science, technology, and policy. We collected data on the primary author's institutional affiliation and the location where the research was carried out for 9 highly ranked peer-reviewed journals for each paper published during 1993, 1998, and 2003. The 9 journals are: Ecology, Conservation Biology, Environmental Science and Technology, Biological Conservation, Global Change Biology (founded in 1995), Environmental Health Perspectives, Water Resources Research, Environmental Toxicology and Chemistry, and Global Biogeochemical Cycles. Three regressions were carried out: Publications per author per million population ~ Researchers per million population + R&D spending as % of GDP + Publications per area and population; Publications about foreign countries ~ log(GDP) + Publications per area; Publications per area ~ Publications per author + Population. The residuals of each regression were ranked and aggregated to form an average rank score.

Rationale

Creation and dissemination of knowledge about, inter alia, environmental, ecological, and socio-economic processes is important for achieving environmental sustainability for several reasons: i) it promotes decision-making on the basis of sound information and data, ii) it facilitates knowledge exchange and propagation between producers and users, iii) it allows adoption of new knowledge and technologies in other regions and sectors (“leapfrogging”).

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>POLITY</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>123</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Democracy measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Trend-adjusted 10-year average score with high values corresponding to high levels of democratic institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>Average of 1993-2002 Polity IV scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Average of the Polity IV scores for 10 years 1993-2002 adjusted for trend: if the trend was positive, the average was increased by 1, if the trend was negative, the average was reduced by 1. The purpose of the adjustment was to reward improvement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>The presence of democratic institutions increases the likelihood that important environmental issues will be debated, that alternative views will be aired, and that decision-making and implementation will be carried out in an open manner. These factors improve the quality of environmental governance.</td>
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Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENEFF</th>
<th>Collection</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>124</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Energy efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Terajoules energy consumption per million dollars GDP (PPP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1998-2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>For energy consumption data: US Energy Information Agency (EIA), <a href="http://www.eia.doe.gov/emeu/iea/wecbtu.html">http://www.eia.doe.gov/emeu/iea/wecbtu.html</a> (accessed January 2005); For GDP data: World</td>
<td></td>
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</tbody>
</table>
Methodology
The original data are in billion British Thermal Units (BTUs), which are converted to terajoules. The factor applied to convert 10^9 BTUs to terajoules is .9478 (Source: Energy Information Administration). Total energy consumption was normalized by GDP in million US dollars in purchasing power parities (PPPs).

Rationale
The more efficient an economy is, the less energy it needs to produce a given set of goods and services.

Indicator | RENPC
---|---
Indicator # | 125
Collection | ESI 2005
Indicator Name | Hydropower and renewable energy production as a percentage of total energy consumption
Units | Hydropower and renewable energy production as a percentage of total energy consumption
Reference Year | MRYA 2002-2003

Methodology
Hydroelectric, biomass, geothermal, solar and wind electric power production were calculated as a percent of total energy consumption. Some countries exceed 100 percent because they are net exporters of renewable energy.

Rationale
The higher the proportion of hydroelectric and other renewable energy sources, the less reliance on more environmentally damaging sources such as fossil fuel and nuclear energy.

Indicator | DJSGI
---|---
Indicator # | 126
Collection | ESI 2005
Indicator Name | Dow Jones Sustainability Group Index (DJSGI)
Units | Ratio of the market capitalization of the firms included in the 2005 Dow Jones Sustainability Index to the market capitalization of the firms eligible for inclusion in the Dow Jones Sustainability Index
Reference Year | 2004-2005
Methodology
This variable measures the ratio of the market capitalization of the firms included in the 2005
Dow Jones Sustainability Index (World) and the market capitalization of the firms eligible for inclusion in the Dow Jones Sustainability Index (World). Market capitalization is as of 30 July 2004.

**Rationale**
The Dow Jones Sustainability Group Index tracks a group of companies that have been rated as the top 10% in terms of sustainability. Firms that are already in the Dow Jones Global Index are eligible to enter the Sustainability Group Index. Countries in which a higher percentage of eligible firms meet the requirements have a private sector that is contributing more strongly to environmental sustainability.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ECOVAL</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>127</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Average Innovest EcoValue rating of firms headquartered in a country</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average weighted score of EcoValue rating weighted by market capitalization share (values &gt; 0 mean better environmental performance relative to peer countries, values &lt; 0 mean poorer environmental performance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Each country starts with a neutral score (0.0 -- equal to Innovest's BBB). Then the weighted average EV21 score for all rated companies in a given country either raises or lowers the neutral weight. A relevance factor, based on EV21 coverage in a given country, determines the allowed deviation from neutral. Having a country score greater than zero means that, on average, companies in a given country have better environmental performance relative to their global peer group. Within each country, EcoValue levels were weighted by market capitalization share and then averaged to get a value for the individual country, based on the location of company headquarters.</td>
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</table>

**Rationale**
The Innovest EcoValue '21 rating measures environmental performance at the firm level. Countries in which firm-level scores are higher have a private sector that is contributing more strongly to environmental sustainability.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ISO14</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>128</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Number of ISO 14001 certified companies per billion dollars GDP (PPP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of ISO 14001 certified companies per billion GDP in US dollars (PPP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Number of ISO 14001 certified companies divided by their GDP in billion US dollars (PPP).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>ISO 14001 specifies standards for environmental management. The more firms that receive ISO 14001 certification, the more likely it is that industries are instituting management practices that reduce waste and resource consumption.</td>
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<tr>
<td>Indicator</td>
<td>WEFPRI</td>
<td>Collection</td>
<td>ESI 2005</td>
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<tr>
<td>-----------</td>
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</tr>
<tr>
<td>Indicator #</td>
<td>129</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>World Economic Forum Survey on private sector environmental innovation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Principal components of several survey questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>This represents principal components of survey questions addressing several aspects of private sector environmental innovation: environmental competitiveness, prevalence of environmental management systems, and private sector cooperation with government (questions Q1112-1114).</td>
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<tr>
<td>Rationale</td>
<td>Private sector innovation contributes to solutions to environmental problems.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>RESCARE</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>130</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Participation in the Responsible Care Program of the Chemical Manufacturer's Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Score from 0 (low) to 4 (high) levels of participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Responsible Care Program is an initiative of the chemical industry. Eight or more years of membership was considered a mature membership and allocated four points. Five to seven years of membership was considered a senior membership and allocated three points. Two to four years of membership was considered a junior membership and allocated 2 points. Up to one year of membership was considered a new membership and allocated 1 point. Not a member = 0 points.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Responsible Care is an initiative of the global chemical industry in which companies, through their national associations, commit to work together to continuously improve the health, safety and environmental performance of their products and processes, and so contribute to the sustainable development of local communities and of society as a whole (Source: ICCA Responsible Care Status Report 2002, URL: <a href="http://www.icca-chem.org/rcreport/">http://www.icca-chem.org/rcreport/</a>). Responsible handling of chemicals is important for environmental sustainability.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>INNOV</th>
<th>Collection</th>
<th>ESI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>131</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Innovation Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized score between 1 (lowest) and 7 (highest)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003/4</td>
<td></td>
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<tr>
<td>Indicator</td>
<td>DAI</td>
<td>Collection</td>
<td>ESI 2005</td>
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<tr>
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</tr>
<tr>
<td>Indicator #</td>
<td>132</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Digital Access Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Score between 0 and 1 with higher scores corresponding to better access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The DAI is a composite index composed of the equally average of Infrastructure, Affordability, Knowledge, Quality, and Usage. Each subcomponent is comprised of the weighted average of benchmarked variables. The variables and their weights are fixed telephone subscribers per 100 inhabitants (weight 0.5), Mobile cellular subscribers per 100 inhabitants (0.5), Internet access price as percentage of GNI per capita (1), Adult literacy (0.66), Combined primary, secondary, and tertiary school enrolment level (0.33), International internet bandwidth (bits) per capita (0.5), Broadband subscribers per 100 inhabitants (0.5), Internet users per 100 inhabitants (1).</td>
<td></td>
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<tr>
<td>Rationale</td>
<td>The Internet has created a new economy and promoted an unprecedented increase in the amount of environmental information that can be accessed and disseminated worldwide. Access to the Internet thus is important for access to information, stakeholder participation, decision-making, and generation of innovative solutions to environmental problems.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>PECR</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>133</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Female primary education completion rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Female primary education completion rate as percentage of females in the relevant age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1998-2003</td>
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</table>

**Methodology**
The proxy indicator for the primary completion rate is the gross intake rate at the last grade of primary education. It is calculated as the total number of new entrants in the last grade of primary education, regardless of age, expressed as a percentage of the population of the theoretical entrance age to the last grade (Source: UNESCO Institute for Statistics). Survival rates may at times exceed 100 due to fluctuations in enrolment. Where such results are published they should be interpreted as the country having a survival rate approaching 100%. Completion rates exceeding 100% are set to 100% so as not to give countries with greater than 100% PECR an advantage over countries with real or close to 100% PECR.

**Rationale**
Female education is widely seen as an important factor for social and economic development. It also correlates with the overall level of schooling of a country and hence with the environmental and technological awareness, reduced incidences of water-borne diseases, and increased participation in decision-making at the household level.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENROL</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>134</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Gross tertiary enrollment rate</td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of pupils (both sexes) of relevant age enrolled at tertiary level of schooling</td>
</tr>
<tr>
<td>Reference Year</td>
<td>MRYA 1999-2003</td>
</tr>
</tbody>
</table>

**Methodology**
The measure was calculated on the basis of pupils enrolled in tertiary educational institutions as a proportion of the population in the relevant official age group.

**Rationale**
The higher the level of education within a population, the higher the capacity for scientific and technological innovation, environmental awareness and ability to address environmental problems.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RESEARCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>135</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Number of researchers per million inhabitants</td>
</tr>
</tbody>
</table>
### Units
Number of researchers per million inhabitants

### Reference Year
2003

### Source

### Methodology
The variable measures the number of scientific researchers per million inhabitants. Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the planning and management of R&D projects. Post-graduate students engaged in R&D are considered as researchers.

### Rationale
Scientific capacity is important for the development of new technologies for sustainable environmental management.

### Indicator
EIONUM

### Collection
ESI 2005

### Indicator #
136

### Sub-Index

### Indicator Name
Number of memberships in environmental intergovernmental organizations

### Units
Number of memberships environmental intergovernmental organizations (out of a maximum of 100)

### Reference Year
2003-2004

### Source

### Methodology
Based on a list of 100 Intergovernmental organizations classified as "environmental" and selected by the ESI Team, the number of memberships for each country were counted.

### Rationale
Countries contribute to global environmental governance by participating in intergovernmental environmental organizations.

### Indicator
FUNDING

### Collection
ESI 2005

### Indicator #
137

### Sub-Index

### Indicator Name
Contribution to international and bilateral funding of environmental projects and development aid

### Units
Score from 0-100 based on aid given and aid received (0 corresponds to low levels of aid and 100 corresponds to high levels of aid)

### Reference Year
2004

### Source
For aid data: Global Environmental Facility (GEF) contributions and receipts and Organisation for Economic Co-operation and Development (OECD) bilateral environmental aid; For ancillary economic data (GNI, PPP, USD current income): World Bank, World Development Indicators 2004, http://www.worldbank.org/data/wdi2004/ (accessed November 2004); For population
Methodology
Two sets of rank percentiles based on standardized residuals were combined. The first is based on the residuals from regressing log aid donated on log population, log gni, log gni/cap, and (log gni)^2. The second set of rank percentiles is based on the residuals from regressing log aid received on the same regressors. Three countries have both donations and receipts and in these cases the most favorable rank was chosen.

Rationale
Participation in environment and development assistance programs, either as a donor or a recipient (depending on income level), is an important sign of government commitment to environmental sustainability.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PARTICIP</th>
<th>Collection</th>
<th>Sub-Index</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>138</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Participation in international environmental agreements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Score between 0 and 1 with 0 corresponding to no participation and 1 to full participation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
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</tbody>
</table>

Methodology
For each convention, protocol, and amendment points were allocated as follows: 1 point for signature, accession, and ratification without signature. An additional point for ratification with signature, acceptance, approval, or succession. The maximum number of points achievable is: 2 points for UNCCD, 12 points for Vienna Convention, Montreal Protocol, and its Amendments, 2 points for CITES, 4 points for UNFCCC and the Kyoto Protocol, 2 points for the Basel convention, 4 points for UNCBD, and 4 points for the Ramsar convention and the Cartagena Protocol. Due to the varying allocation of points, the observed value for each convention/protocol was re-scaled from 0-1 by dividing the observed points by the maximum number of points achievable. The re-scaled values were then aggregated using equal weights of 1/7 each. Countries or territories not listed under the list of parties to a convention/protocol/amendment were assigned 0 points for the respective convention/protocol/amendment.

Rationale
Participation in international environmental efforts should be measured beyond signatures to treaties. For this reason, this variable combines ratifications of treaties and conventions with the level of active participation in, contribution to, and compliance with the treaties' obligations.
**Indicator**
CO2GDP

**Collection**
ESI 2005

**Indicator #**
139

**Sub-Index**

**Indicator Name**
Carbon emissions per million US dollars GDP

**Units**
Metric tons of carbon emissions per million GDP in constant 1995 US dollars

**Reference Year**
2000

**Source**

**Methodology**
Total annual CO2 emissions in metric tons have been normalized by million GDP in constant 1995 US dollars for each country. For the People’s Republic of Korea, World Bank data were not available and GDP at market prices, so current prices, US$ (UN estimates) for 2000 were used instead.

**Rationale**
Emissions of carbon dioxide are not immediately harmful to any given country but contribute to global climate change. Every country emits carbon dioxide. However, the amount of emissions per unit economic activity varies widely, with some countries being far more efficient than others.

---

**Indicator**
CO2PC

**Collection**
ESI 2005

**Indicator #**
140

**Sub-Index**

**Indicator Name**
Carbon emissions per capita

**Units**
Metric tons of carbon emissions per capita

**Reference Year**
MRYA 1996-2001

**Source**

**Methodology**
Total annual carbon dioxide emissions in metric tons of carbon were normalized by total population (de facto) for each country for the same year. For Slovenia the most recent available non-zero figure was for the year 1996, for the Ukraine for the year 1998, and for the Russian Federation for the year 1999.

**Rationale**
Emissions of carbon dioxide are not immediately harmful to any given country, but contribute to
climate change. Every country emits some carbon dioxide, but the amount per person varies widely, with some countries having much lower per capita emissions than others.

<table>
<thead>
<tr>
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<th>Collection</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>141</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>SO2 Exports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Gigagrams of SO2 produced in country that is carried across its boundaries to other countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The data are merged from EMEP, IIASA Europe, and IIASA RAINS-Asia. Kola and the rest of the Russian Federation are aggregated to the Russian Federation (RUS) in the EMEP data.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>The transport of sulfur emissions across territorial boundaries contributes to poor air quality and acid rain in receiving countries.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>POLEXP</th>
<th>Collection</th>
<th>ESI 2005</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>142</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Import of polluting goods and raw materials as percentage of total imports of goods and services</td>
<td></td>
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</tr>
<tr>
<td>Units</td>
<td>Import of polluting goods and raw materials as percentage of total imports of goods and services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The following commodities from the Harmonized Commodity Description and Coding System (HS-1996) are used: salt, sulphur, earth, stone, plaster, lime and cement; ores, slag and ash; paper and paperboard, articles of pulp, etc.; stone, plaster, cement, asbestos, mica, etc.; iron and steel; copper, nickle, aluminium, lead, zinc, tin, other base metals, cermet, and articles thereof; nuclear reactors, boilers, machinery, etc.; vehicles other than railway, tramway; ships, boats and other floating structures; and aircraft, spacecraft, and parts thereof. The import data in US dollars for these codes are added up and divided by the value of total imports of goods and services in US dollars. Countries with no recorded imports of goods and raw materials for the selected HS codes were set to missing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationale</td>
<td>Countries that import a large volume of commodities that are associated with negative environmental externalities at the point of extraction or processing may not be pursuing an environmentally sustainable path because of the likelihood that their actions are contributing to damage abroad. This measure does not take into account variation in actual environmental externalities within exporting countries, nor does it factor in other relevant imports that are not classified as commodities; as such it should be considered a rough proxy.</td>
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</tr>
</tbody>
</table>
Collection 3: 2004 Environmental Vulnerability Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>143</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Environmental Vulnerability Index (EVI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless index score (ranging from 174 low vulnerability to 450 for high vulnerability)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The EVI is based on 50 indicators for estimating the vulnerability of the environment of a country to future shocks. These indicators are combined by simple averaging and reported simultaneously as a single index, a range of policy-relevant thematic sub-indices and as a profile showing the results for each indicator. Simple averages across indicators are used because they can be easily understood and more complex models do not appear to offer any advantages to the expression or utility of the index. This overview with drill-down structure means that in addition to an overall signal of vulnerability, the EVI can be used to identify specific problems. The EVI has been designed to reflect the extent to which the natural environment of a country is prone to damage and degradation. It does not address the vulnerability of the social, cultural or economic systems, nor the environment that has become dominated by those same human systems (such as cities and farms) because these are included in the economic and social vulnerability indices which are needed separately to identify trade-offs. Therefore, the natural environment includes those biophysical systems that can be sustained without direct and/or continuing human support. The environment at risk includes ecosystems, habitats, populations and communities of organisms, physical and biological processes (such as beach building and reproduction), productivity and energy flows, diversity at all levels, and interactions among them all. Each of these ecosystem goods, services and relationships may be affected by natural and human hazards, the risk of which may vary with time, place and human choices and behaviour.</td>
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<tr>
<td>The scores range as follows:</td>
<td></td>
<td></td>
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<tr>
<td>Extremely vulnerable</td>
<td>365+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly vulnerable</td>
<td>315-364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vulnerable</td>
<td>265-314</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At risk</td>
<td>215-264</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resilient</td>
<td>&lt;264</td>
<td></td>
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</tbody>
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<thead>
<tr>
<th>Indicator</th>
<th>HAZARDS</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>144</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Risk of Natural Hazards Occurring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
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</tbody>
</table>
| Methodology | The theory behind the EVI identifies three aspects, which can be identified wherever vulnerability is considered. These are: (i) the risk of hazards occurring, (ii) the inherent resistance to damage and (iii) the acquired vulnerability resulting from past damage. The risk
associated with hazards is dependent on the frequency and intensity of events that, by
definition, may adversely affect the environment.

Rationale
Risks to the natural environment include any events or processes that can cause damage.
These include natural and human events and processes, such as the weather and pollution. It
has been suggested that natural hazards should not be included in discussions of
environmental vulnerability because unless we identify certain natural events as being altered
by humans (e.g. human-induced sea-level rise), all natural events must be ‘normal’ and are
therefore not part of vulnerability. This view implies that nature cannot damage nature and/or
that natural hazards operate more-or-less in isolation. Natural and human hazards affect the
environment in interactive ways, therefore an integrated approach is required when analysing
vulnerability issues. For example, the effects of cyclones on natural communities are worse
where marine and shoreline ecosystems have been degraded by pollution and over-
harvesting. High levels of natural disturbance can drive populations of organisms down to low
levels or make their populations more variable. This in turn, makes the risk of local extinction
from other hazards more likely. The frequency and intensity of natural disturbances cannot be
separated from the effects of human disturbances and needs to be incorporated in the
concept of environmental vulnerability.

Indicator RESISTANCE Collection EVI 2004
Indicator # 145 Sub-Index
Indicator Name Resistance to Damage
Units Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year 2004
Methodology The theory behind the EVI identifies three aspects, which can be identified wherever
vulnerability is considered. These are: (i) the risk of hazards occurring, (ii) the inherent
resistance to damage and (iii) the acquired vulnerability resulting from past damage. The risk
associated with hazards is dependent on the frequency and intensity of events that, by
definition, may adversely affect the environment. The inherent resilience or resistance of the
environment refers to the innate characteristics of a country that would tend to make it more or
less able to cope with natural and anthropogenic hazards. For example, Nepal is inherently
invulnerable to sea-level rise, regardless of the worldwide level of risk and any other damage
that might be sustained to its environments.

Indicator DAMAGE Collection EVI 2004
Indicator # 146 Sub-Index
Indicator Name Vulnerability Resulting from Past Damage
Units Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year 2004
Methodology The theory behind the EVI identifies three aspects, which can be identified wherever
vulnerability is considered. These are: (i) the risk of hazards occurring, (ii) the inherent
resistance to damage and (iii) the acquired vulnerability resulting from past damage. The risk
associated with hazards is dependent on the frequency and intensity of events that, by
definition, may adversely affect the environment. The inherent resilience or resistance of the
environment refers to the innate characteristics of a country that would tend to make it more or
less able to cope with natural and anthropogenic hazards. For example, Nepal is inherently
inulnerable to sea-level rise, regardless of the worldwide level of risk and any other damage
that might be sustained to its environments. Acquired vulnerability arises from damage
sustained in the past and is related to the ecological integrity or level of degradation of
ecosystems. The underlying assumption is that the more degraded the ecosystems of a
country (as a result of past natural and anthropogenic hazards), the more vulnerable they are
likely to be to future hazards.

**Indicator** CCEVI **Collection** EVI 2004
**Indicator #** 147 **Sub-Index**
**Indicator Name** Climate Change Sub-Index
**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
**Reference Year** 2004
**Methodology** The Climate Change Sub-Index of the EVI represents an unweighted average of the scores for
the following variables: WINDEVI, DRYEVI, WETEVI, HOTEVI, SSTEVI, LANDEVI, DISPEVI,
RELIEFEVI, LOWEVI, VEGEVI, WATEREVI, POPDNEVI, and CSTPOPEVI.

**Indicator** ENDEVI **Collection** EVI 2004
**Indicator #** 148 **Sub-Index**
**Indicator Name** Exposure to Natural Disasters Sub-Index
**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
**Reference Year** 2004
**Methodology** The Agriculture & Fisheries Sub-Index of the EVI represents an unweighted average of the
scores for the following variables: WINDEVI, DRYEVI, WETEVI, HOTEVI, COLDEVI,
VOLCANOESI, EARTHQKEVI, TSUNAMIEVI, SLIDESEVI, POPDNEVI, and CSTPOPEVI.

**Indicator** HHEVI **Collection** EVI 2004
**Indicator #** 149 **Sub-Index**
**Indicator Name** Human Health Aspects Sub-Index
**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
**Reference Year** 2004
**Methodology** The Human Health Aspects Sub-Index of the EVI represents an unweighted average of the
scores for the following variables: Fertilisers (FERTLEVI), Pesticides (PESTCDEVI), Water
(WATEREVI), Sulphur Dioxide (SULPHEVI), Waste Treatment (TRTMNTEVI), and Sanitation
(SANEVI).
<table>
<thead>
<tr>
<th>Indicator</th>
<th>AFEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>150</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Agriculture and Fisheries Sub-Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
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<td></td>
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<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
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<tr>
<td>Methodology</td>
<td>The Agriculture &amp; Fisheries Sub-Index of the EVI represents an unweighted average of the scores for the following variables: DRYEVI, WETEVI, SSTEVI, IMBALEVI, OPENEVI, MIGEVI, INTROEVI, VEGEVI, VEGLOEVI, FRAGEVI, DEGEVI, MPAEVI, FARMEVI, FERTLEVI, PESTCDEV, BIOTECHEVI, PRDOFEVI, FSHEFEVI, and WATEREVI.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>WATEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>151</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Water Sub-Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Desertification Sub-Index of the EVI represents an unweighted average of the scores for the following variables: DRYEVI, WETEVI, VEGEVI, VEGLOEVI, DEGEVI, RESRVEVI, FERTLEVI, PESTCDEV, WATEREVI, TRTMNTVEVI, SANEVI, POPDNEVI, and POPGRTHEVI.</td>
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<thead>
<tr>
<th>Indicator</th>
<th>CCDEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>152</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Desertification Sub-Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Desertification Sub-Index of the EVI represents an unweighted average of the scores for the following variables: WINDEVI, DRYEVI, WETEVI, HOTEVI, COLDEVI, RELIEFEVI, LOWEVI, VEGEVI, VEGLOEVI, DEGEVI, and WATEREVI.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CBDEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>153</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Biodiversity Sub-Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Source**

**Methodology**
The Biodiversity Sub-Index of the EVI represents an unweighted average of the scores for the following variables: SSTEVI, LANDEVI, DISPEVI, ISOLEVI, RELIEFEVI, LOWEVI, BORDEVI, IMBALEVI, OPENEVI, MIGEVI, ENDEMEVI, INTROEVI, ENDANGEVI, EXTINCTEVI, VEGEVI, VEGLOEVI, FRAGEVI, RESPRESS, and MPAEVI.

**Indicator**
**Indicator #** 154
**Indicator Name** High Winds
**Units** Values are total knots of excess wind per year.
**Reference Year** 1999-2003
**Source** NOAA DATSAV3 Surface SOD 1973-2003. National Climatic Data Centre, 151 Patton Avenue, Asheville, NC 28801-5001

Additional Sources:
Cook Is. - Data archive of Cook Islands Met Services (CIMS) Director, Met Services; Fiji - Ashmita Gosai (724888); Fiji - FMS Annual Weather Summary 1997 & 1998. Fiji Meteorological Service; Greece - Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr); Kiribati - Kirion Kabunatelti. Climate Archive from Kiribati Meteorology Services (KMS); Nepal - Various Issues of Climatological Records of Nepal. Department of Hydrology and Meteorology. Kathmandu, Nepal; New Zealand - National Institute of Water and Atmospheric Research. Mr A. C Penney. E.Mail: a.penney@niwa.cri.nz; Niue - David Poihega (4196/4602/upoihega@yahoo.com) Niue Meteorology Services; Palau - Federal Climate Complex Asheville; Singapore - Mr Wong Teo Suan ++(65) 5457191 ++(65) 5457192. Meteorological office Singapore; Thailand - Climatology Division Meteorology Department. 21/08/2001; Tonga - Ofa Fa’anunu (676 23401/24145/ Tongamet@kalianet.to) Climate Archive, Tonga Meteorology Services (TMS).

**Methodology**
Values are total knots of excess wind per year. These are as annual averages over the past 5 years of summed deviations of daily maximum windspeeds that are more than 20% higher than the 30 year monthly mean maximum wind speeds, calculated for each climate station in a country and then averaged over all climate stations.

Average annual excess wind over the last five years (summing speeds on days during which the maximum recorded wind speed is greater than 20% higher than the 30 year average maximum wind speed for that month) averaged over all reference climate stations.

Raw values of summed deviations were adjusted for each individual climate station to account for missing days of data. This was done by multiplying the summed deviations across days with more than 20% higher maximum wind speed, by the total number of days in the 5 year period (1826 days) and dividing by the number of days for that station that had data (many stations have missing days) = ([Deviations * 1826] / days with data). The adjustment was done to ensure stations with fewer days of data were comparable with those which had more.

In its original form, this indicator called for data on the number of days with >20% higher maximum wind speeds over the 30-year mean. We adjusted the indicator to sum all the deviations above the threshold so that countries with only slight excess could be distinguished from those with large ones.

**Rationale**
Vulnerability to cyclones, tornadoes, storms, erosion, habitat damage, disturbance. This indicator captures the likelihood of damage from frequent and severe wind that can affect forests, fan fires, create storm surges, dry soils, spread air pollution, and interact with other

73
stressors. Because this indicator is expressed in relation to the 30 year monthly means, a high score could indicate shifts in weather patterns and climate, and could negatively affect a country's resilience to other hazards. The signal generated captures not only the frequency of high winds, but also their strength.

**Indicator:** WINDEVI  
**Collection:** EVI 2004  
**Indicator #:** 155  
**Sub-Index:** 

**Indicator Name:** High Winds (scaled)  
**Units:** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)  
**Reference Year:** 1999-2003  

**Methodology:** Using the variable WINDS the authors applied the following break off values (where X is the log of knots):

- EVI Score = 1  \( X \leq 5 \)
- EVI Score = 2  \( 5 < X \leq 5.3 \)
- EVI Score = 3  \( 5.3 < X \leq 5.6 \)
- EVI Score = 4  \( 5.6 < X \leq 5.9 \)
- EVI Score = 5  \( 5.9 < X \leq 6.1 \)
- EVI Score = 6  \( 6.1 < X \leq 6.4 \)
- EVI Score = 7  \( 6.4 < X \)

**Rationale:** Vulnerability to cyclones, tornadoes, storms, erosion, habitat damage, disturbance. This indicator captures the likelihood of damage from frequent and severe wind that can affect forests, fire fires, create storm surges, dry soils, spread air pollution, and interact with other stressors. Because this indicator is expressed in relation to the 30 year monthly means, a high score could indicate shifts in weather patterns and climate, and could negatively affect a country's resilience to other hazards. The signal generated captures not only the frequency of high winds, but also their strength.

**Indicator:** DRY  
**Collection:** EVI 2004  
**Indicator #:** 156  
**Sub-Index:** 

**Indicator Name:** Dry periods  
**Units:** Millimetres of rainfall deficit (negative value). Total rainfall deficit in mm over the past 5 years, averaged over all stations and months for which there were data. Final values expressed as annual figures.  
**Source:** NOAA GHCN http://www.ncdc.noaa.gov/oa/pub/data/ghcn/v2/ghcnftp_zipd.html; In-country Additional Sources:

Methodology

Average annual rainfall deficit (mm) over the past 5 years for all months with >20% lower rainfall than the 30 year monthly average, averaged over all reference climate stations.

1. This indicator is focused on the size of the rainfall deficit across all climate stations in countries, so takes into account vastly different climates (assessing deficit only in terms of one climate station at a time and then averaging them across stations).

2. Contiguous months of drought are not captured separately from isolated months. Effects are likely to be worse for areas in which the deficit is on-going.

3. The researchers upgraded the indicator from an earlier simpler form to measure the strength of the deficit, if one exists. This gives a better picture of vulnerability because it separates ‘minor’ droughts from major ones.

Rationale

Vulnerability to drought, dry spells, stress on surface water resources. This indicator captures not only the number of months with significantly lower rainfall, but also the strength of the deficit. Two countries could have the same average number of months over the past 5 years with less than 20% lower than the monthly average rainfall, with one only having a small deficit, while another a very large one. This indicator ensures that the amount of rain ‘missed’ is captured. Frequent and severe drought months could indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. fires, water movements, ability of ecosystems to attenuate pollution).

Indicator

DRYEVI

Collection

EVI 2004

Indicator #

157

Sub-Index

Indicator Name

Dry periods (scaled)

Units

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year

1999-2003

Source


Methodology

Using the variable DRY the authors applied the following break off values (where X is the log of the absolute value of the number of dry spells between 1999 and 2003):

EVI Score = 1 $X \leq 4$
EVI Score = 2 $4 < X \leq 4.5$
EVI Score = 3 $4.5 < X \leq 5$
EVI Score = 4 $5 < X \leq 5.5$
EVI Score = 5 $5.5 < X \leq 6$
EVI Score = 6 $6 < X \leq 6.5$
EVI Score = 7 $6.5 < X$
Rationale
Vulnerability to drought, dry spells, stress on surface water resources. This indicator captures not only the number of months with significantly lower rainfall, but also the strength of the deficit. Two countries could have the same average number of months over the past 5 years with less than 20% lower than the monthly average rainfall, with one only having a small deficit, while another a very large one. This indicator ensures that the amount of rain 'missed' is captured. Frequent and severe drought months could indicate shifts in weather patterns and climate, and could negatively affect a country's resilience to other hazards (e.g. fires, water movements, ability of ecosystems to attenuate pollution).

Indicator
WET

Collection
EVI 2004

Indicator #
158

Sub-Index

Indicator Name
Wet periods

Units
Millimetres of excess rainfall. Total excess rainfall in mm over the past 5 years, averaged over all stations and months for which there were data. In their final form results are expressed as annual excess.

Reference Year

Source
NOAA GHCN http://www.ncdc.noaa.gov/oa/pub/data/ghcn/v2/ghcnftp_zipd.html; In-country Additional Sources:

Cook Islands - Meteorology Office. Nga Rauraa (+682 20603/682 21603); Federated States of Micronesia - NOAA/ NCDC – 1999 Local Climate Data/ NCDC. Caesar Hadley. WSO Pohnpei – NWSPR/ NOAA; Fiji - Ashmita Gosai (+679-724888); Greece - Dr Paula Scott (ph&f: +30-81-861219, cariad@her.forthnet.gr); Kiribati - Kirion Kabunateiti. Climate Archive from Kiribati Meteorology Services (KMS); Marshall Islands - NOAA NCDC Ashville. Local Climatological Data (LCD). Lee Z Jacklick; Nauru - Nauru Meteorology Services. Frank W Davey; Nepal - Various issues of Climatological records of Nepal. Soroj Kumar Baidhya (MR) Phone +641 255920; New Zealand - National Institute of Water and Atmospheric Research, New Zealand. Mr A. C Penney. E.Mail: a.penney@niwa.cri.nz ; Niue - Sionetasi Pulehetoa. Meteorology Department Palau - Maria Ngemaes (680 4881034, maria.ngemaes@noaa.gov) Weather Service Office (National Weather Service); Papua New Guinea - Climatic Tables for PNG. McAlphine, J. R.; Keig, G.; and Short, K. PNG National Weather Service; Philippines - Climatological Normals. Ms Panfila E. Gica / Climate Data Section / PAGASA Samoa - Niko Tualevao. Apia Observatory/ Samoa Meteorology; Singapore - Mr Wong Teo Suan ++(65) 5457191 ++(65) 5457192. Meteorological office Singapore; Thailand - Climatology Division Meteorological Department 21 Aug 2001 local_climate@tmdnet.motc.go.th ; Tonga - Ofa Fa’anunu (676 23401/24145/ Tongamet@kalianet.to) Climate Archive, Tonga Meteorology Services (TMS); Trinidad & Tobago - Debbie Rammarine; Tuvalu - Tuvalu Meteorology Services (TMS). Hilia Vavae; Vanuatu - Vanuatu Meteorology Services (VMS). Mr Kaniaha Salesa (678 23866/ 22310/ climate@meteo.vu).

Methodology
Average annual excess rainfall (mm) over the past 5 years for all months with >20% higher rainfall than the 30 year monthly average, averaged over all reference climate stations.

1. This indicator is focused on the size of the rainfall excess across all climate stations in countries, so takes into account vastly different climates (assessing excess only in terms of one climate station at a time and then averaging them across stations).

2. Contiguous months of high rainfall are not captured separately from isolated months. Effects are likely to be worse for areas in which the excess is sustained.

3. We upgraded the indicator from a simpler form to measure the strength of the excess, if one exists. This gives a better picture of vulnerability because it separates ‘minor’ excesses from severe ones.
4. Dividing the total excess by the number of climate stations is necessary to prevent apparently excessive rainfall caused because data are being collected from different numbers of stations in countries. That means that in large countries with many stations, severe excessive rainfall at one or a small number of stations may be lost by averaging over a very large number of stations with normal rainfall. We consider this appropriate since the averaging over many stations puts damage into the context of the entire area likely to be affected.

Further information on this variable is available from the EVI Progress Report 2004, pp. 25-31.

**Rationale**

Vulnerability to floods, cyclones, wet periods, stress on land surfaces and ecosystems subject to flooding and disturbance. This indicator captures not only the number of months with significantly higher rainfall, but also the amount of the excess. Two countries could have the same number of months of the past 60 (5 years) with more than 20% higher rainfall than the monthly average, with one only having a small excess, while another a very large one. The modification to this indicator ensures that the amount of rain ‘in excess’ is captured. Frequent and severe wet months could indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. water movements, the spread of and ability of ecosystems to attenuate pollution).

**Indicator** WETEVI

**Collection** EVI 2004

**Indicator #** 159

**Sub-Index**

**Indicator Name** Wet periods (scaled)

**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year** 1999-2003


**Methodology**

Using the variable WET, which is measured in as the square root of the number of wet spells between 1999 and 2003, the authors applied the following break off values:

- EVI Score = 1 \( \leq X \leq 5 \)
- EVI Score = 2 \( 5 < X \leq 7 \)
- EVI Score = 3 \( 7 < X \leq 9 \)
- EVI Score = 4 \( 9 < X \leq 11 \)
- EVI Score = 5 \( 11 < X \leq 13 \)
- EVI Score = 6 \( 13 < X \leq 15 \)
- EVI Score = 7 \( 15 < X \)

**Rationale**

Vulnerability to floods, cyclones, wet periods, stress on land surfaces and ecosystems subject to flooding and disturbance. This indicator captures not only the number of months with significantly higher rainfall, but also the amount of the excess. Two countries could have the same number of months of the past 60 (5 years) with more than 20% higher rainfall than the monthly average, with one only having a small excess, while another a very large one. The modification to this indicator ensures that the amount of rain ‘in excess’ is captured. Frequent and severe wet months could indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. water movements, the spread of and ability of ecosystems to attenuate pollution).
**Indicator**: HOT  
**Collection**: EVI 2004

**Indicator #**: 160  
**Sub-Index**:  

**Indicator Name**: Hot Periods

**Units**: Total degrees (Fahrenheit) of excess heat per year. Annual averages over the past 5 years of summed deviations of daily maximum temperatures that are more than 9F higher than the 30 year monthly mean maximum temperatures, calculated for each climate station in a country and then averaged over all climate stations.

**Reference Year**: 1999-2003

**Source**: NOAA DATSAV3 Surface SOD 1973-2003. National Climatic Data Centre, 151 Patton Avenue, Asheville, NC 28801-5001

Additional Sources:


Palau - Maria Ngemaes (680 4881034, maria.ngemaes@noaa.gov) Weather Service Office (National Weather Service); Papua New Guinea - Climatic Tables for PNG. McAlphine, J. R.; Keig, G.; and Short, K. PNG National Weather Service; Philippines - Climatological Normals. Ms Panfia E. Gica / Climate Data Section / PAGASA

Samoa - Niko Tuaaleva. Apia Observatory/ Samoa Meteorology; Singapore - Mr Wong Teo Suan ++(65) 5457191 ++(65) 5457192. Meteorological office Singapore; Thailand - Climatology Division Meteorological Department 21 Aug 2001 local_climate@tmdnet.motc.go.th ; Tonga - Ofa Fa’anunu (676 23401/ 24145/ Tongame@kalianet.to) Climate Archive, Tonga Meteorology Services (TMS); Trinidad & Tobago - Debbie Ramnarine; Tuvalu - Tuvalu Meteorology Services (TMS). Hilia Vavae; Vanuatu - Vanuatu Meteorology Services (VMS). Mr Kaniaha Salesa (678 23866/ 22310/ climate@meteo.vu ).

**Methodology**

Average annual excess heat (degrees Fahrenheit) over the past 5 years for all days more than 9F (5°C) hotter than the 30 year mean monthly maximum, averaged over all reference climate stations.

Raw values were supplied in Fahrenheit, so calculations have been made in those units, with the threshold at 9F used for measuring deviations.

Raw values of summed deviations were adjusted for each individual climate station to account for missing days of data. This was done by multiplying the summed deviations across days with more than  5°C (9F) higher daily maximum temperature, by the total number of days in the 5 year period (1826 days) and dividing by the number of days for which that station had data (many stations have missing days) = \( \frac{\text{Deviations} \times 1826}{\text{days with data}} \). The adjustment was done to ensure stations with fewer days of data were comparable with those which had more.

In its original form, this indicator called for data on the number of days with >5C higher daily maximum temperatures over the 30-year monthly mean. We adjusted the indicator to sum all the deviations above the threshold so that countries with only slight excess could be distinguished from those with large ones.
Rationale
Vulnerability to heat waves, desertification, water resources, temperature stress, bleaching. This indicator is designed to capture stress on land surfaces and nearshore or shallow aquatic environments to periods of high temperatures that can affect productivity, oxygen levels, pollution, reproduction and symbiotic relationships and lead to mass mortality. On land, periods of high temperatures can also lead to interactive effects such as fires. This indicator captures not only the number of days with significantly higher temperatures, but also the amount of the excess. Two countries could have the same number of days with more than 5°C higher temperatures than the monthly average, with one only having a small excess, while another a very large one. Frequent and severe hot days could also indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. ability of forests to regenerate if disturbed).

Indicator
HOTEVI
Indicator 
161
Indicator Name
Hot Periods (scaled)
Units
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year
1999-2003
Source
Methodology
Using the variable HOTPER, measured in the natural log of the total degrees (Farenheit) of excess heat per year, the authors applied the following break off values:

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>X</th>
<th>X ≤ 3.5</th>
<th>3.5 &lt; X ≤ 4</th>
<th>4 &lt; X ≤ 4.5</th>
<th>4.5 &lt; X ≤ 5</th>
<th>5 &lt; X ≤ 5.5</th>
<th>5.5 &lt; X ≤ 6</th>
<th>6 &lt; X</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVI Score</td>
<td>1</td>
<td>X ≤ 3.5</td>
<td>3.5 &lt; X ≤ 4</td>
<td>4 &lt; X ≤ 4.5</td>
<td>4.5 &lt; X ≤ 5</td>
<td>5 &lt; X ≤ 5.5</td>
<td>5.5 &lt; X ≤ 6</td>
<td>6 &lt; X</td>
</tr>
</tbody>
</table>

Rationale
Vulnerability to heat waves, desertification, water resources, temperature stress, bleaching. This indicator is designed to capture stress on land surfaces and nearshore or shallow aquatic environments to periods of high temperatures that can affect productivity, oxygen levels, pollution, reproduction and symbiotic relationships and lead to mass mortality. On land, periods of high temperatures can also lead to interactive effects such as fires. This indicator captures not only the number of days with significantly higher temperatures, but also the amount of the excess. Two countries could have the same number of days with more than 5°C higher temperatures than the monthly average, with one only having a small excess, while another a very large one. Frequent and severe hot days could also indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. ability of forests to regenerate if disturbed).

Indicator
COLD
Indicator 
162
Indicator Name
Cold Periods
Units
Total degrees (Farenheit) of heat deficit per year. These are as annual averages over the past 5 years of summed deviations of daily minimum temperatures that are more than 9°F lower than the 30 year by month, mean daily minimum temperatures, calculated for each climate station in a country and then averaged over all climate stations.
**Reference Year**
1999-2003

**Source**

Additional Sources:

Palau - Maria Ngemaes (680 4881034, maria.ngemaes@noaa.gov) Weather Service Office (National Weather Service); Papua New Guinea - Climatic Tables for PNG. McAlphine, J. R.; Keig, G.; and Short, K. PNG National Weather Service; Philippines - Climatological Normals. Ms Panfile E. Gica / Climate Data Section / PAGASA
Samoa - Niko Tualevao. Apia Observatory/ Samoa Meteorology; Singapore - Mr Wong Teo Suan ++(65) 5457191 +++(65) 5457192. Meteorological office Singapore; Thailand - Climatology Division Meteorological Department 21 Aug 2001 local_climate@tmdnet.motc.go.th ; Tonga - Ofa Fa’anunu (676 23401/ 24145/ Tongamet@kalianet.to) Climate Archive, Tonga Meteorology Services (TMS); Trinidad & Tobago - Debbie Ramnarine; Tuvalu - Tuvalu Meteorology Services (TMS). Hilia Vavae; Vanuatu - Vanuatu Meteorology Services (VMS). Mr Kaniaha Salesa (678 23866/ 22310// climate@meteo.vu ).

**Methodology**

Average annual heat deficit (degrees) over the past 5 years for all days more than 5°C cooler than the 30 year mean monthly minimum, averaged over all reference climate stations.

Raw values were supplied in Farenheit, so calculations have been made in those units, with the threshold at 9°F used for measuring deviations.

Raw values of summed deviations were adjusted for each individual climate station to account for missing days of data. This was done by multiplying the summed deviations across days with more than 5°C (9°F) lower daily minimum temperature, by the total number of days in the 5 year period (1826 days) and dividing by the number of days for which that station had data (many stations have missing days) = \[ \frac{\sum \text{Deviations} \times 1826}{\text{days with data}} \]. The adjustment was done to ensure stations with fewer days of data were comparable with those which had more.

In its original form, this indicator called for data on the number of days with >5C lower daily minimum temperatures over the 30-year monthly mean. We adjusted the indicator to sum all the deviations above the threshold so that countries with only slight excess could be distinguished from those with large ones.

**Rationale**

Vulnerability to cold snaps, unusual frosts, effects on water resources, temperature stress, pollution attenuation rates, reproductive success. This indicator is designed to capture stress on land surfaces and nearshore or shallow aquatic environments to periods of low temperatures that can affect productivity, oxygen levels, pollution, reproduction and symbiotic relationships and lead to mass mortality. This indicator captures not only the number of days with significantly lower temperatures, but also the amount of the “heat deficit”. Two countries could have the same number of days with more than 5°C lower temperatures than the monthly average, with one only having a small deficit, while another a very large one. Frequent and severe cold days could also indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. ability of lakes and rivers to attenuate pollutants).
**Indicator**  COLDEVI  **Collection**  EVI 2004

**Indicator #**  163  **Sub-Index**

**Indicator Name**  Cold Periods (scaled)

**Units**  Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**  1999-2003


**Methodology**

Using the variable COLDPER, the authors applied the following break off values (where X is the natural log of the total degrees (Farenheit) of heat deficit per year):

- EVI Score = 1  \( X \leq 3.5 \)
- EVI Score = 2  \( 3.5 < X \leq 4 \)
- EVI Score = 3  \( 4 < X \leq 4.5 \)
- EVI Score = 4  \( 4.5 < X \leq 5 \)
- EVI Score = 5  \( 5 < X \leq 5.5 \)
- EVI Score = 6  \( 5.5 < X \leq 6 \)
- EVI Score = 7  \( 6 < X \)

**Rationale**

Vulnerability to cold snaps, unusual frosts, effects on water resources, temperature stress, pollution attenuation rates, reproductive success. This indicator is designed to capture stress on land surfaces and nearshore or shallow aquatic environments to periods of low temperatures that can affect productivity, oxygen levels, pollution, reproduction and symbiotic relationships and lead to mass mortality. This indicator captures not only the number of days with significantly lower temperatures, but also the amount of the “heat deficit”. Two countries could have the same number of days with more than 5°C lower temperatures than the monthly average, with one only having a small deficit, while another a very large one. Frequent and severe cold days could also indicate shifts in weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. ability of lakes and rivers to attenuate pollutants).

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**Indicator**  SST  **Collection**  EVI 2004

**Indicator #**  164  **Sub-Index**

**Indicator Name**  Sea Temperatures

**Units**  Absolute values of temperature anomalies in relation to the 30 year monthly (1961-1990) averages in degrees C

**Reference Year**  1999-2003

**Source**

1. Climatic Research Unit, University of East Anglia, Norwich, UK. http://www.cru.uea.ac.uk/cru/data/temperature/#datdow
2. Data masked and extracted for EEZs by University of British Columbia

Additional sources:

www.pmel.noaa.gov/pmel (Papua New Guinea); www.seafdec.org/inform/survey.htm (24/05/01) (Thailand); www.start.or.th/got/data/dblink.html (21/05/01); Fiji - Simon McGree. Fiji Meteorological Service; Kiribati - Smith & Reynolds 1998 (61-90); Nauru - Climate Change Response. Nauru’s National Committee on Climate Change & SOPAC’s Energy Unit. 1999; New Zealand - M.J Uddstrom and N.A. Oien, 1999, On the use of high resolution satellite data to describe the spatial and temporal variability of SSTS’s in the New Zealand Region, JGR, 104 (cq) 20729 – 20751; Palau - Coral Reef Research Foundation; Philippines - Monthly mean and annual climatic Data Dry Bulb temperature. Data collected by Panfila. Gica. Climate Data Section/ Philippine Atmospheric, Geophysical and Astronomical Services Administration;
Methodology

Average annual deviation in Sea Surface Temperatures (SST) in the last 5 years in relation to

1. Where countries had data for two or more regions or seas, we calculated average anomalies separately and then averaged them across seas (e.g. Japan, Germany, USA, Turkey)

2. This indicator was considered generally not applicable (NA) to land-locked countries

3. Three countries considered land-locked by UNCTAD and Wikipedia (Azerbaijan, Kazakhstan and Turkmenistan) had data from their associated seas. The available data were used, so an EVI score is available for those countries.

Rationale

This indicator captures vulnerability to fluctuations in productivity, fisheries, currents, eddies, ENSO, cyclones & storms, blooms and coral bleaching. The indicator captures the total amount of the anomalies in SST, either as excess or deficit (using absolute values). Frequent and severe deviations from the 30 year moving average could herald shifts in currents, upwelling, weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. for water movements, the spread of and ability of ecosystems to attenuate pollution). Effects would be especially important when other stresses have already driven populations to low levels.

Indicator | SSTEVI | Collection | EVI 2004
--- | --- | --- | ---
Indicator # | 165 | Sub-Index
Indicator Name | Sea Temperatures (scaled)
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year | 1999-2003
Methodology

Using the variable SEATEMP, the authors applied the following break off values (where X is Absolute values of temperature anomalies in relation to the 30 year monthly (1961-1990) averages in degrees C):

EVI Score = 1 \( X \leq 0.5 \)
EVI Score = 2 \( 0.5 < X \leq 0.75 \)
EVI Score = 3 \( 0.75 < X \leq 1.0 \)
EVI Score = 4 \( 1.0 < X \leq 1.25 \)
EVI Score = 5 \( 1.25 < X \leq 1.5 \)
EVI Score = 6 \( 1.5 < X \leq 1.75 \)
EVI Score = 7 \( 1.75 < X \)

Rationale

This indicator captures vulnerability to fluctuations in productivity, fisheries, currents, eddies, ENSO, cyclones & storms, blooms and coral bleaching. The indicator captures the total amount of the anomalies in SST, either as excess or deficit (using absolute values). Frequent and severe deviations from the 30 year moving average could herald shifts in currents, upwelling, weather patterns and climate, and could negatively affect a country’s resilience to other hazards (e.g. for water movements, the spread of and ability of ecosystems to attenuate pollution). Effects would be especially important when other stresses have already driven populations to low levels.
Indicator Name: Cumulative Volcano Risk

Units: Cumulative volcano risk (CumVEI) as the weighted number of volcanoes with the potential for eruption greater than or equal to a Volcanic Explosively Index (VEI) of 2 within 100km of the country land boundary, divided by the area of land.

Reference Year: 2004

Source: NOAA / NESDIS / National Geophysical Data Centre / World Data Centre-A / Colorado USA; In-country

Methodology:

Volcano Explosively Index (VEI) is a 0-8 scale based on observations (e.g. description, plume height, volume, classification, and frequency of eruptions). Volcanic activity of this scale has the potential to cause significant changes in the environment, loss of ecosystems and biodiversity. Reference for the VEI scale can be found at website: http://volcano.und.nodak.edu/vwdocs/eruption_scale.html.

1. The indicator is calculated as CumVEI = (VEI2*2) + (VEI3*3) + (VEI4*4) + (VEI5*5) + (VEI6*6) + (VEI7*7) + (VEI8*8)

2. This indicator is focused on disturbance. At Think Tank I, it was determined that a country that has volcanoes with a high VEI is susceptible to having large areas damaged by explosive eruptions, which though may not be common, can have geographically far-reaching effects for long periods of time.

3. At Think Tank II, the modified to include all volcanoes of VEI 2+. Volcanoes that erupt periodically and smoke over a long period of time may be just as destructive to the environment as the largest cataclysmic eruptions. Total number of live volcanoes (TNLV) or cumulative VEI may be better indicators for the EVI.

4. The concept of VEI has been criticised because it is largely based on the observed behaviour of a volcano during witnessed eruptions and is key-in to the effects of eruptions on humans. For the purposes of the EVI, we are more interested in effects on the environment as life-support to humans.

Rationale: Vulnerability to Eruptions, landslides, geysers, gas (e.g. SO2 and CO2), fires, ash, dust, marine kills, biodiversity of habitat & species, potential for repeated and long term habitat disturbance. This indicator captures the risk of damage to ecosystems from the physical,
chemical and biological disturbances associated with volcanic eruptions. Because the risk associated with volcanoes varies according to size and type, the signal incorporates the number of volcanoes capable of affecting a country, and its potential for damage.

Indicator | VOLCANOEVI | Collection | EVI 2004
Indicator # | 167 | Sub-Index
Indicator Name | Cumulative Volcano Risk (scaled)
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year | 2004
Methodology | Using the variable VOLCANO, the authors applied the following break off values (where X is the cumulative volcano risk (CumVEI) as the weighted number of volcanoes with the potential for eruption greater than or equal to a Volcanic Explosively Index (VEI) of 2 within 100km of the country land boundary, divided by the area of land):
EVI Score = 1   \( X \leq 2 \)
EVI Score = 2   \( 2 < X \leq 3 \)
EVI Score = 3   \( 3 < X \leq 4 \)
EVI Score = 4   \( 4 < X \leq 5 \)
EVI Score = 5   \( 5 < X \leq 6 \)
EVI Score = 6   \( 6 < X \leq 7 \)
EVI Score = 7   \( 7 < X \)
Rationale | Vulnerability to Eruptions, landslides, geysers, gas (e.g. SO2 and CO2), fires, ash, dust, marine kills, biodiversity of habitat & species, potential for repeated and long term habitat disturbance. This indicator captures the risk of damage to ecosystems from the physical, chemical and biological disturbances associated with volcanic eruptions. Because the risk associated with volcanoes varies according to size and type, the signal incorporates the number of volcanoes capable of affecting a country, and its potential for damage.

Indicator | EARTHQK | Collection | EVI 2004
Indicator # | 168 | Sub-Index
Indicator Name | Cumulative Earthquake Energy
Units | Number of earthquakes (ML \( \geq 6 \), Depth \( \leq 15 \) km)
Reference Year | 2004
Source | NOAA/NESDIS/NGCC/World Data Centre-A, Colorado
Additional sources:

Methodology
Cumulative earthquake energy within 100km of country land boundaries measured as Local Magnitude (ML) $\geq 6.0$ and occurring at a depth of less than or equal to fifteen kilometres ($\leq 15$ km depth) over 5 years (divided by land area).

1. Deeper earthquakes are considered to present less risk to the environment. It is considered that shallow earthquakes of depths less that 15 km are likely to cause the most significant environmental changes and have the most impacts on the overlying environments.

2. The indicator may also function as a proxy for habitat disturbance through avalanches, slides and rifts and could damage structures of ecological significance (e.g. aquifers).

Rationale
Vulnerability to habitat disturbance through movements of land, water and slides. This indicator captures the risks of damage to the environment from large-scale disturbances such as fluidisation of soils and muds, diversion of rivers and other water bodies, tsunamis, slides, and direct damage to organisms associated with earth movements.

Indicator | EARTHQKEVI | Collection | EVI 2004 |
----------|------------|------------|----------|
Indicator # | 169 | Sub-Index | |
Indicator Name | Cumulative Earthquake Energy (scaled) | |
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad) | |
Reference Year | 2004 | |
Methodology
Using the variable EARTHQK, the authors applied the following break off values (where X = Number of earthquakes (ML $\geq 6$, Depth $\leq 15$ km)):

EVI Score = 1  $0 \leq X < 1$
EVI Score = 2  $1 \leq X < 2$
EVI Score = 3  $2 \leq X < 3$
EVI Score = 4  $3 \leq X < 4$
EVI Score = 5  $4 \leq X < 5$
EVI Score = 6  $5 \leq X < 6$

Rationale
Vulnerability to habitat disturbance through movements of land, water and slides. This indicator captures the risks of damage to the environment from large-scale disturbances such as fluidisation of soils and muds, diversion of rivers and other water bodies, tsunamis, slides, and direct damage to organisms associated with earth movements.
Indicator Name: Tsunami Density

Units: Number of tsunamis with run-up >2m above MHWS (years 1900-2000) / length of coastlines (maritime) * 1000

Reference Year: 2004

Source: Tsunamis: NOAA/NESDIS/NGCC
Land area and length maritime coast from WRI 2000-2001 and CIA 2001

Additional sources:
- www.start.or.th/got/data/dblink.htm (Thailand);
- www.ngdc.noaa.gov/cgi-bin/seg/haz/hazfq_result.pl (24/08/01);
- Federated States of Micronesia - Michael Gawel. 1993
- Federated States of Micronesia State of Environment Report. (pp34);
- Greece - Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr);
- Niue - Forbes, TR 233 Coastal Geology and Hazards in Niue;
- Papua New Guinea - Moihoi, M and Anton, L. 1999. Significant Tsunamis in PNG (A Review);
- Philippines - National Disaster Coordinating Council (NDCC) administrative reports. Mr. Percival A. Guiuan / (632) 8965390 / pa.guiuan@nscb.gov.ph;
- Tuvalu - New Zealand Meteorology Service (Kerr; p 103 – 104);

Methodology:
Number of tsunamis or storms surges with run-up greater than 2 metres above Mean High Water Spring tide (MHWS) per 1000 km coastline since 1900.

1. Indicator is tested raw, in relation to length of coastline and in relation to land area of each country.

2. The tsunamis per length of coast is better multiplied by 1000 to create a range that extends between zero and whole numbers up to 25. For tsunamis per area of land, the multiplier used was 1 million.

3. Because these are geological events, the time series covers the period since 1900. The figure calculated may change through additional tsunami events being recorded in a country.

4. Only tsunamis with a run-up of >2m are included. Those smaller are considered of minimal threat to coastal systems, and are expected to have an impact within the range of more common storms.

5. For landlocked countries the risk of tsunamis is considered zero and the data designation NA (not applicable) is used. In terms of EVI scaling, landlocked countries are scored the lowest EVI value (1) unless it can be shown that the shorelines and coastal areas of large lakes have been the subject of tsunami-like events, in which case they would record values like any other country.

Rationale:
This indicator captures the potential loss of shorelines, coastal ecosystems and resources, and loss of species due to catastrophic run up of seawater onto coastal lands. Countries with frequent and severe tsunamis are at risk of severe or permanent damage to biodiversity, productivity and the ability to recover from other stressors.
**Indicator**  TSUNAMIEVI  
**Collection**  EVI 2004

**Indicator #**  171  
**Sub-Index**

**Indicator Name**  Tsunami Density (scaled)

**Units**  Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**  2004


**Methodology**  
Using the variable TSUNAMI, the authors applied the following break off values (where $X = \frac{\text{Number of tsunamis with run-up} > 2\text{m above MHWS (years 1900-2000)}}{\text{length of coastlines (maritime)} \times 1000}$):

- EVI Score = 1  $X = 0$, or NA
- EVI Score = 2  $0 < X \leq 1$
- EVI Score = 3  $1 < X \leq 2$
- EVI Score = 4  $2 < X \leq 5$
- EVI Score = 5  $5 < X \leq 10$
- EVI Score = 6  $10 < X \leq 15$
- EVI Score = 7  $X > 15$

**Rationale**  
This indicator captures the potential loss of shorelines, coastal ecosystems and resources, and loss of species due to catastrophic run up of seawater onto coastal lands. Countries with frequent and severe tsunamis are at risk of severe or permanent damage to biodiversity, productivity and the ability to recover from other stressors.

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**Indicator**  SLIDES  
**Collection**  EVI 2004

**Indicator #**  172  
**Sub-Index**

**Indicator Name**  Land Slides

**Units**  Number of slides recorded between 1996-2000, divided by area of land (km2).

**Reference Year**  1996-2000

**Source**  EMDAT OFDA/CRED International Disaster Database 2001

Additional sources:

Encarta 2000 Maps; Botswana - Contact - Sarah E. A. Kabaija (Mrs)267 – 352200 Phone267 – 352201 Faxskabaija@gov.bw. Principal StatisticianHead of environment Statistics. Central Statistics Office; Costa Rica - Comision nacional de emergencia 2002; Fiji - Media (Fiji TV, Fiji Times) EVI Team; Kiribati - Contact - Ms Naomi Atauea. Mineral Unit/Ministry of Natural Resources and Development.

**Methodology**  
Number of slides recorded in the last 5 years (see EMDAT definitions), divided by land area.

Number of slides (landslides, mudslides and avalanches) lasting more than 30 seconds recorded over the past 5 years, divided by the area of mountainous lands. Mountainous lands are any over 1000m above sea level.

1. It may be possible to obtain data for this indicator from seismological records. Landslides may be part of the background noise in seismological records taken continuously.

2. The effects of slides are likely to be relatively localised (though they may mobilize runoff and mudflows which could travel down water courses and into the sea).
Data on slides included the following categories for inclusion: 10 or More people killed; 100 or more people affected; Significant disaster; Significant damage; Declaration of state of emergency or/and appeal for an international assistance; Disaster entered at the country level without data, because it has affected several countries/region.

Rationale
This indicator captures the risk of habitat disturbance and persistence of ecosystems and species from catastrophic shifts in the land surface. The primary and cumulative effects of slides would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator | SLIDESEVI | Collection | EVI 2004
Indicator # | 173 | Sub-Index
Indicator Name | Land Slides (scaled)
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year | 1996-2000
Methodology
Using the variable SLIDES, the authors applied the following break off values (where X = natural log of the number of slides recorded between 1996-2000, divided by area of land):

- EVI Score = 1 \( X = 0 \)
- EVI Score = 2 \( 0 < X \leq 0.5 \)
- EVI Score = 3 \( 0.5 < X \leq 1 \)
- EVI Score = 4 \( 1 < X \leq 1.5 \)
- EVI Score = 5 \( 1.5 < X \leq 2 \)
- EVI Score = 6 \( 2 < X \leq 2.5 \)
- EVI Score = 7 \( 2.5 < X \)

Rationale
This indicator captures the risk of habitat disturbance and persistence of ecosystems and species from catastrophic shifts in the land surface. The primary and cumulative effects of slides would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator | LAND | Collection | EVI 2004
Indicator # | 174 | Sub-Index
Indicator Name | Land Area
Units | Total land area (accumulated across islands, if present in square kilometers)
Reference Year | 2003
Additional sources:
www.bartleby.com/151/a6.html  (20/02/2002); www.linz.govt.nz/rcs/linz/pub/web/root/home/index.jsp (New Zealand); Cook Islands - Cook Islands NEMS (National Environmental Management Strategy) Report. SPREP (South Pacific Regional Environment Programme); Greece - Greece Govt Information. Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr); Kiribati - Internal record (Digitized 1:25000 Paper Maps), Ordinance Surveys, UK. Land Management Division (LMD); Marshall Islands - Land in Micronesia & its

Methodology
Area of land is calculated from MHWM (mean high water on maritime coasts). Estimates differ among sources and are subject to errors depending on the scale of maps used and the definition of where land begins in relation to sea-level. These differences are not considered of significance.

Rationale
This indicator captures the richness of habitat types and diversity, availability of refugia if damage is sustained or for protection, and species and habitat redundancy. It is generally considered that larger countries will have more options and the ‘critical mass’ required for ecological systems to persist and re-seed each other in the face of ecosystem stressors. There will also be more options for the human populations to allow areas that have been damaged to recover.

Indicator | Collection | LANDER
---|---|---
LANDEVI | EVI 2004

Indicator 
175

Indicator Name
Land Area (scaled)

Units
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year
2004

Source

Methodology
Using the variable LANDAR, the authors applied the following break off values (where X = natural log of the area of land):

EVI Score = 1    X >14
EVI Score = 2    12 < X ≤14
EVI Score = 3    10 < X ≤ 12
EVI Score = 4    8 < X ≤ 10
EVI Score = 5    6 < X ≤ 8
EVI Score = 6    4 < X ≤6
EVI Score = 7    X <4

Rationale
This indicator captures the richness of habitat types and diversity, availability of refugia if damage is sustained or for protection, and species and habitat redundancy. It is generally considered that larger countries will have more options and the ‘critical mass’ required for ecological systems to persist and re-seed each other in the face of ecosystem stressors. There will also be more options for the human populations to allow areas that have been damaged to recover.

89
Indicator: Country Dispersion

Units: Total length of land and sea borders (km) / land area of country (accumulated across islands, if present) (1000 sq km).

Reference Year: 2004


Additional sources:

Methodology:
Ratio of length of borders (land and maritime) to total land area

1. Indicator is tested raw.
2. The degree of dispersion of countries may prove to be correlated with overall land area.
3. Length of borders includes all land and coastlines.

Rationale:
This indicator captures the degree to which a country's land area is fragmented and 'thin'. Countries which are highly fragmented, comprised of many islands, or which have many peninsulas or land areas in thin strips are likely to be prone to more transboundary effects. The land areas may also be more exposed to damage from natural disasters and human impacts (e.g. cyclones, fires, effects of war) in such areas, because the presence of refugia and ecosystem types that may form breaks are likely to be limited. Although fragmentation may also bring with it the possibility that damage could be limited by intervening areas of land or sea, there are likely to be higher risks that ecosystems and species (particularly if many are endemic) will not persist. This could be especially true if there are interactions with on-going human impacts. Larger countries with fragmentation are likely to be less at risk from this stressor than small ones and this indicator would need to be examined in tandem with Indicator 10 on country size.

Indicator: Country Dispersion (scaled)

Units: Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year: 2004


Methodology:
Using the variable COUNTRYD, the authors applied the following break off values (where X =
natural log of the ratio of length of borders (land and maritime) to total land area:

EVI Score = 1  \( X \leq 2 \)
EVI Score = 2  \( 2 < X \leq 3 \)
EVI Score = 3  \( 3 < X \leq 4 \)
EVI Score = 4  \( 4 < X \leq 5 \)
EVI Score = 5  \( 5 < X \leq 6 \)
EVI Score = 6  \( 6 < X \leq 7 \)
EVI Score = 7  \( X > 7 \)

**Rationale**
This indicator captures the degree to which a country’s land area is fragmented and ‘thin’. Countries which are highly fragmented, comprised of many islands, or which have many peninsulas or land areas in thin strips are likely to be prone to more transboundary effects. The land areas may also be more exposed to damage from natural disasters and human impacts (e.g. cyclones, fires, effects of war) in such areas, because the presence of refugia and ecosystem types that may form breaks are likely to be limited. Although fragmentation may also bring with it the possibility that damage could be limited by intervening areas of land or sea, there are likely to be higher risks that ecosystems and species (particularly if many are endemic) will not persist. This could be especially true if there are interactions with on-going human impacts. Larger countries with fragmentation are likely to be less at risk from this stressor than small ones and this indicator would need to be examined in tandem with Indicator 10 on country size.

**Indicator**
ISOL

**Collection**
EVI 2004

**Indicator #**
178

**Sub-Index**
Indicator Name
Geographic Isolation

**Units**
Distance to nearest continent (in km)

**Reference Year**
2004

**Source**
Times Comprehensive World Atlas 2000 used by EVI Team to estimate distances using the given scales.

Additional sources:


**Methodology**
1. Distance to nearest continent
2. Distance to the nearest continent within 10 degrees of latitude
3. Indicator is tested raw

**Rationale**
This indicator captures the proximity of a country to the nearest continent. Note that if a country is within a continent, this value is zero. Isolated countries may have a greater risk of loss of ecosystem types and species during periods of stress if they are far away from refugia and sources of recolonisation. Isolated countries also likely to support fewer species than those which are close to large continents, or biogeographic centres of radiation. Additionally, there is less chance of genetic interchange (part of genetic resilience) in isolated areas. The likelihood of isolation being an important part of a country’s ecological resilience
would be especially important if there are interactions with on-going human impacts. Countries close to sources of recolonisation are likely to be less at risk of permanent species losses, compared with those far away, particularly if they are small or fragmented. This indicator would need to be examined in conjunction with Indicators 10 and 11.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>IsolevI</th>
</tr>
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<tbody>
<tr>
<td>Indicator #</td>
<td>179</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Geographic Isolation (scaled)</td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
</tr>
</tbody>
</table>
| Methodology | Using the variable ISOL, the authors applied the following break off values (where X = is the distance to nearest continent in km):

\[
\begin{align*}
\text{EVI Score} &= 1 \quad X \leq 0 \\
\text{EVI Score} &= 2 \quad 0 < X \leq 50 \\
\text{EVI Score} &= 3 \quad 50 < X \leq 100 \\
\text{EVI Score} &= 4 \quad 100 < X \leq 400 \\
\text{EVI Score} &= 5 \quad 400 < X \leq 800 \\
\text{EVI Score} &= 6 \quad 800 < X \leq 1600 \\
\text{EVI Score} &= 7 \quad X >1600
\end{align*}
\]

Rationale

This indicator captures the proximity of a country to the nearest continent. Note that if a country is within a continent, this value is zero. Isolated countries may have a greater risk of loss of ecosystem types and species during periods of stress if they are far away from refugia and sources of recolonisation. Isolated countries also likely to support fewer species than those which are close to large continents, or biogeographic centres of radiation. Additionally, there is less chance of genetic interchange (part of genetic resilience) in isolated areas. The likelihood of isolation being an important part of a country’s ecological resilience would be especially important if there are interactions with on-going human impacts. Countries close to sources of recolonisation are likely to be less at risk of permanent species losses, compared with those far away, particularly if they are small or fragmented. This indicator would need to be examined in conjunction with Indicators 10 and 11.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RELIEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>180</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Vertical Relief</td>
</tr>
<tr>
<td>Units</td>
<td>Altitude range (highest point subtracted from the lowest point in country)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
</tr>
<tr>
<td>Source</td>
<td>CIA World Fact Book 2001</td>
</tr>
</tbody>
</table>

Additional Sources:


Kathmandu;


### Methodology

Altitude range (highest point subtracted from the lowest point in country).

1. This indicator is a proxy for ecosystem diversity.
2. The indicator may also function as a proxy for habitat disturbance through avalanches, slides and large rivers.

### Rationale

Biodiversity of habitat & species, potential for habitat disturbance through movements of water and slides. A country with a large altitude range is likely to have a greater variety of ecosystems, which in very high altitude areas, or very low ones (e.g. the Black Sea) leads to the formation of "endemic habitat types". These can be an integral part of the character of a country, and if lost, the same arguments as for endemic species applies.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RELIEFEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>181</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Vertical Relief (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Methodology

Using the variable RELIEF, the authors applied the following break off values (where X = is the highest point subtracted from the lowest point in country):

- EVI Score = 1 \( X < 1500 \)
- EVI Score = 2 \( 1500 \leq X < 3000 \)
- EVI Score = 3 \( 3000 \leq X < 4500 \)
- EVI Score = 4 \( 4500 \leq X < 6000 \)
- EVI Score = 5 \( 6000 \leq X < 7000 \)
- EVI Score = 6 \( 7000 \leq X < 8000 \)
- EVI Score = 7 \( 8000 \leq X \)

### Rationale

Biodiversity of habitat & species, potential for habitat disturbance through movements of water and slides. A country with a large altitude range is likely to have a greater variety of ecosystems, which in very high altitude areas, or very low ones (e.g. the Black Sea) leads to the formation of "endemic habitat types". These can be an integral part of the character of a country, and if lost, the same arguments as for endemic species applies.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LOW</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>182</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Lowlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of total land area which is ( \leq 50 )m above sea level anywhere in the country.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology

Data were extracted from electronic maps available through Encarta 2004 using a point intercept method. Overlays with a large number of regularly-spaced dots were placed over maps. These were enumerated for the whole country and again for those parts shaded as being ≤50 above sea level. Note that because the method used is a statistical one, it is possible for a country to have a small area of its land below 50m that was not detected by the method, resulting in a value of 0%. The converse is true for countries recorded as having 100% of their land below 50m above sea level. In-country data were supplied for area ≤10m above sea level by collaborators, but only for 11 countries, a number insufficient for this indicator. As a result the in-country data were not used in this analysis.

Percentage of land area ≤50m above sea level
Percentage of land area ≤10m above sea level

1. Although this indicator was originally defined in relation to land areas ≤10 above sea level, data were difficult to obtain. Although maps are available locally in some countries that could be used to calculate area of land at or below this level, coverage was generally poor. It was necessary to redefine the indicator to include all land areas ≤50m which is shown on global maps.

2. We consider the use of ≤50m a proxy for this indicator. The indicator will be more valuable when data for land area ≤10m become generally available.

3. Data were extracted by the EVI Team on Encarta 2004 Maps using a point intercept method on electronic maps at a scale 1:7.4million.

Rationale

This indicator focuses on the presence of lowlands in a country with implied impacts associated with pollution, ecosystem disturbance, flooding and coastal vulnerability. Areas of lowlands are those that will tend to be the first to flood, will tend to accumulate pollution that is mobilised by surface run-off, provide an important entry point (and extraction point) for groundwaters and if on the coasts of the sea or lakes may be subject to storm surges, tsunamis or sea level rise. They tend to be areas of high biodiversity and/or form critical habitats. They may also be critical areas for productivity, soil formation, erosion, natural resources and pollution attenuation. A country’s resilience to future hazards will be related to risks on lowland areas. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.
**Indicator** | LOWEVI | **Collection** | EVI 2004
---|---|---|---
**Indicator #** | 183 | **Sub-Index** | |
**Indicator Name** | Lowlands (scaled) | | |
**Units** | Standardized unit scale (from 1-7; with 1 as good and 7 as bad) | | |
**Reference Year** | 2004 | | |
**Methodology** | Using the variable LOWLANDS, the authors applied the following break off values (where \( X \) is the percentage of total land area which is ≤ 50m above sea level anywhere in the country): | | |
EVI Score = 1 & \( X = 0 \)
EVI Score = 2 & \( X \leq 15 \)
EVI Score = 3 & \( 15 < X \leq 30 \)
EVI Score = 4 & \( 30 < X \leq 45 \)
EVI Score = 5 & \( 45 < X \leq 60 \)
EVI Score = 6 & \( 60 < X \leq 75 \)

**Rationale** | This indicator focuses on the presence of lowlands in a country with implied impacts associated with pollution, ecosystem disturbance, flooding and coastal vulnerability. Areas of lowlands are those that will tend to be the first to flood, will tend to accumulate pollution that is mobilised by surface run-off, provide an important entry point (and extraction point) for groundwaters and if on the coasts of the sea or lakes may be subject to storm surges, tsunamis or sea level rise. They tend to be areas of high biodiversity and/or form critical habitats. They may also be critical areas for productivity, soil formation, erosion, natural resources and pollution attenuation. A country’s resilience to future hazards will be related to risks on lowland areas. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human

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**Indicator** | BORD | **Collection** | EVI 2004
---|---|---|---
**Indicator #** | 184 | **Sub-Index** | |
**Indicator Name** | Shared Borders | | |
**Units** | Number of borders shared with other countries, regardless of whether they are on land or in the sea. | | |
**Reference Year** | 2000 | | |
**Source** | CIA Fact file 2000
SOPAC EEZ Maps for the Pacific | | |

**Additional Sources:**

- Philippines - Bureau of Fisheries and Aquatic Resources (BFAR) Administrative Reports
- Singapore - Communicable disease surveillance in Singapore 2000. Quarantine and
- Epidemiology Department; Fiji - Return of Notifiable Diseases for Year 1992-1998. Fisheries
- Department; Federated States of Micronesia - Reported Notifiable Diseases Summary. NHSO,
- Department of Health, Education and Social Affairs; Marshall Islands - Crawford, M. 1992. RMI
- National Environmental Management Strategy (NEMS) Report: Part A (State of Environment);
- Section. Lupe Matoto & Asipeli Palaki (676 23611/ 23216/ imepacs@candw.to ,
- Vailala@candw.to); Kyrgyzstan - Inspectorate of Sanitation and Epidemiological Control.
- Contact - Mr. Usenbaev; Thailand - Pollution Control Dept. Thailand, Water Quality Management
Methodology

Number of land and sea borders shared with other countries.

1. High seas areas are not considered, though they are usually under some form of management that has implications for surrounding countries.

2. For sea borders, assessments were made by the EVI team using a 200 nm limit from the coast of a country.

Rationale

This indicator captures the risk to terrestrial and aquatic ecosystems from transboundary risks including species introductions, lack of control of effects from neighbouring countries, lack of control of straddling stocks of resources, and uncontrolled migrations of humans (e.g. refugees). The greater the number of different jurisdictions bordering a country by land or sea, the greater the risks of neighbour effects that is risks to the environment caused by the policies and behaviours of other countries. The effects of these factors would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator

BORDEVI

Collection

EVI 2004

Indicator #

185

Sub-Index

Indicator Name

Shared Borders (scaled)

Units

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year

2000

Source


Methodology

Using the variable BORDERS, the authors applied the following break off values (where X = is the number of borders shared with other countries, regardless of whether they are on land or in the sea):

EVI Score = 1  X = 0
EVI Score = 2  0 < X ≤ 2
EVI Score = 3  2 < X ≤ 4
EVI Score = 4  4 < X ≤ 6
EVI Score = 5  6 < X ≤ 8
EVI Score = 6  8 < X ≤ 10
EVI Score = 7  X >10

Rationale

This indicator captures the risk to terrestrial and aquatic ecosystems from transboundary risks including species introductions, lack of control of effects from neighbouring countries, lack of control of straddling stocks of resources, and uncontrolled migrations of humans (e.g. refugees). The greater the number of different jurisdictions bordering a country by land or sea, the greater the risks of neighbour effects that is risks to the environment caused by the policies and behaviours of other countries. The effects of these factors would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
**Indicator**

IMBAL

**Collection**

EVI 2004

**Indicator #**

186

**Sub-Index**

Ecosystem Imbalance

**Units**

+ or - change in trophic level calculated by weighting each trophic level present in the national catch by the tonnes reported.

**Reference Year**

NA

**Source**

University of British Columbia; Fisheries Centre, Lower Mall Research Station; Methods described in: http://data.fisheries.ubc.ca/references/pdfs/MappingFF.pdf and http://data.fisheries.ubc.ca/references/pdfs/whatsleft.pdf

See also www.seaaroundus.org

Additional sources:

Philippines - Bureau of Fisheries and Aquatic Resources (BFAR) Administrative Reports; Singapore - Communicable disease surveillance in Singapore 2000. Quarantine and Epidemiology Department; Fiji - Return of Notifiable Diseases for Year 1992-1998. Fisheries Department; Federated States of Micronesia - Reported Notifiable Diseases Summary. NSHO, Department of Health, Education and Social Affairs; Marshall Islands - Crawford, M. 1992. RMI National Environmental Management Strategy (NEMS) Report: Part A (State of Environment); Tonga - Bureau of Public Health: Monthly Report. Environmental Planning & Conservation Section. Lupe Matoto & Asipeli Palaki (676 23611/ 23216/ imepacs@candw.to, Vailala@candw.to); Kyrgyzstan - Inspectorate of Sanitation and Epidemiological Control. Contact - Mr. Usenbaev; Thailand - Pollution Control Dept. Thailand, Water Quality Management Division. Tel 66 2 2982253 Fax 66 2 2982240 e-mail: marinepollution_pcd@yahoo.com ;Costa Rica - Ministerio de Salud; Greece - Dr Paula Scott (ph&f: 30 81 8 61 219, carlad@her.forthnet.gr); Cook Islands - Totokoitu Research Station. Contact - Brian Tairea (682 28711 or 28720) Ministry of Agriculture; Kiribati - T Tebaitongo. Fisheries Division; New Zealand - Ministry of Health. Contact - Hine-Wai Loose: Ministry of Foreign affairs and Trade; Niue - Niue Department of Agriculture, Forestry & Fisheries. Contact - Sauni Tongatule (4032/ 4079/ tongatules@mail.gov.nu); Tonga - Lupe Matoto & Asipeli Palaki (676 23611/ 23216/ imepacs@candw.to, Vailala@candw.to); Tuvalu - Agriculture. Contact - C. Howells.

**Methodology**

Weighted average change in trophic level since fisheries began (for trophic level slice \( \leq 3.35 \))

1 This indicator includes only those species with a trophic level of 3.35 or below. This constitutes a trophic slice, intended to exclude large pelagic fisheries usually caught offshore.

2 A positive (+) change indicates an increase in trophic level present in the catch, which would be consistent with an increase in the catch of larger fish-eating fishes. This is usually associated with an expansion of the fishery and a move to greater use of large pelagic species, usually offshore.

3 A negative (-) change is usually associated with loss of fishes in the higher trophic levels and indicates fishing down of the food web, ecosystem damage and overfishing.

4 This indicator is sensitive to over aggregation of taxa in the country catch data. This may lead to a reduced ability to detect changes in trophic level.

**Rationale**

Ecosystem stress, loss of diversity, damage to the trophic structure of ecosystems, loss of balance. This indicator captures the risk to aquatic ecosystems from risks associated with shifting the natural relationships, diversity and energy-flows within and among ecosystems. Although fisheries are used here, the indicator is more generally concerned with the downstream effects on habitats and other organisms. The greater the downward (negative) trend in trophic level change, the more likely that the marine biomass and trophic structures have been damaged. Such changes could lead to outbreaks or overgrowth of unexpected or
pest organisms, monopolies of certain species, and losses of ecosystem elements that may be
dependent on the behaviour or populations of others. The effects of these factors would be
especially important if there are many endangered species, sensitive ecosystems, and
interactions with on-going human impacts.

**Indicator** IMBALEVI  
**Collection** EVI 2004  
**Indicator #** 187  
**Sub-Index**  
**Indicator Name** Ecosystem Imbalance (scaled)  
**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)  
**Reference Year** NA  
**Methodology** Using the variable IMBALANCE, the authors applied the following break off values (where X = + or - change in trophic level calculated by weighting each trophic level present in the national catch by the tonnes reported):

EVI Score = 1  \( X \geq 0 \)
EVI Score = 2  \( 0 > X \geq -0.02 \)
EVI Score = 3  \( -0.02 > X \geq -0.04 \)
EVI Score = 4  \( -0.04 > X \geq -0.06 \)
EVI Score = 5  \( -0.06 > X \geq -0.08 \)
EVI Score = 6  \( -0.08 > X \geq -0.10 \)
EVI Score = 7  \( X < -0.10 \)

**Rationale** Ecosystem stress, loss of diversity, damage to the trophic structure of ecosystems, loss of balance. This indicator captures the risk to aquatic ecosystems from risks associated with shifting the natural relationships, diversity and energy-flows within and among ecosystems. Although fisheries are used here, the indicator is more generally concerned with the downstream effects on habitats and other organisms. The greater the downward (negative) trend in trophic level change, the more likely that the marine biomass and trophic structures have been damaged. Such changes could lead to outbreaks or overgrowth of unexpected or pest organisms, monopolies of certain species, and losses of ecosystem elements that may be dependent on the behaviour or populations of others. The effects of these factors would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

**Indicator** OPEN  
**Collection** EVI 2004  
**Indicator #** 188  
**Sub-Index**  
**Indicator Name** Environmental Openness  
**Units** Freight density as \( X = \) thousands of dollars of freight moved into the country per sq km of land  
**Reference Year** 1997  
**Source** WRI 2000-2001  
**Additional Sources:**  
Methodology
Total USD freight imports per year over the past 5 years by any means / sq km land area.

Total tonnage of freight imported per year over the past 5 years by any means / sq km land area

1. Data on tonnages were provided by 14 of the 32 collaborators, but were not available from public sources.

2. The public data available are expressed in $ values of freight imports and are not averages

Rationale
This indicator captures the risk of damage to a country through the importation of foreign materials (physical, chemical and biological) by land, air or sea through the large volumes of freight that move around the globe annually. Countries with large amounts of freight moving into them are considered more at risk of inadvertent introductions of diseases, species and genetically modified organisms, than those with lower levels of freight movements. The likelihood of such introductions negatively affecting a country’s resilience would be especially important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with ongoing human impacts. This includes the importing of hazardous wastes. Freight imports may also be a mechanism for the introduction of pollution risks not normally found in a country e.g. the import of radioactive substances, oil, chemicals.

Indicator
OPENEVI

Collection
EVI 2004

Indicator #
189

Sub-Index

Indicator Name
Environmental Openness (scaled)

Units
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year
1997

Source

Methodology
Using the variable OPENNESS, the authors applied the following break off values (where Freight density as X = thousands of dollars of freight moved into the country per sq km of land):

EVI Score = 1 \( X \leq 1 \)
EVI Score = 2 \( 1 < X \leq 1.5 \)
EVI Score = 3 \( 1.5 < X \leq 2 \)
EVI Score = 4 \( 2 < X \leq 2.5 \)
EVI Score = 5 \( 2.5 < X \leq 3 \)
EVI Score = 6 \( 3 < X \leq 3.5 \)

Rationale
This indicator captures the risk of damage to a country through the importation of foreign materials (physical, chemical and biological) by land, air or sea through the large volumes of freight that move around the globe annually. Countries with large amounts of freight moving into them are considered more at risk of inadvertent introductions of diseases, species and genetically modified organisms, than those with lower levels of freight movements. The likelihood of such introductions negatively affecting a country’s resilience would be especially
important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with on-going human impacts. This includes the importing of hazardous wastes. Freight imports may also be a mechanism for the introduction of pollution risks not normally found in a country e.g. the import of radioactive substances, oil, chemicals.

### Indicator MIG

**Collection**
EVI 2004

**Indicator #**
190

**Indicator Name**
Migratory Species

**Units**
Density of migratory species expressed as number of species per 1000 sq km land area under various categories of GROMS migrants.

**Reference Year**
1998-2001

**Source**

Additional sources:

- www.biologie.uni-freiburg.de/data/zoolgy/riede/grooms/Getting_Started/Definition/(24/01/2003); Costa Rica - Escuela de Biologia, Universidad de Costa Rica.

**Methodology**
Number of known species that migrate outside the territorial area at any time during their life spans (include land and aquatic species) / area of land.

1. Data are likely to be incomplete and biased towards obvious species such as mammals and birds, and economically important species such as tunas. Insects, marine invertebrates and microorganisms are unlikely to be correctly represented.

2. Categories of GROMS migrants include intracontinental, intercontinental, nomadising, emigration, range extension, interoceanic, intraoceanic, and for fishes: anadromous, catadromous, amphidromous, potamodromous, limnodromous, oceanodromous.

3. Not all of the migrating species in a country necessarily migrate outside a country’s borders.

**Rationale**
This indicator focuses on species which pass outside the control of the country and which during that time may be affected by actions of surrounding countries, or distant nations utilising them as a resource. It focuses on biodiversity, resilience and persistence of species with large variances in population numbers and or /that are susceptible to local extinctions. Straddling stocks of migrating mammals and fishes may also be key species in determining ecosystem conditions in a country, and damage to these while they are outside the country may lead to indirect effects on ecosystems within the country (e.g. migrating mammals as determinants of grasslands in Africa and America). Species could become endangered or threatened in a country, despite good internal management, with implied impacts on biodiversity, ecosystem integrity and resilience to future hazards. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.

### Indicator MIGEVI

**Collection**
EVI 2004

**Indicator #**
191

**Indicator Name**
Migratory Species (scaled)

**Units**
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Methodology

Using the variable MIGRATORY, the authors applied the following break off values (where $X = \text{density of migratory species expressed as number of species per 1000 sq km land area under various categories of GROMS migrants}):

- EVI Score = 1  \quad X \leq 1
- EVI Score = 2  \quad 1 < X \leq 1.5
- EVI Score = 3  \quad 1.5 < X \leq 2
- EVI Score = 4  \quad 2 < X \leq 2.5
- EVI Score = 5  \quad 2.5 < X \leq 3
- EVI Score = 6  \quad 3 < X \leq 3.5
- EVI Score = 7  \quad X > 3.5

Rationale

This indicator focuses on species which pass outside of the control of the country and which during that time may be affected by actions of surrounding countries, or distant nations utilising them as a resource. It focuses on biodiversity, resilience and persistence of species with large variances in population numbers and or /that are susceptible to local extinctions. Straddling stocks of migrating mammals and fishes may also be key species in determining ecosystem conditions in a country, and damage to these while they are outside the country may lead to indirect effects on ecosystems within the country (e.g. migrating mammals as determinants of grasslands in Africa and America). Species could become endangered or threatened in a country, despite good internal management, with implied impacts on biodiversity, ecosystem integrity and resilience to future hazards. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ENDEM</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>192</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Endemic Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Species per million km2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000-2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>WRI 2000-2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional sources:

Methodology

Number of known species that migrate outside the territorial area at any time during their life spans (include land and aquatic species) / area of land.

Where multiple values for these measures were reported, these were reduced to the lowest given value for use in the analysis. That is, if 2 and 3 were returned for a measure, the value 2 was used in the analysis. If no value given, 0 was used.

Rationale

Biodiversity and the risk of losing unique species. The more endemic species a country has, the more vulnerable it is because localised extinction cannot be resupplied from elsewhere by natural or augmented recolonisation. Losses of key species can affect ecosystems and potential for sustainable activities for foreign exchange.

Indicator ENDEMEVI Collection EVI 2004
Indicator # 193 Sub-Index
Indicator Name Endemic Species (scaled)
Units Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year 2000-2001
Methodology Using the variable ENDEMICS, the authors applied the following break off values (where X = species per million km2):

EVI Score = 1  0 ≤ X
EVI Score = 2  0 < X ≤ 2
EVI Score = 3  2 < X ≤ 4
EVI Score = 4  4 < X ≤ 6
EVI Score = 5  6 < X ≤ 8
EVI Score = 6  8 < X ≤ 10
EVI Score = 7  10 < X

Rationale Biodiversity and the risk of losing unique species. The more endemic species a country has, the more vulnerable it is because localised extinction cannot be resupplied from elsewhere by natural or augmented recolonisation. Losses of key species can affect ecosystems and potential for sustainable activities for foreign exchange.

Indicator INTRO Collection EVI 2004
Indicator # 194 Sub-Index
Indicator Name Introductions
Units Number of species introduced per 1000 sq km of land area.
Reference Year 2002
Source FAO 2002 website

Additional sources:
Methodology

Number of introduced species per 1000 square kilometre of land area.

1. All known introductions are included, regardless of the year. The earliest recorded in this data set are from the 14th Century in Romania, but most are since the 19th and 20th Centuries.

2. Data are likely to be incomplete and biased towards obvious species such as mammals and birds. Insects, marine invertebrates and microorganisms are unlikely to be correctly represented.

3. Data from in-country sources were used in preference to FAO data only in cases where the two were less than 10x different. Several in-country sources gave extremely high values not likely to be correct, possibly because they misunderstood the data required. For example, one country returned a value of 1500 introduced species of fungi.

4. The overall number of introductions in the FAO database is likely to be low, even for obvious species. Most countries would have several hundred species of imported agricultural and domestic plants and animals that do not appear to be in this list.

Rationale

This indicator captures past species introductions to a country with implied impacts on biodiversity and ecosystem integrity. This may include impacts at the levels of populations, genetics, species and ecosystems through complex ecological interactions. Past introductions of species could negatively affect a country’s resilience to future hazards. This would be especially important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with on-going human impacts.

Indicator

INTROEVI

Collection

EVI 2004

Indicator #

195

Sub-Index

Indicator Name

Introductions (scaled)

Units

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year

2002

Source


Methodology

Using the variable INTRODUCTIONS, the authors applied the following break off values (where density of introductions as X = number of species introduced per 1000 sq km of land area):

EVI Score = 1  X = 0
EVI Score = 2  0 < X ≤ 1
EVI Score = 3   1 < X ≤ 1.5
EVI Score = 4   1.5 < X ≤ 2
EVI Score = 5   2 < X ≤ 2.5
EVI Score = 6   2.5 < X ≤ 3
EVI Score = 7   X > 3

**Rationale**

This indicator captures past species introductions to a country with implied impacts on biodiversity and ecosystem integrity. This may include impacts at the levels of populations, genetics, species and ecosystems through complex ecological interactions. Past introductions of species could negatively affect a country’s resilience to future hazards. This would be especially important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with on-going human impacts.

**Indicator** ENDANG  
**Collection** EVI 2004

**Indicator #** 196  
**Sub-Index**

**Indicator Name** Endangered Species

**Units** Density of endangered species expressed as number of species per 1000 sq km land area categorised by IUCN as either critically endangered, endangered or vulnerable.

**Reference Year** 2000

**Source** IUCN Red Book 2000

Additional sources:


**Methodology**

Number of endangered and vulnerable species per 1000 sq km land area (IUCN definitions).

1. All known critically endangered, endangered and vulnerable species are included, as categorised by IUCN between the years of 1981 and 2000.
2. Data are likely to be incomplete and biased towards obvious species such as mammals and birds. Insects, marine invertebrates and microorganisms are unlikely to be correctly represented.

3. Data from in-country sources were used where IUCN data were unavailable.

**Rationale**

This indicator focuses on those species that have become endangered or threatened in a country with implied impacts on biodiversity and ecosystem integrity. These are the species most likely to next become extinct, and may already be resulting, by their reduced numbers, in impacts at the levels of populations, genetics, species and ecosystems through complex ecological interactions. The reduction of populations of species could negatively affect a country's resilience to future hazards. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with ongoing human impacts.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENDANGEVI</td>
<td>EVI 2004</td>
</tr>
</tbody>
</table>

**Indicator #**

197

**Indicator Name**

Endangered Species (scaled)

**Units**

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**

2000

**Source**


**Methodology**

Using the variable ENDANGERED, the authors applied the following break off values (where \( X \) = density of endangered species expressed as number of species per 1000 sq km land area categorised by IUCN as either critically endangered, endangered or vulnerable):

- EVI Score = 1 \( X = 0 \)
- EVI Score = 2 \( 0 < X \leq 1 \)
- EVI Score = 3 \( 1 < X \leq 2 \)
- EVI Score = 4 \( 2 < X \leq 3 \)
- EVI Score = 5 \( 3 < X \leq 4 \)
- EVI Score = 6 \( 4 < X \leq 5 \)
- EVI Score = 7 \( X > 5 \)

**Rationale**

This indicator focuses on those species that have become endangered or threatened in a country with implied impacts on biodiversity and ecosystem integrity. These are the species most likely to next become extinct, and may already be resulting, by their reduced numbers, in impacts at the levels of populations, genetics, species and ecosystems through complex ecological interactions. The reduction of populations of species could negatively affect a country's resilience to future hazards. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with ongoing human impacts.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
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</thead>
<tbody>
<tr>
<td>EXTINCT</td>
<td>EVI 2004</td>
</tr>
</tbody>
</table>

**Indicator #**

198

**Indicator Name**

Extinctions

**Units**

Number of known extinct species per 1000 sq km land area.

**Reference Year**

1900-2000
Methodology

Number of species known to have become extinct since 1900 per 1000 sq km land area (IUCN definitions).

1. All known extinctions are included, as categorised by IUCN between the years of 1900 and 2000.

2. Data are likely to be incomplete and biased towards obvious species such as mammals and birds. Insects, marine invertebrates and microorganisms are unlikely to be correctly represented.

3. Undescribed species will not be represented and may be becoming extinct without human knowledge.

4. It is possible for species to become extinct in a country, but not globally extinct. From the perspective of the country concerned, and the environments in it, loss from a country is considered an extinction in that country. If the species are available in other countries, this opens the possibility for a species to become 'unextinct' in the future.

5. We considered using % of known species which have become extinct as the basis of this indicator, but this would tend to hide the real numbers of species that could be lost in very diverse and/or large countries. In terms of environmental vulnerability, countries should aim at ensuring no further species become extinct, not merely gauging their efforts as a percentage of those species available in the country. In a very small, undiverse country, 0.1% extinctions could mean 10 species. In a large or diverse country this percentage could mean the loss of 100 species. Loss per unit area addresses this problem.

6. Countries in which most clearance and species loss occurred pre-1900 (e.g. Europe) have apparently low vulnerabilities in this indicator. This does not represent their true state in terms of extinctions simply because different time frames are being compared.

7. Data from in-country sources were used where IUCN data were unavailable.

Rationale

This indicator focuses on those species that have become extinct in a country with implied impacts on biodiversity and ecosystem integrity. The loss of these species has resulted in a loss of biodiversity, and may also have resulted in impacts on ecosystem structure and function through complex ecological interactions. The loss of species could negatively affect a country's resilience to future hazards. This would be especially important if there are many
sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EXTINCTEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>199</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Extinctions (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1900-2000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Methodology | Using the variable EXTINCTIONS, the authors applied the following break off values (where $X$ = density of extinctions expressed as number of known extinct species per 1000 sq km land area):

EVI Score = 1  $X = 0$
EVI Score = 2  $0 < X \leq 0.25$
EVI Score = 3  $0.25 < X \leq 0.5$
EVI Score = 4  $0.5 < X \leq 0.75$
EVI Score = 5  $0.75 < X \leq 1$
EVI Score = 6  $1 < X \leq 1.25$
EVI Score = 7  $X > 1.25$

| Rationale | This indicator focuses on those species that have become extinct in a country with implied impacts on biodiversity and ecosystem integrity. The loss of these species has resulted in a loss of biodiversity, and may also have resulted in impacts on ecosystem structure and function through complex ecological interactions. The loss of species could negatively affect a country’s resilience to future hazards. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts. |

<table>
<thead>
<tr>
<th>Indicator</th>
<th>VEG</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>200</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Natural Vegetation Cover Remaining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of original (and regrowth) vegetation cover remaining.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000-2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Source | WRI 2000-2001  

Additional sources:

www.forest.go.th/stat42/stat.htm (7/6/01) (Thailand); Source 1: FAO - State of the World's Forests 2000, pp 150-153; Source 2: FAO - State of the World's Forests 1995, Table 2: pp 125-130; Source 3: FAO - State of the World's Forests 1995, Table 2: pp 125-130; Source 4: FAO - State of the World's Forests 1995, Table 2: pp 125-131, Table 3: pp 131-135; Botswana - Botswana Rangeland, Inventory and Monitoring Project (BRIMP) Information System. Contact - Mr R. M. Kwerepe267-350511 Phone; 267-307057 Fax. rkwerepe@gov.bw; Costa Rica - Observatorio del desarrollo; Costa Rica - Contact - Wolf F. SOPAC. Information Technology Unit; Greece - Internal (Greek Embassy, USA), External (CIA World Factbook). Contact - Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr); Kiribati - Barr, J. Ministry of Natural Resources Development (MNRD) 2) Thaman, R. and Whistler, W. FAO; Kyrgyzstan - The
Methodology

Percentage of natural and regrowth vegetation cover remaining (include forests, wetlands, prairies, tundra, desert and alpine associations).

1. Amount of natural cover considered here should encompass all ecosystem types, whether forests, grasslands or deserts.

2. Data provided by WRI are expressed as percentage of forests remaining, and may not cover tundra, deserts, alpine and herb areas and grasslands etc.

3. Data from WRI refers to Original forest cover about 8,000 years ago assuming current climatic conditions.

4. Data from in-country sources were used for countries not covered by WRI.

5. The definition of regrowth forest is one in which regrowth is unsupported by human (other than in allowing natural regeneration) and results in a forest community that is self-sustaining indefinitely (not withstanding climatic changes).

Rationale

This indicator focuses on the loss of natural vegetation cover in a country with implied impacts on biodiversity and ecosystem integrity. The loss of natural vegetation has resulted in a loss of biodiversity, and may also have resulted in impacts on ecosystem structure and function through complex ecological interactions. Areas of natural vegetation are viewed as refugia for threatened species, those unknown to science, or those which may act as a future resource (e.g. for biochemical applications). Natural forests and vegetated areas are also likely to be important areas for groundwater intake, soil production, CO2 – oxygen relationships and attenuating air and water pollution. A country’s resilience to future hazards will be related to the rate and total loss of naturally vegetated areas. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.


= percentage of original (and regrowth) vegetation cover remaining):

EVI Score = 1  X > 80
EVI Score = 2  60 < X ≤ 80
EVI Score = 3  40 < X ≤ 60
EVI Score = 4  20 < X ≤ 40
EVI Score = 5  10 < X ≤ 20
EVI Score = 6  0 < X ≤ 10
EVI Score = 7  X = 0

Rationale
This indicator focuses on the loss of natural vegetation cover in a country with implied impacts on biodiversity and ecosystem integrity. The loss of natural vegetation has resulted in a loss of biodiversity, and may also have resulted in impacts on ecosystem structure and function through complex ecological interactions. Areas of natural vegetation are viewed as refugia for threatened species, those unknown to science, or those which may act as a future resource (e.g. for biochemical applications). Natural forests and vegetated areas are also likely to be important areas for groundwater intake, soil production, CO2 – oxygen relationships and attenuating air and water pollution. A country’s resilience to future hazards will be related to the rate and total loss of naturally vegetated areas. This would be especially important if there are many sensitive ecosystems susceptible to the loss of keystone species and interactions with on-going human impacts.

Indicator VEGLO Collection EVI 2004
Indicator # 202 Sub-Index
Indicator Name Loss of natural vegetation cover
Units Percent change in natural forest cover over last 5 years.
Reference Year 2000-2001
Source WRI 2000-2001

Additional sources:
Niue - Lane, J & SPREP, 1994. Niue SoE Report, 1993; Palau - Environmental Quality Protection Board Permit Files. Contact - Paul Christiansen (680 4881639 or 3600/ 4882963/ EZRA@PALAUNET.COM); Papua New Guinea - Internal data from source. Papua New Guinea Resource Information System (PNGRIS) Contact - Mame Kasalau (675 3214458 or 1046/3217813), Technical & Field Services Division, Department of Agriculture & Livestock/ Special Project Officer; Samoa - Department of Lands, Surveys & Environment (DLSE) Aerial Photos 1990 - 1999. Contact - Leoo Polutea, DLSE; Thailand - www.forest.go.th/stat42/stat/htm (7/6/01); Trinidad & Tobago - Karen Ragoonanan; Tuvalu - Contact - EVI Team (Dr U Kaly); Vanuatu - Land Use and Planning Office (LUPO). Contact William (LUPO).

Methodology
Net percentage change in natural vegetation cover over the last five years.
Net percentage of land area changed by removal of natural vegetation over the last five years.
1. Values may be +ve or -ve, where a positive value indicates net regrowth and a negative value indicates loss.

2. For WRI data, with the exception of South Africa and Australia, forest areas in developed countries are not broken down into the subcategories of natural and plantation because of the difficulty of distinguishing the two in many countries.

3. FAO data were not used for analysis because very large changes between 1995 and 2000 were often spurious, in some countries leading to >-100% change, a result which is clearly not possible.

4. Values are only for forest cover and do not include non-forest forms of natural vegetation (tundra, grasslands, alpine and herb associations)

**Rationale**

This measures the rate of loss or gain of natural vegetation cover in countries. It focuses on biodiversity, ecosystem resilience, the capacity of a country to attenuate pollution, prevention of soil loss, reduction of runoff, recharging of ground waters and soil formation.

**Indicator**

VEGLOEVI

**Collection**

EVI 2004

**Indicator #**

203

**Sub-Index**

**Indicator Name**

Loss of natural vegetation cover (scaled)

**Units**

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**

2000-2001

**Source**


**Methodology**

Using the variable LOSS VEG, the authors applied the following break off values (where X = percentage of original (and regrowth) vegetation cover remaining):

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X &gt; 0</td>
</tr>
<tr>
<td>2</td>
<td>No EVI</td>
</tr>
<tr>
<td>3</td>
<td>No EVI</td>
</tr>
<tr>
<td>4</td>
<td>X = 0</td>
</tr>
<tr>
<td>5</td>
<td>-1 ≤ X &lt; 0</td>
</tr>
<tr>
<td>6</td>
<td>-2 ≤ X &lt; -1</td>
</tr>
<tr>
<td>7</td>
<td>X &lt; -2</td>
</tr>
</tbody>
</table>

**Rationale**

This measures the rate of loss or gain of natural vegetation cover in countries. It focuses on biodiversity, ecosystem resilience, the capacity of a country to attenuate pollution, prevention of soil loss, reduction of runoff, recharging of ground waters and soil formation.

**Indicator**

FRAG

**Collection**

EVI 2004

**Indicator #**

204

**Sub-Index**

**Indicator Name**

Fragmented Habitats

**Units**

1. Total length of all roads in a country (km) / land area (sq km)

2. Cumulative area of all fragments of natural cover greater than 1,000 ha in the country as a percent of total land area.

**Reference Year**

1990-1999

**Source**

World Bank World Development Indicators 2001
Methodology

Total length of all roads in a country (latest data) / land area.

1. Data were generally unavailable for the original form of this indicator.

2. A proxy of the total length of roads was used. The reasoning behind this is that the length of roads shows not only how dissected and disturbed the land ecosystems may be, but they act as physical barriers for seasonal migrations and normal daily home range movements of animals. Secondly, roads also lead to direct losses of animals through vehicular accidents.

Rationale

This is a proxy measure for pressure on ecosystems resulting from fragmentation into discontinuous pieces. It also relates to habitat disturbance and degradation. Fragmentation is likely to affect biodiversity, affecting species with variability in population numbers, keystones, those susceptible to local extinctions, those that use migration corridors and the persistence of species with large home ranges. For many large mammals and some birds viable fragments of habitat are size-dependent, despite the fact that the overall area available in a country may still sum to a relatively large area. This indicator measures a specific aspect of habitat availability that relates to size and quality of patches. The effects of fragmentation would be particularly important if there are other natural and human stresses operating on susceptible organisms and ecosystems.

Indicator FRAGEVI

Collection EVI 2004

Indicator # 205

Sub-Index

Indicator Name Fragmented Habitats (scaled)

Units Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

Reference Year 1990-1999


Methodology

Using the variable FRAGMENTATION, the authors applied the following break off values (where $X =$ percentage of original (and regrowth) vegetation cover remaining):

- EVI Score = 1  $X < 0.2$
- EVI Score = 2  $0.2 < X \leq 0.4$
- EVI Score = 3  $0.4 < X \leq 0.6$
- EVI Score = 4  $0.6 < X \leq 0.8$
- EVI Score = 5  $0.8 < X \leq 1.0$
- EVI Score = 6  $1.0 < X \leq 1.2$
- EVI Score = 7  $X > 1.2$

Rationale

This is a proxy measure for pressure on ecosystems resulting from fragmentation into discontinuous pieces. It also relates to habitat disturbance and degradation. Fragmentation is likely to affect biodiversity, affecting species with variability in population numbers, keystones, those susceptible to local extinctions, those that use migration corridors and the persistence of species with large home ranges. For many large mammals and some birds viable fragments of habitat are size-dependent, despite the fact that the overall area available in a country may still sum to a relatively large area. This indicator measures a specific aspect of habitat availability that relates to size and quality of patches. The effects of fragmentation would be
particularly important if there are other natural and human stresses operating on susceptible organisms and ecosystems.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DEG</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>206</td>
<td>Sub-Index</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**: Degradation

**Units**: Percent of a country’s land area considered severely and very severely degraded.

**Reference Year**: 2000

**Source**: FAO / AGL Terrastat: Severity of human induced degradation.

Additional sources:


**Methodology**

Data are the status in 2000 and are derived from FAO/AGL Terrastat. These values were then recalculated as the percentage of the total land area considered severely or very severely degraded. Although there are lighter forms of degradation, these were not included in this indicator. The indicator measures the most severe forms of past degradation in a country as an indicator of poor management in the past, lost resilience and a prognosis if current practices continue. Countries with high levels of degradation have already sustained damage and could be expected to be less resilient to future damage.

1. Data are percentage of land area that is severely or very severely degraded. Lighter forms of degraded land were not included.

**Rationale**

This indicator captures the status of loss of ecosystems in a country. Degraded land means that which can no longer revert to its natural ecosystem without active and costly rehabilitation by humans to reverse permanent damage, if at all. Types of degradation include water and wind erosion, chemical and physical deterioration, agriculture, deforestation and grazing. These can be associated with salinisation and desertification. This indicator highlights the breakdown of ecosystems which leads to decreasing biodiversity, soil quality, resilience against natural events and the assimilative capacity of the environment.
Indicator: DEGEVI
Collection: EVI 2004
Indicator #: 207
Sub-Index:
Indicator Name: Degradation (scaled)
Units: Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year: 2000

Methodology:
Using the variable DEGRADATION, the authors applied the following break off values (where X = percent of a country’s land area considered severely and very severely degraded.):

EVI Score = 1  \( X \leq 5 \)
EVI Score = 2  \( 5 < X \leq 10 \)
EVI Score = 3  \( 10 < X \leq 15 \)
EVI Score = 4  \( 15 < X \leq 20 \)
EVI Score = 5  \( 20 < X \leq 25 \)
EVI Score = 6  \( 25 < X \leq 50 \)
EVI Score = 7  \( X > 50 \)

Rationale:
This indicator captures the status of loss of ecosystems in a country. Degraded land means that which can no longer revert to its natural ecosystem without active and costly rehabilitation by humans to reverse permanent damage, if at all. Types of degradation include water and wind erosion, chemical and physical deterioration, agriculture, deforestation and grazing. These can be associated with salinisation and desertification. This indicator highlights the breakdown of ecosystems which leads to decreasing biodiversity, soil quality, resilience against natural events and the assimilative capacity of the environment.

Indicator: RESRV
Collection: EVI 2004
Indicator #: 208
Sub-Index:
Indicator Name: Terrestrial Reserves
Units: Percent of the total land area set aside as reserves.
Reference Year: 2000-2001
Source: WRI 2000-2001

Additional sources:

**Methodology**

Percent of terrestrial land area legally set aside as no take reserves.

1. Data refer to area of land especially dedicated to the protection and maintenance of biological diversity, of natural and associated cultural resources, and which are managed through legal or other effective means (see WRI 2000-2001).

2. Reserves includes lakes, rivers, swamps and other aquatic habitats located within the land area of a reserve.

3. See notes in Section 6 on definitions.

**Rationale**

This indicator captures the increase in resilience, function of pollution attenuation, groundwater recharge, limits to losses of biodiversity and refuges afforded by the presence of adequate terrestrial reserves (including aquatic ecosystems located within the land area) in a country. The indicator focuses on areas with the most intact terrestrial environments and the level of environmental management. The benefits of areas set aside as terrestrial reserves increase with increasing area, increasing representation of ecosystem types, increasing degree of protection and period of time of protection. Permanent no-take reserves that are representative of major ecosystem types and occupy 20% of the land area would be considered ideal. Reserves would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts in the country. Reserves may be one of the few ways managers could off-set some other environmental damage and build resilience against natural events that can damage the environmental support system.

**Indicator** RESRVEVI

**Collection** EVI 2004

**Indicator #** 209

**Sub-Index**

**Indicator Name** Terrestrial Reserves (scaled)

**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year** 2000-2001


**Methodology**

Using the variable RESERVES, the authors applied the following break off values (where $X =$ percent of the total land area set aside as reserves):

- EVI Score = 1 $20 \leq X$
- EVI Score = 2 $15 < X < 20$
- EVI Score = 3 $10 < X \leq 15$
This indicator captures the increase in resilience, function of pollution attenuation, groundwater recharge, limits to losses of biodiversity and refugees afforded by the presence of adequate terrestrial reserves (including aquatic ecosystems located within the land area) in a country. The indicator focuses on areas with the most intact terrestrial environments and the level of environmental management. The benefits of areas set aside as terrestrial reserves increase with increasing area, increasing representation of ecosystem types, increasing degree of protection and period of time of protection. Permanent no-take reserves that are representative of major ecosystem types and occupy 20% of the land area would be considered ideal. Reserves would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts in the country. Reserves may be one of the few ways managers could off-set some other environmental damage and build resilience against natural events that can damage the environmental support system.

### Indicator
- **Name**: Marine Reserves
- **Units**: Percent of the shelf area set aside as marine reserves.
- **Reference Year**: 1999-2001
- **Source**: UNEP WCMC 1999 (Using IUCN categories Ia to VI)
  WRI 2000-2001 (for area of continental shelf)

Additional sources:
- www.forest.go.th/ (Thailand);
- Cook Islands - Contact - Ian Bertram (682 28722/ 682 29721/ rar@mmr.gov.ck) Director - Research & Economic Development (RED).
- Costa Rica - Ministerio del Ambiente y Energía, Sistema Nacional de Áreas de Conservación;
- Federated States of Micronesia - Action Strategy for the Pacific. 1997. SPREP. The Nature Conservancy; Greece - Zool. Museum, University of Athens. Contact - Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr);
- Kiribati - Contact - Michael Phillips. Environment & Conservation Division (E&CD);
- Kyrgyzstan - Contact - Mr. Myrsaliev N(Unit of Conventions). Department of State Ecological Control and Environment Utilization;
- Braatz, Susan. Office of Environment & Conservation; Samoa - IUCN Directory of Protected Areas in Oceania. World Conservation Monitoring Centre. Lands, Surveys & Environment;
- Tonga - IUCN Directory of Protected Areas in Oceania. Environmental Planning & Conservation Section;
- Tuvalu - Environment Unit GOT and SPREP, 1995. Department of Lands and Survey; Vanuatu - Contact - Ernest Bani (678 25302/ 23565) Principal Environment Officer/Environment Unit. Contact - Mary Cordiner. Email -Info@wcmc.org.uk. UNEP World Conservation Monitoring Centre (WCMC).

### Methodology
The raw data for this indicator are comprised of the total area of marine reserves (MPAs) established in countries. Data are derived from UNEP WCMC 1999, based on IUCN categories Ia-VI, and from in-country sources. These values were then divided by total area of continental shelf (from WRI 2000-2001) to produce a percentage of shelf area set aside as
MPAs.

1. Landlocked countries are not included in the data and distributions analysed below. They are not given an EVI score for this indicator. Their overall EVI scores are calculated from the remaining indicators.

2. The denominator used for calculating percentage is area of continental shelf from WRI. It is possible for countries to have >100% in this indicator if part of their EEZ is designated. This could lead to misleading results only if countries designate large area of their EEZs as MPAs, or if they designate only oceanic areas from their EEZs as MPAs.

3. Protected areas outside of the continental shelf area need to be omitted from this indicator.

4. See Section 6 below for definitions.

Rationale
This indicator captures the increase in resilience, function of pollution attenuation and fisheries production, limits to losses of biodiversity and refuges afforded by the presence of adequate marine reserves in a country. The indicator focuses on areas with the most intact marine environments and the level of environmental management. The benefits of areas set aside as marine and coastal reserves increase with increasing area, increasing representation of ecosystem types, increasing degree of protection and period of time of protection. Permanent no-take reserves that are representative of major ecosystem types and occupy 20% of the shelf area would be considered ideal. Reserves would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts in the country. Reserves may be one of the few ways managers could off-set some other environmental damage and build resilience against natural events that can damage the environmental support system.

Indicator | MPAEVI | Collection | EVI 2004
--- | --- | --- | ---
Indicator # | 211 | Sub-Index | |
Indicator Name | Marine Reserves (scaled) | | |
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad) | | |
Reference Year | 1999-2001 | | |
Methodology | Using the variable MPAs, the authors applied the following break off values (where X = percent of the shelf area set aside as marine reserves):
EVI Score = 1 20 ≤ X
EVI Score = 2 15 < X < 20
EVI Score = 3 10 < X ≤ 15
EVI Score = 4 5 < X ≤ 10
EVI Score = 5 0 < X ≤ 5
EVI Score = 6 Not used
EVI Score = 7 X=0 | | |
Rationale | This indicator captures the increase in resilience, function of pollution attenuation and fisheries production, limits to losses of biodiversity and refuges afforded by the presence of adequate marine reserves in a country. The indicator focuses on areas with the most intact marine environments and the level of environmental management. The benefits of areas set aside as marine and coastal reserves increase with increasing area, increasing representation of ecosystem types, increasing degree of protection and period of time of protection. Permanent no-take reserves that are representative of major ecosystem types and occupy 20% of the | | |
shelf area would be considered ideal. Reserves would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts in the country. Reserves may be one of the few ways managers could off-set some other environmental damage and build resilience against natural events that can damage the environmental support system.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator # 212</td>
<td>EVI 2004</td>
<td></td>
</tr>
</tbody>
</table>

**Indicator Name**: Intensive Farming

**Units**: Mean tonnes of intensively farmed animals produced per year per sq km of land.

**Reference Year**: 1995-2000

**Source**: FAO 1996-2000 data

Additional sources:


**Methodology**

Average annual tonnage of intensively farmed animal products (includes aquaculture, pigs, chickens, cattle, etc.) produced over the last 5 years per square kilometre land area.

1. We were not able to find a database that focused on quantifying intensive farming. We were able to find FAO data 1996-2000 on total numbers of animal stocks.

2. Numbers on animal stocks were converted to tonnages using average weights for the farmed animals.

3. Tonnages on aquiculture products were available in tonnes from FAO for the years 1995 and 1999.

**Rationale**

This indicator captures the risk of pollution, eutrophication, ecosystem loss or damage and the risk of diseases and plagues. It focuses on lands being used for intensive agriculture, which we define as those in which the wastes produced over the land are in excess of the ability of that same land area to attenuate them. Intensive farming includes the farming of poultry, pigs, aquaculture, and some farming of cattle and other animals where kept in feed lots. Intensive farming usually involves clearing of land, feeding, heavy use of pesticides and other medications and a concentrated production of wastes. It concentrates the environmental requirements of farmed animals into a small area, and wastes often find their way into the surrounding water table, waterways and land areas. Countries with a large production through intensive farming methods are also considered more at risk of inadvertent introductions of diseases, species and genetically modified organisms. The effects of intensive farming would be especially important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with on-going human impacts.
**Indicator Name**: Intensive Farming  

**Units**: Standardized unit scale (from 1-7; with 1 as good and 7 as bad)  

**Reference Year**: 1995-2000  


**Methodology**: Using the variable FARMING, the authors applied the following break off values (where $X = \text{mean tonnes of intensively farmed animals produced per year per sq km of land}$):

\[
\begin{align*}
\text{EVI Score} &= 1 \quad X \leq 2 \\
\text{EVI Score} &= 2 \quad 2 < X \leq 3 \\
\text{EVI Score} &= 3 \quad 3 < X \leq 4 \\
\text{EVI Score} &= 4 \quad 4 < X \leq 5 \\
\text{EVI Score} &= 5 \quad 5 < X \leq 6 \\
\text{EVI Score} &= 6 \quad 6 < X \leq 7 \\
\text{EVI Score} &= 7 \quad X > 7
\end{align*}
\]

**Rationale**: This indicator captures the risk of pollution, eutrophication, ecosystem loss or damage and the risk of diseases and plagues. It focuses on lands being used for intensive agriculture, which we define as those in which the wastes produced over the land are in excess of the ability of that same land area to attenuate them. Intensive farming includes the farming of poultry, pigs, aquaculture, and some farming of cattle and other animals where kept in feed lots. Intensive farming usually involves clearing of land, feeding, heavy use of pesticides and other medications and a concentrated production of wastes. It concentrates the environmental requirements of farmed animals into a small area, and wastes often find their way into the surrounding water table, waterways and land areas. Countries with a large production through intensive farming methods are also considered more at risk of inadvertent introductions of diseases, species and genetically modified organisms. The effects of intensive farming would be especially important if there are many endangered species, sensitive ecosystems that could be affected by key species, and interactions with on-going human impacts.

**Indicator Name**: Fertilisers  

**Units**: Kilograms of fertilisers used per year per km² total land area.  

**Reference Year**: 1995-1997  

**Source**:  
- WRI 2000-2001  
- OECD 1999  

Additional sources:

Methodology

Average annual intensity of fertiliser use over the total land area (kg/yr/km²) over the last 5 years.

1. WRI: Fertiliser refers to nutrients in terms of nitrogen (N), phosphate (P₂O₅), and potash (K₂O). Fertiliser use is calculated using a trade balance approach. As nations sometimes increase or decrease their stocks of fertiliser in a given year, actual use may be larger or smaller than the figure given. If the sale of fertiliser stocks is particularly large, there is the potential for a negative fertiliser use value.

2. Data are averages for the period 1995-1997.

Rationale

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from the use of chemical NPK fertilisers. This indicator is a measure of damage to ecosystems, water and soil quality, coral reefs and other sensitive organisms through eutrophication, pollution, soil damage and salinisation. The effects of using NPK fertilisers depends on the intensity of application and time and space needed for natural attenuation. The effects of releasing large amounts of fertilisers into the environment would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator | FERTLEVI | Collection | EVI 2004
--- | --- | --- | ---
Indicator # | 215 | Sub-Index | 
Indicator Name | Fertilisers (scaled) | 
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad) | 
Reference Year | 1995-1997 | 
Methodology | Using the variable FERTILISERS, the authors applied the following break off values (where X = kilograms of fertilisers used per year per km² total land area): |
| EVI Score = 1 | X ≤ 2 |
| EVI Score = 2 | 2 < X ≤ 4 |
| EVI Score = 3 | 4 < X ≤ 6 |
| EVI Score = 4 | 6 < X ≤ 7 |
| EVI Score = 5 | 7 < X ≤ 8 |
| EVI Score = 6 | 8 < X ≤ 9 |
| EVI Score = 7 | X > 9 |

Rationale

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from the use of chemical NPK fertilisers. This indicator is a measure of damage to ecosystems, water and soil quality, coral reefs and other sensitive organisms through eutrophication, pollution, soil damage and salinisation. The effects of using NPK fertilisers depends on the intensity of application and time and space needed for natural attenuation. The effects of releasing large amounts of fertilisers into the environment would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
application and time and space needed for natural attenuation. The effects of releasing large amounts of fertilisers into the environment would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PESTCD</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>216</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Pesticides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Kilograms pesticides used per year per km2 of total land area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996-1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>WRI 2000-2001 OECD 1999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional sources:


Methodology

Average annual pesticides used as kg/km²/year over total land area over last 5 years.

1. Data for this indicator are from WRI 2000-2001 and were expressed as loads in kg/yr/ha of cropland. We have recalculated them in terms of kg/yr/ha of total land area because this is the area over which they could potentially be attenuated.

2. Data are for 1996 or 1997 only and not an average of the last 5 years

3. Definitions: WRI: Pesticide use (1996) refers to per hectare use or sale to the agriculture sector of substances that reduce or eliminate unwanted plants or animals, especially insects. They include major groups of pesticides such as insecticides, mineral oils, herbicides, plant growth regulators, bacteria and seed treatments, and other active ingredients. OECD: Data include total pesticides, insecticides, fungicides, herbicides, fumigants, rodenticides and anti-coagulants.

Rationale

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from heavy use of pesticides. The indicator focuses on damage and pollution of ecosystems, soil damage, damage to reproductive systems of organisms, loss of species, and damage to aquatic organisms including fisheries and coral reefs. Pesticides need time and a suitable area
of land or volume of water for their attenuation. High loads of mobile pesticides present risks to all aspects of the environment. The effects of introducing pesticides into the environment where they can accumulate would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

**Indicator** PESTCDEVI  
**Collection** EVI 2004

**Indicator #** 217  
**Sub-Index**

**Indicator Name** Pesticides (scaled)

**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year** 1996-1997


**Methodology** Using the variable PESTICIDES, the authors applied the following break off values (where $X =$ kilograms pesticides used per year per km$^2$ of total land area):

- EVI Score = 1  $X = 0$
- EVI Score = 2  $0 < X \leq 0.5$
- EVI Score = 3  $0.5 < X \leq 1$
- EVI Score = 4  $1 < X \leq 2$
- EVI Score = 5  $2 < X \leq 3$
- EVI Score = 6  $3 < X \leq 4$
- EVI Score = 7  $X > 4$

**Rationale** This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from heavy use of pesticides. The indicator focuses on damage and pollution of ecosystems, soil damage, damage to reproductive systems of organisms, loss of species, and damage to aquatic organisms including fisheries and coral reefs. Pesticides need time and a suitable area of land or volume of water for their attenuation. High loads of mobile pesticides present risks to all aspects of the environment. The effects of introducing pesticides into the environment where they can accumulate would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

**Indicator** BIOTECH  
**Collection** EVI 2004

**Indicator #** 218  
**Sub-Index**

**Indicator Name** Biotechnology

**Units** Cumulative number of deliberate field trials of GMOs in countries 1996-2000.

**Reference Year** 1986-2002

BINAS http://binas.unido.org/binas/trials.php3
Information Systems for Biotechnology (ISB), 2002; http://www.nbiap.vt.edu/

**Additional sources:**
www1.oecd.org/ehs/table.htm (Sept 2000);
www.isaacc.org/kc/Global_Status/global/Europe/trialist.htm (International Services for the acquisition of Agribiotech Applications) (09/01/03); www.binas.unido.org/binas/trials.php3 (08/01/03); BIOTECH 1991-1999 http://biotech.jrc.it/ (08/01/03); Information Systems for
Methodology

Cumulative number of deliberate field trials of genetically modified organisms conducted in the country since 1986.

1. Although the number of deliberate field trials of GMOs does correlate with the size of countries, we did not convert this indicator to a density over the land area of a country. GMOs are considered capable of spreading once released into the field and we considered that the number of trials, particularly of different organisms would be a better measure of the risks involved in introducing new genetic materials into the environment.

2. ISAAA data show most countries with a zero value, while the remaining data sources show many of these with no data. For this evaluation of the EVI we have used the zero values provided by ISAAA.

3. Field trials can include several instances of a single GMO type.

4. Any kind of GMO is included.

Rationale

This indicator captures the risk to genetic diversity, genetic pollution and unpredictable ecosystem effects of introducing incompletely tested and/or unpredictable bioengineered organisms into the environment. This includes new toxin-producing organisms, terminators (the use of deliberately sterile organisms is often used as a biological control method for pests) or organisms with new ecological behaviours. This indicator operates under the precautionary principle. The effects of releasing organisms developed under laboratory conditions into the environment are unknown until they are tested in the environment. We have used data on deliberate field trials of GMOs for this indicator. It is likely that the risks of GMOs are less dependent on the area used, and more dependent on the different types of GMOs being either tested or grown. That is, we see risk increasing more with exposure to increasing numbers of GMOs, rather than the number of instances of any one type because of the capacity to spread once a gene ‘escapes’. Although operating at the genetic rather than species level, we see some of the risks of GMOs to ecosystems as being similar to those associated with introduced species.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BIOTECHEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>219</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Biotechnology (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1986-2002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Using the variable BIOTECH, the authors applied the following break off values (where $X =$ cumulative number of deliberate field trials of GMOs in countries 1996-2000):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVI Score = 1</td>
<td>$X = 0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVI Score = 2</td>
<td>Not used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVI Score = 3</td>
<td>Not used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rationale
This indicator captures the risk to genetic diversity, genetic pollution and unpredictable ecosystem effects of introducing incompletely tested and/or unpredictable bioengineered organisms into the environment. This includes new toxin-producing organisms, terminators (the use of deliberately sterile organisms is often used as a biological control method for pests) or organisms with new ecological behaviours. This indicator operates under the precautionary principle. The effects of releasing organisms developed under laboratory conditions into the environment are unknown until they are tested in the environment. We have used data on deliberate field trials of GMOs for this indicator. It is likely that the risks of GMOs are less dependent on the area used, and more dependent on the different types of GMOs being either tested or grown. That is, we see risk increasing more with exposure to increasing numbers of GMOs, rather than the number of instances of any one type because of the capacity to spread once a gene ‘escapes’. Although operating at the genetic rather than species level, we see some of the risks of GMOs to ecosystems as being similar to those associated with introduced species.

Indicator | PRDOF | Collection | EVI 2004
---|---|---|---
Indicator # | 220 | Sub-Index
Indicator Name | Productivity Overfishing
Units | Fisheries catch in relation to productivity as the Productivity : Catch ratio. The greater the catch (t/sqkm EEZ/yr) in relation to productivity (t/sqkm shelf/yr) the more vulnerable the country to overfishing.
Reference Year | 1994-1998
Source | FAO 1993-1998 data (fisheries)
| UBC (productivity)

Additional sources:
Methodology

Average Ratio of Productivity : Fisheries Catch (tonnes Carbon/sqkm of EEZ/year) : (tonnes/sqkm Shelf area/year) over the last 5 years

1. This indicator does not measure overfishing of individual stocks in a country. Individual stocks may be highly vulnerable even where the overall biomass extracted is not high in relation to productivity. A low EVI score coupled with the loss of certain stocks may suggest that effort is too focused in a country and suggests investigations.

2. This indicator has been revised to better capture the rate of catch in relation to the ability of the environment to replenish the catch.

3. The previous text for this indicator was: "Percent of fisheries stocks over-fished (FAO definitions)". Although there are some FAO references to the state of the world’s fisheries, which discuss the state of stocks, these data are not generally available for individual countries.

4. Tonnages on fisheries catch production were available from FAO for the years 1993 and 1998. We averaged the most recent 5 years (1994-1998).

5. Data on productivity were obtained from University of British Colombia (UBC). http://saup.fisheries.ubc.ca/eez/eez.aspx

6. Area of shelf was used as the density denominator for fisheries catches, but excludes lakes and other freshwater fisheries. These should be added.

7. Data on catches needs to consider whether they arise from within the country’s EEZ, or outside.

Indicator | PRDOFEVI | Collection | EVI 2004
---|---|---|---
Indicator # | 221 | Sub-Index
Indicator Name | Productivity Overfishing (scaled)
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year | 1994-1998
Methodology | Using the variable PRODUCTIVITY OVERFISHING, the authors applied the following break off values (where X = fisheries catch in relation to productivity as the Productivity : Catch ratio):

- EVI Score = 1  X >15
- EVI Score = 2  14 < X ≤ 15
- EVI Score = 3  13 < X ≤ 14
- EVI Score = 4  12 < X ≤13
- EVI Score = 5  11 < X ≤ 12
- EVI Score = 6  10 < X ≤ 11

Rationale | This indicator captures the risk of damage to fisheries stocks by examining rates of extraction in relation to the potential for the environment to replenish those stocks (productivity). We term this "ecological overfishing" or fishing beyond the capacity of the environment to replenish
stocks through primary production and biomass transfer. If the catch is high and productivity low, there is a higher risk that overall fisheries stocks can be depleted (all other factors being equal) than if the converse were the case. This indicator should be read in combination with Indicator 39 which focuses on catch per human effort. The effects of ecological overfishing would be especially important if there are interactions with other on-going human and natural impacts. A small P:C ratio means greater vulnerability of fisheries.

**Indicator** FSHEF  
**Collection** EVI 2004

**Indicator #** 222  
**Sub-Index**

**Indicator Name** Fishing Effort

**Units** Density of fishers as mean annual number of fishers per km of coastline (last 5 years).

**Reference Year** 1994-1996

**Source** WRI 2000-2001

**Methodology**

Average annual number of fishers per kilometre of coastline over the last 5 years.

1. This indicator has been revised to better capture the fishing pressure in a country.

2. Data on changes in catch per unit of effort (CPUE) over time, say percent change over 5 years, would be ideal for this indicator, but we were unable to find appropriate data to detect changes in CPUE.

3. Data on number of fishers is from WRI 2000-2001 but only incompletely covers years 1994-1996 (i.e. some years missing for most countries).
4. Numbers of fishers are available for landlocked countries, where the length of coastline is sometimes recorded as zero (see Indicator 11). In the future, lengths of lake coastlines and length of rivers may need to be added where this has been omitted for some countries, to allow for the calculation of values for this indicator.

**Rationale**

This indicator captures the risk of damage to fisheries stocks through overcapacity of human effort. In this indicator we have tried to capture all fishers, not just the commercial fleet. Countries with large densities of fishers working their coastlines, including freshwater coasts such as lakes, are more likely to overfish their resources than those with lower densities. This indicator should be read in combination with Indicator 24, which focuses on ecological overfishing. The effects of overfishing would be especially important if there are interactions with other on-going human and natural impacts.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FSHEFEVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>223</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fishing Effort (scaled)</td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>1994-1996</td>
</tr>
<tr>
<td>Methodology</td>
<td>Using the variable FISHING EFFORT, the authors applied the following break off values (where X = density of fishers as mean annual number of fishers per km of coastline (last 5 years)):</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( X \leq 2 )</td>
</tr>
<tr>
<td>2</td>
<td>( 2 &lt; X \leq 2.5 )</td>
</tr>
<tr>
<td>3</td>
<td>( 2.5 &lt; X \leq 3 )</td>
</tr>
<tr>
<td>4</td>
<td>( 3 &lt; X \leq 3.5 )</td>
</tr>
<tr>
<td>5</td>
<td>( 3.5 &lt; X \leq 4 )</td>
</tr>
<tr>
<td>6</td>
<td>( 4 &lt; X \leq 4.5 )</td>
</tr>
<tr>
<td>7</td>
<td>( X &gt; 4.5 )</td>
</tr>
</tbody>
</table>

**Rationale**

This indicator captures the risk of damage to fisheries stocks through overcapacity of human effort. In this indicator we have tried to capture all fishers, not just the commercial fleet. Countries with large densities of fishers working their coastlines, including freshwater coasts such as lakes, are more likely to overfish their resources than those with lower densities. This indicator should be read in combination with Indicator 24, which focuses on ecological overfishing. The effects of overfishing would be especially important if there are interactions with other on-going human and natural impacts.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>224</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Renewable water</td>
</tr>
<tr>
<td>Units</td>
<td>Water use as a percent of total renewable water (note this does not imply that any water used actually comes from renewable sources).</td>
</tr>
<tr>
<td>Reference Year</td>
<td>1991-1995</td>
</tr>
</tbody>
</table>
Methodology

Average annual water usage as percentage of renewable water resources over the last 5 years.

Average annual percentage of water usage per year met from renewable and non-declining sources over the last 5 years.

1. This proxy indicator does not show whether the water actually used by countries comes from renewable sources or whether it is mined. It shows only whether overall withdrawals exceed the available supply of renewable water. Countries may still be making the choice to mine their water from non-renewable sources.

2. Kuwait has no renewable water resources. It therefore has no value for the water use as % of renewable (would be ) and does not appear in the distributional analyses below. It was assigned an EVI=7 score.

3. The original form of the indicator, shown as 2 above, would be a better measure because it encompasses the choice of whether needs are being met from the available renewable resources.

Rationale

This indicator captures the risk to terrestrial environments, aquatic ecosystems and ground waters from over-extraction of freshwater resources. It focuses on sustainable use of surface free water and groundwater and damage through salinisation, extraction of functionally non-renewable groundwater, and damage to rivers, lakes and other habitats. Renewable water is that which is caught in rain tanks and reservoirs, or collected from streams, rivers, lakes, ice or groundwater sources that are not being diminished or salinised as a result of the extraction. The effects of over-extraction would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
**Indicator**  
WATEREVI  
**Collection**  
EVI 2004  
**Indicator #**  
225  
**Sub-Index**  
**Indicator Name**  
Renewable Water (scaled)  
**Units**  
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)  
**Reference Year**  
1991-1995  
**Source**  
**Methodology**  
Using the variable WATER, the authors applied the following break off values (where X = water use as a percent of total renewable water (note this does not imply that any water used actually comes from renewable sources)):  

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10 ≤ X ≤ 20</td>
</tr>
<tr>
<td>2</td>
<td>20 &lt; X ≤ 40</td>
</tr>
<tr>
<td>3</td>
<td>40 &lt; X ≤ 60</td>
</tr>
<tr>
<td>4</td>
<td>60 &lt; X ≤ 80</td>
</tr>
<tr>
<td>5</td>
<td>80 &lt; X ≤ 100</td>
</tr>
<tr>
<td>6</td>
<td>X &gt; 100</td>
</tr>
</tbody>
</table>

**Rationale**  
This indicator captures the risk to terrestrial environments, aquatic ecosystems and ground waters from over-extraction of freshwater resources. It focuses on sustainable use of surface free water and groundwater and damage through salinisation, extraction of functionally non-renewable groundwater, and damage to rivers, lakes and other habitats. Renewable water is that which is caught in rain tanks and reservoirs, or collected from streams, rivers, lakes, ice or groundwater sources that are not being diminished or salinised as a result of the extraction. The effects of over-extraction would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going

**Indicator**  
SULPH  
**Collection**  
EVI 2004  
**Indicator #**  
226  
**Sub-Index**  
**Indicator Name**  
Sulphur Dioxide Emissions  
**Units**  
Sulphur dioxide emissions as tonnes/km2/year  
**Reference Year**  
1995  
**Source**  
GEO-3 Data Compendium 2002  
OECD 1999  
WRI 2000-2001  
HDR 1999  
WDI 2001  
Additional sources:  
**Methodology**

Average annual SO2 emissions (tonnes / sq km / yr) over the last 5 years.

1. This indicator was originally designed to measure ambient concentrations of SO2 in the country or in its largest city, but data were difficult to obtain.

2. We redefined the indicator to focus on emissions for which data are available for most countries. This proxy may not measure the conditions acting on a country if emissions tend to be exported and do not primarily act on the country producing the gases. Issues of the transboundary export of pollution and the resulting effects on countries receiving air pollution would be better assessed using the original form of the indicator, though the sources may not be readily identifiable.

3. Data are for 1995 only.

**Rationale**

This indicator captures the risk to ecosystem health from air pollution, including its downstream effects. High rates of emissions of gases from industry present risks to all aspects of the environment through diffuse pathways, including deposition by rain. The effects of air pollution (of which SO2 is only one indicator and only one of the gases of concern) into the environment and beyond its capacity to attenuate them would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human

---

**Indicator**

SULPHEVI

**Collection**

EVI 2004

**Indicator #**

227

**Sub-Index**

EVI 2004

**Indicator Name**

Sulphur Dioxide Emissions (scaled)

**Units**

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**

1995

**Source**


**Methodology**

Using the variable SULPHUR, the authors applied the following break off values (where X = sulphur dioxide emissions as tonnes/km2/year):

- EVI Score = 1  X ≤ 0.25
- EVI Score = 2  0.25 < X ≤ 0.5
- EVI Score = 3  0.5 < X ≤ 0.75
- EVI Score = 4  0.75 < X ≤ 1
- EVI Score = 5  1 < X ≤ 1.5
- EVI Score = 6  1.5 < X ≤ 2
- EVI Score = 7  X > 2

**Rationale**

This indicator captures the risk to ecosystem health from air pollution, including its downstream effects. High rates of emissions of gases from industry present risks to all aspects of the environment through diffuse pathways, including deposition by rain. The effects of air pollution (of which SO2 is only one indicator and only one of the gases of concern) into the environment and beyond its capacity to attenuate them would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human
<table>
<thead>
<tr>
<th>Indicator</th>
<th>WASTE Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>228</td>
<td>Sub-Index</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Waste Production</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Wastes produced and imported (including toxic, hazardous and municipal wastes) as X = mean tonnes per year per sq km of land.</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996-2000</td>
<td></td>
</tr>
</tbody>
</table>
EPA [http://www.zerowasteamerica.org/WasteTrade.htm](http://www.zerowasteamerica.org/WasteTrade.htm)  
| Additional sources: |  
| Methodology | Average annual net amount of generated and imported toxic, hazardous and municipal wastes per square kilometre land area over the last 5 years (t/km²/yr).  
1. Data include wastes generated in each country in addition to those imported for storage or attenuation.  
2. Wastes exported to other countries are specifically not included as a deduction in this indicator, so there will be double-accounting of wastes because where they appear in one country as generated, they may also appear in another as imported. We believe this a better measure of vulnerability.  
3. Data from in-country sources were difficult to obtain. |
| Rationale | This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from toxic and municipal wastes. All such wastes need a suitable area of land or volume of water for their eventual attenuation. High waste loads present risks to all aspects of the environment. The effects of dumping large amounts of wastes into the environment and beyond its capacity to attenuate them would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts. |
**Indicator**

WASTEEVI

**Collection**

EVI 2004

**Indicator #**

229

**Sub-Index**

Waste Production (scaled)

**Units**

Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**

1996-2000

**Source**


**Methodology**

Using the variable WASTE, the authors applied the following break off values (where wastes produced and imported (including toxic, hazardous and municipal wastes) as $X = \text{mean tonnes per year per sq km of land}$):

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>$X$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\leq 1$</td>
</tr>
<tr>
<td>2</td>
<td>$1 &lt; X \leq 2$</td>
</tr>
<tr>
<td>3</td>
<td>$2 &lt; X \leq 3$</td>
</tr>
<tr>
<td>4</td>
<td>$3 &lt; X \leq 4$</td>
</tr>
<tr>
<td>5</td>
<td>$4 &lt; X \leq 5$</td>
</tr>
<tr>
<td>6</td>
<td>$5 &lt; X \leq 6$</td>
</tr>
<tr>
<td>7</td>
<td>$X &gt; 6$</td>
</tr>
</tbody>
</table>

**Rationale**

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from toxic and municipal wastes. All such wastes need a suitable area of land or volume of water for their eventual attenuation. High waste loads present risks to all aspects of the environment. The effects of dumping large amounts of wastes into the environment and beyond its capacity to attenuate them would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

**Indicator**

TRTMNT

**Collection**

EVI 2004

**Indicator #**

230

**Sub-Index**

Waste Treatment

**Units**

Average annual percentage of wastes produced that undergo treatment that limits negative effects on the environment.

**Reference Year**

1992-1998

**Source**

Eurostat   http://www.waste.eionet.eu.int

Additional sources:

Mean annual percent of hazardous, toxic and municipal waste effectively managed and treated over the past 5 years.

1. Effectively managed wastes are composted, reused, recycled, subjected to controlled incineration (including temperature control, retention time control and control of emissions), and/or placed in controlled landfill (involving treatment of leachate, containment, gas management, aftercare and rehabilitation i.e. recovery, planting and post management).

Proportion of wastes rendered less harmful. This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from toxic and municipal wastes and how they are treated. All wastes need a suitable area of land or volume of water for their eventual attenuation, but treatment and recycling are effective means of reducing the overall waste load in a country. High waste loads present risks to all aspects of the environment. The effects of dumping large amounts of wastes into the environment and beyond its capacity to attenuate them would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

EVI Score = 1  \[ X = 100 \]
EVI Score = 2  \[ 80 \leq X < 100 \]
EVI Score = 3  \[ 60 \leq X < 80 \]
EVI Score = 4  \[ 50 \leq X < 60 \]
EVI Score = 5  \[ 40 \leq X < 50 \]
EVI Score = 6  \[ 30 \leq X < 40 \]
EVI Score = 7  \[ X < 30 \]
Indicator: INDUST  
Collection: EVI 2004

Indicator #: 232  
Sub-Index: 

Indicator Name: Industry

Units: Tonnes of oil equivalent (toe) per year per sq km of land.

Reference Year: 1997

Source: WRI 2000-2001

Additional sources:

www.world-nuclear.org (16/7/02); www.diw.go.th/ Report on Control of Waste Discharged from Oil and Gas Exploration and Production in the Gulf of Thailand, Pollution Control Dept (2001) (Thailand); UNDP, UNEP, World Bank, WRI. 2000 World Resources 2000-2001: People and Ecosystems: The fraying web of life. World Resource Institute. Washington, D.C.; Cook Island - Bureau of Statistics Information – Census 1998. Environment Services; Federated States of Micronesia - FSM DEA, and Department of Health, Education and Social Affairs (DHESA). Contact - Eneriko Sultan, and Moses Petrick (691 3202619/ 691 3205263/ Fsmhealth@mail.fm). FSM DEA/ Assistant Secretary; DHESA/ Environmental Health Specialist; Fiji - Vandanana Naidu (311 699). Department of Environment (DoE); Greece - Various sources. Contact - Dr Paula Scott (ph&f: 30 81 8 61 219, cariad@her.forthnet.gr); Kiribati - Contact - Michael Phillips. Environment & Conservation Division (E&CD); Kyrgyzstan - Department of State Ecological Control and Environment Utilization. Conatct - Mr Myrsaliev. Unit of Conventions; Nauru - Nauru Rehabilitation Corporation (NRC) Contact - Dempsey Detenamo (674 4443220/ 4443272/ detenamo@yahoo.com); Palau - Permit Files. Environmental Quality Protection Board (EQPB). Contact - Robert (Bob) Marek (680 4881639 or 3600/ 4882963/ eqpb@palaunet.com); Papua New Guinea - Data provided by: Katrina Solien (674 3250194, 3250113). Assistant Manager, Office of Environment & Conservation (OE & C); Republic of Marshall Islands - Republic of Marshall Islands Environmental Protection Agency (RMI EPA) Employees. Contact - Deborah Barker (Yumie Crisostomo’s contact: 3035/ 5203/ EPARMI@ntamar.com/ Yumic@hotmail.com) 
Samoa - Lands, Surveys & Environment. Contact - Vainuupo Jungblut (685 22481 or 22486/ 23176/ envdlse@samoa.net); Singapore - Lim Siak Heng: Tel 6731 9782 Fax : 67319651. Executive engineer Pollution Control Department (PCD); St Lucia - Sustainable development and environment department. Contact - Christopher Corbin Tel: 7584685041 Fax - 7584516958 E-Mail ccorbin@planning.gove.lc. Senior sustainable development + Environment officer; Tonga - Environmental Planning & Conservation Section (EPACS) Contact - Lupe Matoto (676 23611/ 23216/ imepacs@candw.to, Vailala@candw.to) EPACS; Tuvalu - Environment Department. Contact – Mataio. Environment Dept; Vanuatu - Contact - Ernest Bani (678 25302/ 23565). Environment Unit/ Principal Environment Officer.

Methodology

Average annual use of electricity for industry over the last 5 years per square kilometre of land.

1. The new form of this indicator uses the proxy of electricity use for industry because information on numbers of relevant industries was difficult to obtain for a large number of

Rationale

This indicator captures all major potential chemical and other industrial polluters that could cause significant environmental damage from accidents and diffuse pollution, including acid rain, not normally recorded as part of waste streams. It also captures electricity generation and/or use specifically for purposes of industry, which in itself has ecological consequences. This indicator is used to take into account accidents such as the Bhopal chemical explosion in India, as well as incidents such as the Chernobyl and more recently the Japanese nuclear disaster. The effects of industrial accidents and diffuse pollution would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
**Indicator**  INDUSTEVI  
**Collection**  EVI 2004  

**Indicator #**  233  
**Sub-Index**  

**Indicator Name**  Industry (scaled)  

**Units**  Standardized unit scale (from 1-7; with 1 as good and 7 as bad)  

**Reference Year**  1997  


**Methodology**  Using the variable INDUSTRY, the authors applied the following break off values (where X = tonnes of oil equivalent (toe) per year per sq km of land):

- EVI Score = 1  \( X \leq 5 \)
- EVI Score = 2  \( 5 < X \leq 10 \)
- EVI Score = 3  \( 10 < X \leq 20 \)
- EVI Score = 4  \( 20 < X \leq 50 \)
- EVI Score = 5  \( 50 < X \leq 100 \)
- EVI Score = 6  \( 100 < X \leq 200 \)
- EVI Score = 7  \( X >200 \)

**Rationale**  This indicator captures all major potential chemical and other industrial polluters that could cause significant environmental damage from accidents and diffuse pollution, including acid rain, not normally recorded as part of waste streams. It also captures electricity generation and/or use specifically for purposes of industry, which in itself has ecological consequences. This indicator is used to take into account accidents such as the Bhopal chemical explosion in India, as well as incidents such as the Chernobyl and more recently the Japanese nuclear disaster. The effects of industrial accidents and diffuse pollution would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

**Indicator**  SPILLS  
**Collection**  EVI 2004  

**Indicator #**  234  
**Sub-Index**  

**Indicator Name**  Spills  

**Units**  Number of spills greater than 1,000 litres between 1996-2000.  

**Reference Year**  1996-2000  

**Source**  ITOPF 2002 International Tanker Owners Federation - Refers to oil spills at sea only  

SPILLS 2000 www.etcentre.org/spills. The source of the spill must be a vessel, generally a tanker or barge on which a petroleum product was cargo, and must involve at least 1000 barrels (42,000 gallons).  

CRED 2000 The OFDA/CRED International disaster database: data source derived from LLOYDS CAS  

Additional sources:  

Methodology

Total number of spills of oil and hazardous substances greater than 1000 litres on land, in rivers or within territorial waters per million km maritime coast during the last five years

1. Two countries, Kyrgyzstan and Kazakhstan recorded spills during the period 1996-2000 but do not have maritime coasts.

Rationale

This indicator captures the risk to marine, estuarine, riverine, lake, ground water and terrestrial ecosystems from spills of hydrocarbons and other toxic fluids. Only spills greater than 1,000 litres are included. The effects of spills of toxic chemicals are of special significance for endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Indicator Name</th>
<th>Units</th>
<th>Source</th>
</tr>
</thead>
</table>

Reference Year

1996-2000

Methodology

Using the variable SPILLS, the authors applied the following break off values (where X = number of spills greater than 1,000 litres between 1996-2000):

- EVI Score = 1 \( X = 0 \)
- EVI Score = 2 \( 0 < X \leq 50 \)
- EVI Score = 3 \( 50 < X \leq 100 \)
- EVI Score = 4 \( 100 < X \leq 150 \)
- EVI Score = 5 \( 150 < X \leq 200 \)
- EVI Score = 6 \( 200 < X \leq 250 \)
- EVI Score = 7 \( X > 250 \)

Rationale

This indicator captures the risk to marine, estuarine, riverine, lake, ground water and terrestrial ecosystems from spills of hydrocarbons and other toxic fluids. Only spills greater than 1,000 litres are included. The effects of spills of toxic chemicals are of special significance for endangered species, sensitive ecosystems, and interactions with on-going human impacts.
Indicator Name: Mining

Units: Average total mining production 1996-2000 in tonnes/km²/year.

Reference Year: 1996-2000

Source: USGS - US Geological Survey and are mean annual production 1996-2000
Summaries 2002)
Uranium is only from 2000

Additional sources:
www4.btwebworld.com/mineralsuk/britmin/AMS1995-99.pdf (29/01/03);
www.minerals.er.usgs.gov/minerals/pubs/country/2001/; Botswana - Contact - Mr. N.C
MmolawaTel: 365 7000 Fax: 352141 nmmolawa@gov.bw Department of Mines Senior Mining
Engineer; Federated States of Micronesia - Contact - Eneriko Suldan. FSM Department of
Economic Affairs (FSMDEA); Fiji - SML (B) Files: Form 13 & 14 Monthly Reports. Minerals
Resources Department (MRD); Kiribati - Contact - Naomi Atauea (686 21099/ 686 21120)
Ministry of Natural Resources Development (MNRD); Kyrgyzstan - Department of State
Ecological Control and Environment Utilization. Contact - Mr. Myrsaliev N, Unit Of Conventions;
Marshall Islands - Contact - J. Kramer (Kenneth Kramer’s contact: 3560/ 3348/
Kkramer@ite.net ) Pacific International (Construction) Inc.; Nauru - Shipment data; Niue -
Contact - DeveTalagi (Fax: 4223). Public Works Department/ Director; Papua New Guinea -
Annual Mining Estimates. Mining Division; Philippines - Environmental Degradation due to
Selected Economic Activities. Minerals and Mining Sector, PEENRA; Samoa - Contact -
Vainuupo Jungblut. Lands, Surveys & Environment; Thailand - Mineral Statistic of Thailand
Agriculture Organisation of the United Nations acting as executing agency for the United
Nations Development Programme.

Methodology:

Average annual mining production over the past 5 years (includes all surface and subsurface
mining and quarrying) (tonnes/km²/yr).

Tonnes of mining material (ore + tailings) extracted from sub-surface mines per square
kilometre per land area per year average last five years. Include all metals, oil, coal and any
other non-renewables extracted through sub-surface mining.

1. Data are on average annual production between 1996-2000 for most products, except
Uranium for which data for only the year 2000 were available.

2. Data includes 81 types of mining, including clays, gravels, cement, gems, radioactive
materials, metals, petroleum and gas.

3. Production is not the best measure for this indicator. We designed the indicator to measure
the total amount of ores extracted, not just the much smaller amounts of final products taken
from them. Ore extraction is considered a better measure of environmental disturbance for
two reasons. First, it measures the level of general physical disturbance of the environment,
regardless of the value or volume/weight of the final product of interest. Second, the amount
of ore extracted may be self-weighting. That is, for large volume/weight materials such as
stone, cement, gravels etc, the amount of material extracted is approximately equal to the final
product (except for overburden) and therefore represents mostly the physical disturbance.
For heavy metals, the amount of ore extracted is much larger than the weight of the final
product. In this case, using the value for ore builds-in a stronger signal than just final production figures, the difference representing some measure of the effects of processing the ore to the final concentrate.

4. Data from in-country sources were difficult to obtain.

### Rationale

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from the effects of ecosystem disturbance, accidents, oil spills and toxic leachates, and processing from mining of all kinds. All disturbance can lead to vulnerability to other processes, human and natural, and wastes need a suitable area of land or volume of water for their eventual attenuation or long term deposition. High levels of mining activity present risks to all aspects of the environment. The effects of mining would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MININGEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>237</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Mining (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996-2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Using the variable MINING, the authors applied the following break off values (where X = average total mining production 1996-2000 in tonnes/km2/yr):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- EVI Score = 1 if $X \leq 1$
- EVI Score = 2 if $1 < X \leq 2$
- EVI Score = 3 if $2 < X \leq 3$
- EVI Score = 4 if $3 < X \leq 4$
- EVI Score = 5 if $4 < X \leq 5$
- EVI Score = 6 if $5 < X \leq 6$
- EVI Score = 7 if $X > 6$

### Rationale

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters from the effects of ecosystem disturbance, accidents, oil spills and toxic leachates, and processing from mining of all kinds. All disturbance can lead to vulnerability to other processes, human and natural, and wastes need a suitable area of land or volume of water for their eventual attenuation or long term deposition. High levels of mining activity present risks to all aspects of the environment. The effects of mining would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SAN</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>238</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percent of human population with access to safe sanitation, converted to percent without access and then a density of population per km2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990-1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Methodology**

Density of population without access to safe sanitation (WHO definitions).

Density of population without access to secondary or higher levels of sewage treatment.

1. The original indicator text was converted to a density function and reversed from a focus part of the population with sanitation (text 3), to focus on part without sanitation for a more relevant and intuitive EVI scale.

2. This scale is set more critically than that on population density because it focuses on populations without access to safe sanitation and which may therefore be more likely to release untreated pollutants into the surrounding environment.

3. A better form of this indicator would be the population without access to at least secondary sewage treatment (text 2 above). That is, at least partial bacterial breakdown of sewage before it is released into the environment.

**Rationales**

’Safe sanitation’ is normally an issue seen from a human perspective. It deals with hygiene, disease control and direct quality of life for humans. We are using this information for the EVI from and environmental perspective. This indicator (text 1 above) is a proxy measure for how human waste is treated before it enters the environment. We are taking safe sanitation as an indication of at least some pre-treatment of sewage before it enters stream, groundwater recharge, coastal and land areas. If sanitation is of a low standard, ecosystems downstream have a higher risk of being polluted with sewage that has not been broken down and which will contain high levels of urea, ammonia, nitrites, pharmaceuticals and pathogens. The WHO definition of safe sanitation used here is the percentage of the human population with sewage disposal facilities that can effectively prevent human, animal, and insect contact. This includes connections to public sewers, household systems such as pit and pour-flush latrines, septic tanks, communal toilets, and other such facilities.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>SANEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>239</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Sanitation (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990-1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Methodology | Using the variable SANITATION, the authors applied the following break off values (where X = percent of human population with access to safe sanitation, converted to percent without access and then a density of population per km²):

<table>
<thead>
<tr>
<th>EVI Score</th>
<th>X Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X &lt; 1.5</td>
</tr>
<tr>
<td>2</td>
<td>1.5 &lt; X ≤ 2</td>
</tr>
<tr>
<td>3</td>
<td>2 &lt; X ≤ 2.5</td>
</tr>
<tr>
<td>4</td>
<td>2.5 &lt; X ≤ 3</td>
</tr>
<tr>
<td>5</td>
<td>3 &lt; X ≤ 3.5</td>
</tr>
<tr>
<td>6</td>
<td>3.5 &lt; X ≤ 4</td>
</tr>
<tr>
<td>7</td>
<td>X &gt; 4</td>
</tr>
<tr>
<td>Rationale</td>
<td>‘Safe sanitation’ is normally an issue seen from a human perspective. It deals with hygiene, disease control and direct quality of life for humans. We are using this information for the EVI from an environmental perspective. This indicator (text 1 above) is a proxy measure for how human waste is treated before it enters the environment. We are taking safe sanitation as an indication of at least some pre-treatment of sewage before it enters stream, groundwater recharge, coastal and land areas. If sanitation is of a low standard, ecosystems downstream have a higher risk of being polluted with sewage that has not been broken down and which will contain high levels of urea, ammonia, nitrates, pharmaceuticals and pathogens. The WHO definition of safe sanitation used here is the percentage of the human population with sewage disposal facilities that can effectively prevent human, animal, and insect contact. This includes connections to public sewers, household systems such as pit and pour-flush latrines, septic tanks, communal toilets, and other such facilities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>VEH</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>240</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Vehicles in a country per sq km of land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>WRI 2000-2001; OECD 1999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology

Number of vehicles per square kilometre of land area (most recent data)

1. Data from WRI only cover 1996

Rationale

This indicator captures the risk to terrestrial ecosystems in the form of habitat damage, habitat fragmentation, loss of biodiversity, pollution hazardous wastes and industries, including air and lead pollution on land and in waterways. Of particular concern is fragmentation of the countryside which can interfere with normal movements and/or migration of terrestrial mammals. The definition of vehicles used here is from the World Bank. The effects would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator | EVHEVI | Collection | EVI 2004
Indicator # | 241 | Sub-Index |
Indicator Name | Vehicles (scaled) |
Unit | Standardized unit scale (from 1-7; with 1 as good and 7 as bad) |
Reference Year | 1996 |
Methodology

Using the variable VEHICLES, the authors applied the following break off values (where X = vehicles in a country per sq km of land):

EVI Score = 1 \( X \leq 1 \)
EVI Score = 2 \( 1 < X \leq 1.5 \)
EVI Score = 3 \( 1.5 < X \leq 2 \)
EVI Score = 4 \( 2 < X \leq 2.5 \)
EVI Score = 5 \( 2.5 < X \leq 3 \)
EVI Score = 6 \( 3 < X \leq 3.5 \)
EVI Score = 7 \( X > 3.5 \)

Rationale

This indicator captures the risk to terrestrial ecosystems in the form of habitat damage, habitat fragmentation, loss of biodiversity, pollution hazardous wastes and industries, including air and lead pollution on land and in waterways. Of particular concern is fragmentation of the countryside which can interfere with normal movements and/or migration of terrestrial mammals. The definition of vehicles used here is from the World Bank. The effects would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
**Indicator**
POPDN

**Collection**
EVI 2004

**Indicator #**
242

**Sub-Index**

**Indicator Name**
Population Density

**Units**
Total human population/sq km.

**Reference Year**
2000-2001

**Source**
WRI 2000-2001
CIA Fact sheets 2001

Additional sources:

**Methodology**
Total human population density (number per km² land area).

**Rationale**
This is a proxy measure for pressure on the environment resulting from the number of humans being supported per unit of land. The greater numbers of people increases pressure on the environment for resources, for the attenuation of wastes and physical disturbance of the environment.

**Indicator**
POPDNEVI

**Collection**
EVI 2004

**Indicator #**
243

**Sub-Index**

**Indicator Name**
Population Density (scaled)

**Units**
Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year**
2000-2001

**Source**

**Methodology**
Using the variable DENSITY, the authors applied the following break off values (where X = total human population/sq km):
EVI Score = 1  X < 3
EVI Score = 2  3 < X ≤ 3.5
EVI Score = 3  3.5 < X ≤ 4
EVI Score = 4  4 < X ≤ 4.5
EVI Score = 5  4.5 < X ≤ 5
EVI Score = 6  5 < X ≤ 5.5
EVI Score = 7  X > 5.5

**Rationale**

This is a proxy measure for pressure on the environment resulting from the number of humans being supported per unit of land. The greater numbers of people increases pressure on the environment for resources, for the attenuation of wastes and physical disturbance of the environment.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>POPGRTH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicator #</strong></td>
<td>244</td>
</tr>
<tr>
<td><strong>Sub-Index</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Units**

Average percent yearly change in population (1996-2001)

**Reference Year**

1996-2001

**Source**

WRI 2000-2001
U.S. Bureau of Census - International Data Base

Additional sources:

- www.stats.govt.nz (New Zealand); www.forest.go.th/stat42/stat.htm (7/6/01)(Thailand);
- www.census.gov/ipc/www/idb.html (US Census Bureau); UNDP, UNEP, World Bank, WRI.

**Methodology**

Annual human population growth rate over the last 5 years

This indicator focuses on the potential for damage relating to expanding human populations. It signals increasing rates of habitat damage, exploitation of natural resources and disposal of wastes that will need to be assimilated into the environment. It also captures the risk of...
This indicator focuses on the potential for damage relating to expanding human populations. It signals increasing rates of habitat damage, exploitation of natural resources and disposal of wastes that will need to be assimilated into the environment. It also captures the risk of infrastructure not being able to keep up with demand for issues such as waste treatment.

**Indicator** POPGRTHEVI  
**Collection** EVI 2004

**Indicator #** 245  
**Sub-Index**

**Indicator Name** Population Growth (scaled)

**Units** Standardized unit scale (from 1-7; with 1 as good and 7 as bad)

**Reference Year** 1996-2001


**Methodology** Using the variable GROWTH, the authors applied the following break off values (where X = average percent yearly change in population (1996-2001)):

- EVI Score = 1  \( X < 0 \)
- EVI Score = 2  \( X = 0 \)
- EVI Score = 3  \( 0 \leq X < 0.5 \)
- EVI Score = 4  \( 0.5 \leq X < 1 \)
- EVI Score = 5  \( 1 \leq X < 1.5 \)
- EVI Score = 6  \( 1.5 \leq X < 2 \)
- EVI Score = 7  \( 2 \leq X \)

This indicator focuses on the potential for damage relating to expanding human populations. It signals increasing rates of habitat damage, exploitation of natural resources and disposal of wastes that will need to be assimilated into the environment. It also captures the risk of infrastructure not being able to keep up with demand for issues such as waste treatment.

**Indicator** TOUR  
**Collection** EVI 2004

**Indicator #** 246  
**Sub-Index**

**Indicator Name** Tourists

**Units** Mean number of international tourists x number of days stayed divided by area of land (sq km).

**Reference Year** 1996-2000

**Source** WTO (World Trade Organisation) web site  
In-country tourist boards and EVI collaborators

Additional sources:

- www.world-tourism.org/market_research/facts&figures/statistics/t_ita00country.pdf (13/12/02); www.czso.cz/eng/figures (28/11/02) (Brunei Darussalam); www.brazil.org.uk/page.php?cid=1189 (29/11/02) (Brazil); www.cnta.com/lyen/2fact/annual.htm (13/12/02) (China); www.embassy.org/cambodia/tourism/tour.htm (13/12/02)(Cambodia); www.stat.gov.tw (Taiwan); www.bps.go.id/sector/tourism/table25.shtml (29/11/02) (Indonesia); Barbados - Digest of Tourism Statistics. Barbados Statistical Service; Botswana - Contact - Mrs Joyce Morontshe. 353024 – phone 308675 – fax. tourism@botsnet.bw. Tourism/Tourism Officer II. Department of Tourism; Cook Islands - Annual Statistical Bulletin, June 2000. Cook Islands Statistics Office; Costa Rica - Estadísticas. Estadísticas, Instituto Costarricense del Turismo
Methodology

Average annual number of international tourists per km² land over the past 5 years

Average annual number of international tourist-days per km² of land over the last five years.

1. Although data on number of international tourists is generally available through WTO and in-country tourist boards (for 169 countries), the number of days stayed is generally not available (only 32 countries).

2. A proxy for this indicator using only the mean annual number of tourists / land area was used.

Rationale

This is a measure for the additional load of all human impacts associated with international visitors and not reported in human population statistics. Tourists place additional pressure on the environment through increasing demands on local resources and through creation of pollution as well as physical disturbances of the environment. It is possible that their environmental burden is greater than that of residents.

Indicator | TOUREVI | Collection | EVI 2004
--- | --- | --- | ---
Indicator # | 247 | Sub-Index
Indicator Name | Tourists (scaled)
Units | Standardized unit scale (from 1-7; with 1 as good and 7 as bad
Reference Year | 1996-2000
Methodology | Using the variable TOURISTS, the authors applied the following break off values (where X =
mean number of international tourists x number of days stayed divided by area of land (sq km)):

EVI Score = 1 \( X < 3 \)
EVI Score = 2 \( 3 \leq X < 3.5 \)
EVI Score = 3 \( 3.5 \leq X < 4 \)
EVI Score = 4 \( 4 \leq X < 4.5 \)
EVI Score = 5 \( 4.5 \leq X < 5 \)
EVI Score = 6 \( 5 \leq X \leq 5.5 \)

**Rationale**

This is a measure for the additional load of all human impacts associated with international visitors and not reported in human population statistics. Tourists place additional pressure on the environment through increasing demands on local resources and through creation of pollution as well as physical disturbances of the environment. It is possible that their environmental burden is greater than that of residents.

**Indicator**

CSTPOP

**Collection**

EVI 2004

**Indicator #**

248

**Sub-Index**

Human Populations

**Units**

Population living with 100 km of a coast divided by the area of coastal lands (sq km).

**Reference Year**

2000-2001

**Source**

WRI 2000-2001
CIA Fact sheets 2001

Additional source:


**Methodology**

Density of people living in coastal settlements (i.e. with a city centre within 100km of any maritime or lake* coast). (* To be included, lakes must have an area of at least 100 sq km).

1. Area of coastal lands is calculated by multiplying length of all coastlines (maritime + lake) by 100km. Where this figure exceeds the total area of land in a country (from WRI 2000-2001 and CIA 2002, Indicator 11), the figure used is total land area. This situation can occur because of overlap of the 100km band where coasts are close together or very convoluted.

2. Landlocked countries for which this indicator is not applicable are given the value of zero (and the lowest EVI score).
Rationale: This indicator captures the focus of stress on coastal ecosystems, often the most productive living areas in a country, through pollution, eutrophication, resource depletion and habitat degradation. The adjacent water areas are capable of spreading pollution widely in aquatic habitats and will not tend to allow for attenuation over upland areas. Countries with heavy densities of human populations living on their coastal areas are likely to be damaging some of their most productive and diverse areas and negatively affecting the resilience of the country to natural disasters such as cyclones, tsunamis etc.

Indicator: CSTPOPEVI
Indicator #: 249
Indicator Name: Human Populations (scaled)
Units: Standardized unit scale (from 1-7; with 1 as good and 7 as bad)
Reference Year: 2000-2001
Methodology: Using the variable COASTAL, the authors applied the following break off values (where X = population living with 100 km of a coast divided by the area of coastal lands (sq km)):

EVI Score = 1  X < 3
EVI Score = 2  3 < X ≤ 3.5
EVI Score = 3  3.5 < X ≤ 4
EVI Score = 4  4 < X ≤ 4.5
EVI Score = 5  4.5 < X ≤ 5
EVI Score = 6  5 < X ≤ 5.5
EVI Score = 7  X > 5.5

Rationale: This indicator captures the focus of stress on coastal ecosystems, often the most productive living areas in a country, through pollution, eutrophication, resource depletion and habitat degradation. The adjacent water areas are capable of spreading pollution widely in aquatic habitats and will not tend to allow for attenuation over upland areas. Countries with heavy densities of human populations living on their coastal areas are likely to be damaging some of their most productive and diverse areas and negatively affecting the resilience of the country to natural disasters such as cyclones, tsunamis etc.

Indicator: AGRMT
Indicator #: 250
Indicator Name: Environmental Agreements
Units: Number of treaties in force.
Reference Year: 2003
Methodology

Number of environmental treaties in force in a country.

1. Information for using the original form of this indicator, were generally not available, though most of our collaborators did provide valuable information for this indicator. As a result, we used public information on number of treaties in force, which is available for a large number of countries.

2. The logic of using treaties is that international environmental treaties provide guidance and support for environmental policy and implementation. Countries that are signatories to a significant number of treaties are likely to have at least considered some of their more important issues, be undertaking some monitoring and control, have access to guidance, and be under pressure to correct problems.

3. Being signatory to a treaty does not guarantee that the environment is managed or that obligations under the treaty are being met.

Rationale

This indicator captures the level of management and stewardship of the environment in a country. Two aspects of legislation are needed: the message to the public that environmental management is essential, and the effectiveness of controls. The benefits of good management would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.
Source

Methodology
Using the variable AGREEMENTS, the authors applied the following break off values (where X = number of treaties in force):

- EVI Score = 1  60 < X
- EVI Score = 2  50 < X ≤ 60
- EVI Score = 3  40 < X ≤ 50
- EVI Score = 4  30 < X ≤ 40
- EVI Score = 5  20 < X ≤ 30
- EVI Score = 6  10 < X ≤ 20
- EVI Score = 7  X ≤ 10

Rationale
This indicator captures the level of management and stewardship of the environment in a country. Two aspects of legislation are needed: the message to the public that environmental management is essential, and the effectiveness of controls. The benefits of good management would be especially important if there are many endangered species, sensitive ecosystems, and interactions with on-going human impacts.

Indicator
CONFLT
Collection
EVI 2004
Indicator #
252
Sub-Index
Indicator Name
Human Conflicts
Units
Number of conflict years
Reference Year
1991-2000
Source

Methodology
Average number of conflict years per decade over the past 50 years.

1. The EM-DAT database covers only the period 1991-2000. Data should be for a longer time
series.

2. There is no information on the type or geographic extent of conflicts, numbers of people involved, or duration. Incorporating these measures would improve the indicator's ability to measure likely ecological effects.

3. For future evaluations of the EVI values should be calculated as mean number of conflict years per decade and used against the same scale indicated here.

4. The number of conflict years can be greater than the number of data years if there are multiple simultaneous conflicts in the country.

5. Conflict: Use of armed force between the military forces of two or more governments, or of government and at least one organized armed group, resulting in the battle-related deaths of at least 10 people or 100 affected in one year. (SIPRI definition adapted to for EMDAT). In EM-DAT, conflict includes the disaster types 'intragstate conflict' and 'international conflict'.

6. Intrastate conflict: CRED has adopted the simple Project Ploughshares' typology of modern armed conflict based on three overlapping types of intrastate conflict: state control, state formation and state failure.

7. International conflict: This includes border disputes, foreign invasion and other cross-border attacks (Project Ploughshares).

**Rationale**

This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters related to human conflicts. Conflicts can result in habitat disturbance and degradation, pollution and a complete breakdown in environmental management. The direct effects include degradation through bombing, land mines, and chemicals left in the environment, temporary camps and vehicle disturbances, and damage caused by displaced people who need to support themselves under emergency conditions. This is also a proxy for the lack of environmental management during those years. The effects of civil unrest would be especially important if they were on-going, repeated, or occurring as separate events in more than one part of a country. Effects would be amplified if there are many endangered species, sensitive ecosystems, and interactions with other on-going human impacts. The time frame used reflects the long term nature of conflict-related damage to the environmental support system.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CONFLTEVI</th>
<th>Collection</th>
<th>EVI 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>253</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Human Conflicts (scaled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Standardized unit scale (from 1-7; with 1 as good and 7 as bad)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1991-2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Using the variable CONFLICTS, the authors applied the following break off values (where X = number of conflict years): EVI Score = 1 X = 0, EVI Score = 2 Not used, EVI Score = 3 Not used, EVI Score = 4 Not used, EVI Score = 5 0 &lt; X ≤ 2, EVI Score = 6 2 &lt; X ≤ 5, EVI Score = 7 X &gt; 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rationale
This indicator captures the risk to terrestrial, aquatic ecosystems and ground waters related to human conflicts. Conflicts can result in habitat disturbance and degradation, pollution and a complete breakdown in environmental management. The direct effects include degradation through bombing, land mines, and chemicals left in the environment, temporary camps and vehicle disturbances, and damage caused by displaced people who need to support themselves under emergency conditions. This is also a proxy for the lack of environmental management during those years. The effects of civil unrest would be especially important if they were on-going, repeated, or occurring as separate events in more than one part of a country. Effects would be amplified if there are many endangered species, sensitive ecosystems, and interactions with other on-going human impacts. The time frame used reflects the long term nature of conflict-related damage to the environmental support system.

Collection 4: Rio to Johannesburg Dashboard

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PLBOD</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>254</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percent Population Living Below One Dollar Per Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percent of population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>World Bank SIMA and World Development Indicators online</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Deininger and Squire</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology
The CSD Methodology Sheet states, "The most important purpose of a poverty measure is to enable poverty comparisons" and notes key branches of such comparisons. The RIOJO dashboard follows the branch monitoring absolute poverty with the World Bank’s preferred measure, percent of population living on less than $1 a day in 1985 international or purchasing power parity (PPP) prices.

Since PPP rates were designed for comparing national accounts aggregates, not for international poverty comparisons; there is no certainty that this international poverty line measures the same degree of need or deprivation across countries, within different regions of one country, or across socio-economic groups all of which are important branches of poverty comparisons. To some extent all other indicators in the CSD Thematic Framework contribute to the other main branch, relative poverty comparisons, in addition to monitoring specific aspects of sustainable development.

The choice between income and consumption as welfare indicators is discussed in the CSD Methodology Sheet. Income is generally more difficult to measure; consumption accords better with the idea of the standard of living than does income, which can vary over time even if the standard of living does not. However, consumption data are not always available and when they are not there is little choice but to use income. Moreover, household survey questionnaires can differ widely, for example in the number of distinct categories of consumer goods they identify; survey quality varies and even similar surveys may not be strictly comparable. Since the World Bank is the only source for this indicator, coverage in the RIOJO Dashboard reflects judgments by that institution’s experts about use of income-based estimates.

Placeholders for OECD nations presume minimal (0%) rate.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>GINI</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>255</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Gini Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Gini coefficient of inequality (higher numbers signify greater inequality)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1998</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

This measure of income or resource inequality, together with the indicator of per capita income, gives a sense of relative poverty. To promote consistency with the absolute measure, consumption-based estimates were preferred where income-based estimates were also available; cell-level comments flag use of the latter when the former are not available.

The sources consulted catalog major factors in assessing data quality, assign an overall score to each "point" estimate, and discard those compilers rate below their minimum standard for such estimates. Since the RIOJO Dashboard offers range estimates (with parallel measures of data quality in its underlying database), it includes most estimates underlying sources rejected as point estimates.

In a few cases urban and rural estimates reported separately in noted sources have been combined using appropriate population weights.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FWAGEGAP</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>256</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Female Wage Gap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Female wages in manufacturing as % of males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>International Labour Organization LABORSTA</td>
<td>UN CDB</td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

The CSD Methodology Sheet observes that "[T]he lower the ratio of wages offered to women, the less the attraction for women to join the labor force, which in turn deprives the economy of a vital component of development." Data are mainly from the UN's Common Data Base, which in turn draws on data from the International Labour Organization (ILO). Where possible, data refer to wages in manufacturing to minimize problems of international comparability. ILO sources are national labour force surveys, labour-related establishment surveys, collective agreements, industrial/commercial surveys, insurance records, industrial/commercial censuses, labour-related establishment censuses, or administrative reports. Reports may refer to earnings, wages, wage rates, or salaries; per hour, week, or month. Data may cover all employees, wage earners, or salaried employees. Finally, data may be based on Revision 3 or 2 of the International Standard Industrial Classification.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>CHLDMRT</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>257</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Under-Five Mortality Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Deaths per 1,000 live births</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>World Health Organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>World Bank SIMA and WDI online</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Under-5 mortality rate is the probability that a newborn baby will die before reaching age five. Since the construct is derived from demographic models; time period coverage depends on periodicity of modeling exercises. WHO has stated it will now update this indicator annually, with uncertainty intervals. The World Bank projects model results quinquennially to 2050.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LIFEEXP</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>258</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Life Expectancy at Birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>World Health Organization</td>
<td></td>
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<tr>
<td>World Bank SIMA and WDI online</td>
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<tr>
<td>US Bureau of Census IDB</td>
<td></td>
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</tr>
<tr>
<td>Methodology</td>
<td>Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Since the construct is derived from demographic models; time period coverage depends on periodicity of modeling exercises. The World Bank and us Bureau of Census project model results at least quinquennially to 2050. WHO has introduced a refinement (healthy life expectancy or HALE) that deducts years of ill-health, weighted by severity, from the expected overall life expectancy. WHO has stated it will update both life expectancy and HALE annually, with uncertainty intervals.</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>CHLDIMM</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>259</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Child Immunization (DPT only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percent of children under 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>United Nations Children's Fund (Unicef), Progress since the World Summit for Children: A Statistical Review</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Immunization rates are available individually for several diseases likely to occur during childhood without immunization. However, no synthetic indicator gauges full immunization. The World Health Organization's WHO vaccine preventable diseases: monitoring system: 2000 global summary reports time series on immunization coverage for: BCG (Bacille Calmette Guérin) vaccine, DTP3 (third dose of diphtheria toxoid, tetanus toxoid, and pertussis vaccine), HepB3 (third dose of hepatitis B vaccine); MCV (measles-containing vaccine), POL3 (third dose of polio vaccine), and TT2plus (second and subsequent doses of tetanus toxoid); YFV (Yellow fever vaccine). The present exercise only considers coverage for DPT and relies primarily on WHO and defaults to World Bank DPT reports.

**Indicator** CPR  **Collection** Rio to Johannesburg Dashboard
**Indicator #** 260  **Sub-Index**
**Indicator Name** Contraceptive Prevalence Rate
**Units** Percent of women aged 15-49
**Reference Year** late 1990s
**Source** World Bank SIMA and WDI online
**Methodology** Contraceptive prevalence rate is the percentage of women who are practicing, or whose sexual partners are practicing, any form of contraception. It is usually measured for married women age 15-49 only.

**Indicator** PERGR  **Collection** Rio to Johannesburg Dashboard
**Indicator #** 261  **Sub-Index**
**Indicator Name** Persistence to Grade 5, Total
**Units** Percent of cohort
**Reference Year** 1997
**Source** UN Economic and Social Council (Unesco) obtained via WB SIMA
**Methodology** Persistence to grade 5 (percentage of cohort reaching grade 5) is the share of children enrolled in primary school who eventually reach grade 5. The estimate is based on the reconstructed cohort method.

OECD countries might look worse than they are, see for example the Netherlands and latest UNESCO statistics.

**Indicator** SECENR  **Collection** Rio to Johannesburg Dashboard
**Indicator #** 262  **Sub-Index**
**Indicator Name** Secondary School Gross Enrollment Ratio
**Units** Secondary school pupils as percent of secondary school aged population
**Reference Year** 1998-2002 (most recent year available)
**Source** USAID Global Education Database (GED) at http://qesdb.cdie.org/ged/index.html

153
Methodology

Enrollment of secondary students of all ages expressed as a percentage of the secondary school-age population. The ratio describes the capacity of a school system in relation to the size of the official school-age population. For example, a ratio of 100 percent indicates that the number of children actually enrolled, including those outside the official age range, is equivalent to the size of the official secondary school-age population. It does not mean that all children of official secondary school-age are actually enrolled. If the ratio were so misinterpreted, it would overstate the actual enrollment picture in those countries in which a sizable proportion of students are younger or older than the official age owing to early or delayed entry or to repetition.

Indicator LITRT  
Collection Rio to Johannesburg Dashboard
Indicator # 263  
Sub-Index
Indicator Name Adult Literacy Rate
Units Percent of adult population (25 and over)
Reference Year late 1990s
Source Unesco as given by USAID Global Education Database (GED) and World Bank SIMA
Methodology The population aged 15 years and above who can both read and write with understanding a short simple statement on their every day life. It has been observed that some countries apply definitions and criteria of literate (illiterate) which are different from the international standards or equate persons with no schooling as illiterates. Practices for identifying literates and illiterates during actual census enumeration may also vary, as well as errors in literacy self-declaration can also affect the reliability of literacy statistics.

Indicator FLRAREA  
Collection Rio to Johannesburg Dashboard
Indicator # 264  
Sub-Index
Indicator Name Floor Area Per Person in Selected Cities
Units Square meters per person
Reference Year 1993
Source UN-Habitat database and WRI World Resources 1998-1999
Methodology The CSD Methodology Sheet states Alternative measures of crowding have been the subject of data collection and reporting in international statistical compendia. The two most common are persons per room and households per dwelling unit, each of which was included among data collected during the first phase of the Housing Indicators Programme (UNCHS, World Bank, 1992). Surveys have shown that floor area per person is more precise and policy sensitive than the other two indicators.
This indicator is in the 1993 UN-Habitat database of Global Urban indicators but not the 1998 update; neither alternative is included in either database. Hence, The RioJo Dashboard reports available 1993 estimates as 1990 and carries them forward to 2000.
<table>
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<tr>
<th>Indicator</th>
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<tbody>
<tr>
<td>HOMICD</td>
<td>Rio to Johannesburg Dashboard</td>
</tr>
<tr>
<td>Indicator #</td>
<td>265</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Homicides</td>
</tr>
<tr>
<td>Units</td>
<td>Per 100,000 of population</td>
</tr>
<tr>
<td>Reference Year</td>
<td>Benchmarks only</td>
</tr>
<tr>
<td>Source</td>
<td>WHO age-standardized death rates</td>
</tr>
</tbody>
</table>

**Methodology**

The CSD Methodology Sheet discusses Number of Reported Crimes but warns Definitions of what is or is not a crime may vary for different countries. So may readiness to report to the police, readiness to record by the police, methods of counting, accuracy and reliability of the recorded figures reported. The CGSDI initially complied the specified indicator but these problems clearly left results more noise than signal. For example, by this indicator Scandinavian nations are the most crime-ridden. As a less noisy measure the RioJo Dashboard reports homicides. It gives preference to WHO estimates of death by homicide as the most standardized measure available and fills gaps from sources noted below in descending preference order. No attempt has been made to harmonize these data sources, some of which report national estimates while others refer to one or a few cities.

<table>
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<tr>
<th>Indicator</th>
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<tbody>
<tr>
<td>URBANPCT</td>
<td>Rio to Johannesburg Dashboard</td>
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<tr>
<td>Indicator #</td>
<td>266</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Urbanization</td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of total population</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
</tr>
<tr>
<td>Source</td>
<td>World Bank SIMA and WDI online</td>
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</tbody>
</table>

**Methodology**

The CSD Thematic Framework envisages an indicator of Population of Urban Formal and Informal Settlements here plus one on Area of Urban Formal and Informal Settlements under Environment; it describes each as “focusing on the legality of human settlements [to measure] the marginality of human living conditions.” Since UN-Habitat gives some city estimates of population but not land area by tenure types, in practice only one such indicator is likely for the foreseeable future. On the other hand, the Framework does not seek an indicator of urbanization. The RioJo Dashboard therefore reports the share of urban in total population here and the available indicator of urban “marginality” under Environment.

<table>
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<tr>
<th>Indicator</th>
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<tr>
<td>CLMCHG</td>
<td>Rio to Johannesburg Dashboard</td>
</tr>
<tr>
<td>Indicator #</td>
<td>267</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Climate Change (Carbon Emissions Per Capita)</td>
</tr>
<tr>
<td>Units</td>
<td>Metric Tons of Carbon Equivalent per Person</td>
</tr>
<tr>
<td>Reference Year</td>
<td>1999</td>
</tr>
</tbody>
</table>
The CSD Methodology Sheet calls for a broad composite measure, of Anthropogenic emissions, less removal by sinks, of the greenhouse gases carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6), chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), together with the indirect greenhouse gases nitrogen oxides (NOx), carbon monoxide (CO) and non-methane volatile organic compounds (NMVOCs).

Such a measure is available only for Parties to the UN Framework Convention on Climate Change but estimates of CO2 emissions are available for most countries. Hence, the RioJo Dashboard reports separately on CO2 emissions.

Greenhouse gases, CO2 emissions from burning fuel
Carbon dioxide (CO2) is the most prevalent of several gases associated with global warming; burning (consumption and flaring) of fossil fuels is the main anthropogenic (human) source of CO2 emissions. More comprehensive estimates of greenhouse gases (GHG) submitted to the International Protocol on Climate Change (IPCC) by 37 industrialized nations suggest that CO2 emissions from burning fuel account for three-quarters of GHG emissions excluding land-use change and forestry, areas in which removals of CO2 (carbon-banking in biomass) often outweigh emissions.

**Indicator**
- **Indicator**
  - OTHRGHG
  - **Collection**
  - Rio to Johannesburg Dashboard
- **Indicator #**
  - 268
- **Sub-Index**
- **Indicator Name**
  - Other Greenhouse Gases
- **Units**
  - Metric tons per capita
- **Reference Year**
  - 1998
- **Source**
  - UN Framework Convention on Climate Change
- **Methodology**
  - Covers, for the 37 Parties to the UN Framework Convention on Climate Change, aggregate emissions of CO2 other than from burning fuel (see above), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF), including CO2 emissions/removals from land-use change and forestry. Data in gigagrams of CO2 equivalent were divided by population *1000 to measure metric tons per capita. However, methodological differences between this source and US DOE reports on CO2 mean the two measures of GHG emissions are not additive.

**Indicator**
- **Indicator**
  - CROPLAND
  - **Collection**
  - Rio to Johannesburg Dashboard
- **Indicator #**
  - 269
- **Sub-Index**
- **Indicator Name**
  - Arable and Permanent Cropland
- **Units**
  - Percentage of total land area
- **Reference Year**
  - 2000
- **Source**
  - FAOSTAT
- **Methodology**
  - Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is not included.
Indicator | FERTCON  
---|---
Indicator # | 270
Indicator Name | Fertilizer Consumption
Units | 100 grams per hectare of harvested land
Reference Year | 1999
Source | FAOSTAT with CGSDI synthesis of data on harvested area
Methodology | The CSD Methodology Sheet observes environmental impacts caused by leaching and volatilization of fertilizer nutrients depend not only on the quantity applied, but also on the condition of the agro-ecosystem, cropping patterns, and on farm management practices. In addition, this indicator does not include organic fertilizer from manure and crop residues, or the application of fertilizers to grasslands. The indicator assumes even distribution of fertilizer on the land… A more relevant and sophisticated indicator would focus on nutrient balance to reflect both inputs and outputs associated with all agricultural practices. This would address the critical issue of surplus or deficiency of nutrients in the soil. This would need to be based on agro-ecological zones.

Such refinements require geographic information systems (GIS) that are very useful for subnational analyses yet rarely yield national indicators, the goal of the present exercise. While full discussion of “scale” problems is beyond this paper, what is relevant here is that distinct attributes, say of land, come into focus as scale (time and place) changes. Harmonizing information for decision-making on “nested” scales requires that indicators on each level consider attributes analyzed at others. As an example, without major changes in data collections, fertilizer consumption is here related to harvested rather than arable land as specified in the CSD Methodology Sheet.

A case can be made for this change independent of scale problems. In addition to harvested area, arable land covers fallow and grasslands for fodder, neither of which is usually fertilized. Harvested land is a denominator more relevant to the numerator. Aggregating harvested land is complicated by multi-cropping, which was only crudely introduced to the present exercise (arable land set the upper limit for estimates based on crop-level data on area harvested). But issues like greater need for fertilizer with multi-cropping (and for fallow land when fertilizer use is low) and the influence of crop choice on fertilizer demand (high for rice, low for potatoes, etc.) are at the heart of decision-making about sustainable fertilizer consumption. Such decisions require subnational analysis but defining national indicators like intensity of fertilizer use with an eye on multi-level decision-making increases their effectiveness.

Indicator | PESTUSE  
---|---
Indicator # | 271
Indicator Name | Use of Pesticides
Units | Kilogram per ha of cropland
Reference Year | Benchmark
Source | WRI Table AF.2 Agricultural Land and Inputs; Environmental Sustainability Index (ESI) via CIESIN
Methodology | The CSD Methodology Sheet notes pesticide supply-use data in metric tons are only available from international sources for selected countries and limited to the major types of pesticide. Some pesticide data are available for about 50-60 countries. The data are not regularly collected and reported, and not usually available on a sub-national basis. Hence, while compilation is analogous to fertilizer consumption in principle, in practice it requires
considerably more "tweezers" work. The RioJo Dashboard therefore did not attempt to go beyond spotty estimates of WRI and ESI.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
<th>Sub-Index</th>
<th>Indicator Name</th>
<th>Units</th>
<th>Reference Year</th>
<th>Source</th>
<th>Methodology</th>
</tr>
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<tbody>
<tr>
<td>Indicator</td>
<td>FORESTAR</td>
<td>Rio to Johannesburg Dashboard</td>
<td>Indicator #</td>
<td>272</td>
<td>Indicator Name</td>
<td>Forest Area</td>
<td>Units</td>
</tr>
<tr>
<td>Indicator</td>
<td>POPCOAST</td>
<td>Rio to Johannesburg Dashboard</td>
<td>Indicator #</td>
<td>273</td>
<td>Indicator Name</td>
<td>Population in Coastal Zones</td>
<td>Units</td>
</tr>
</tbody>
</table>
| Indicator | RENWAT     | Rio to Johannesburg Dashboard | Indicator # | 274   | Indicator Name | Use of Renewable Water Resources | Units | Consumption as a percent of potentially utilizable water resources | Reference Year | 2000 | Source | International Water Management Institute, Water for Rural Development (2001), World Water Demand and Supply (1998), and World water supply and demand (2000) World Resources Institute | Methodology | The CSD Methodology Sheet seeks the "total annual volume of ground and surface water
abstracted for water uses as a percentage of the total annually renewable volume of freshwater.” The denominator (renewable volume) is from hydrological models while the numerator (use) is from household surveys, censuses, etc. Unless a “water balance” model harmonizes the two, the ratio is often misleading. Such modeling is in its infancy and key parameters (e.g., national average use of water in irrigation) need further expert review. Indeed, International Water Management Institute PODIUM studies, which provide most data for this RioJo indicator, began to foster such review. However, early IWMI studies (see sources) "show to what extent freshwater resources are already used, and the need for adjusted supply and demand management policy,” the indicator goal in the CSD Methodology Sheet.

While WRI reports the specified denominator IWMI suggests a refinement, potentially utilizable water resources (PUWR), to exclude rainfall that cannot be stored with “technically, socially, environmentally, and economically feasible water development programs.” Ideally, both would be monitored over time to show natural changes in renewable volume (e.g., variable rainfall) and human-induced shifts in PUWR (as technology and price structures vary). In practice one must choose between two benchmarks. The RioJo Dashboard favors the refinement since IWMI shows it helps distinguish between physical and economic water scarcity, a key issue in management policy choices.

IWMI also refines WRI benchmarks on water use by sector to calibrate scenarios for policy responses to rising demand over time. IWMI first gave 1990 as its benchmark date but moved to 1995, always projecting results to 2025. The initial study gave country projections in two scenarios, business-as-usual or more efficient use of water for irrigation; further studies only the latter. First results were used for the RioJo Dashboard given its focus on 1990 and 2000, projecting 1990 to 2000 by business-as-usual growth. For countries only in recent studies (from the former USSR), 1995 estimates of water use were projected to 2000 and back to 1990 with their assumption of more efficient irrigation.
### Methodology
Where possible data refer to gross domestic investment, i.e., the sum of gross fixed capital formation and changes in inventories. For a number of countries, however, estimates of the latter are not available or relate only to changes in livestock and most changes in inventories are subsumed in residual estimates of private consumption.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CURACCT</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>277</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Current Account Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>IMF Balance of payments statistics and World Bank SIMA and WDI online</td>
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</tbody>
</table>

### Methodology
The CSD Methodology Sheet states, "The balance of trade in goods and services is defined in the 1993 SNA, and partly in the International Trade Statistics." In fact there are three types of data sources (foreign trade, balance of payments, and national accounts) that are reconciled conceptually but often yield quite different country measures. The slightly broader indicator from the balance of payments, current account balance (CAB) has been taken for the RioJo Dashboard for practical reasons, with gap filling from the other sources.

CAB covers current transfers as well as net exports of goods, services, and income. In theory the sum of CABs for all countries (plus supranational organizations) is zero; in practice it can be large and highly variable. The size of such unrecorded "net errors and omissions" suggests the margin of error in country-level CABs.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EXTDEBT</th>
<th>Collection</th>
<th>Rio to Johannesburg Dashboard</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>278</td>
<td>Sub-Index</td>
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</tr>
<tr>
<td>Indicator Name</td>
<td>External debt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage of GDP</td>
<td></td>
<td></td>
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<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
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</tr>
<tr>
<td>Source</td>
<td>World Bank SIMA and WDI online</td>
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<td></td>
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<tr>
<td>International Monitory Fund (IMF)</td>
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</table>

### Methodology
The principal sources of the information for the long-term external debt indicator are reports from member countries to the World Bank through the Debtor Reporting System (DRS). These countries have received either IBRD loans or IDA credits. A total of 137 individual countries report to the World Bank’s DRS. The RioJo Dashboard uses DRS data where available and relies on other sources for countries that are not IBRD/IDA borrowers. Where possible such additions are based on official reports of a nation's international investment position, preferably as reported in IMF Balance of Payments Statistics (BOPS). Failing that, government external debt data from the IMF’s International Financial Statistics have been used (with conversion to US dollars).

Exceptionally, US data are as reported in Federal Reserve Board's Flow of Funds report on rest of world holdings of US Government Securities. Since the US dollar is the world’s main reserve currency, the portion of such securities held abroad might change without any specific intention on the part of the US Government to borrow from or repay nonresidents. To
a lesser extent, the same can be said of other reserve currency countries (in Europe and Japan).

**Indicator** | AIDEXCH  | **Collection** | Rio to Johannesburg Dashboard  
**Indicator #** | 279  | **Sub-Index** |  
**Indicator Name** | Aid Given or received (% GNP)  
**Units** | Percentage of GDP  
**Reference Year** | 2000  
**Source** | World Bank Data Query for recipients, OECD reports for donors  
**Methodology** | Official development assistance and net official aid record the actual international transfer by the donor of financial resources or of goods or services valued at the cost to the donor, less any repayments of loan principal during the same period. Aid dependency ratios are computed using values in U.S. dollars converted at official exchange rates.

**Indicator** | DIRMAT  | **Collection** | Rio to Johannesburg Dashboard  
**Indicator #** | 280  | **Sub-Index** |  
**Indicator Name** | Direct material input  
**Units** | Percentage of GDP  
**Reference Year** | 1999  
**Source** | World Bank Genuine Saving, UNCTAD World exports and imports of minerals and metals  
**Methodology** | The CSD Methodology Sheet limits Intensity of material use to national consumption of metals and minerals in metric tons (divided by GDP). UNCTAD is lead agency for this indicator but its website does not offer data specified nor estimates of national consumption of some 20 commodities per unit of GDP mentioned in the Sheet. WRI and the Wuppertal Institute offer a suite of material use indicators with a metals and minerals subset but only for some OECD countries. The placeholder in the RioJo Dashboard refers to what they call direct material input (DMI), limited to key metals and minerals but calculable for most countries with defined, actionable imperfections discussed here.

DMI measures supply (domestic extractions + imports) = demand (national consumption + exports + net addition to stocks or NAS). DMI is easier to measure than consumption because data on NAS are sparse. International comparison of DMI entails double-counting trade in metals and minerals but this may be analytically preferable since it implies producer and consumer nations share benefits and costs of international trade in materials, which vary with the definition of extraction—with consequences for defining NAS.

WRI and Wuppertal Institute estimate “hidden flows” of ore “lifted” from the ground (extraction) that it is not profitable to refine at prevailing prices and refining costs (production). Ore extracted but not counted as production (including post-refinement residuals) accumulates; it may be called overburden to emphasize costs like acid producing potential, or tailings to emphasize benefits like profitability in richer tailings if prices for refinery products rise relative to refining costs. In practice all lifted ore enters NAS regardless of quality and the portion that can be refined profitably, regardless of when and where lifted, moves from NAS to refineries. Mining companies that lift and refine at the same site monitor the process from extraction to refinement and quantity and quality of tailings; lift-only sites monitor extraction and tailings; separate refineries monitor refined product and residuals. Most reporting simplifies the process by focusing on refinery output from domestic extraction +/- NAS.
Since refineries may process imported ore, their output is not solely from domestic extraction +/− NAS. Customs reports on exports and imports of metals and minerals don’t identify crude ore by whether it comes from current extraction or tailings and may commingle crude and semi-refined product. Again, reporting is usually simplified down to refined content with estimates for crude ore shipped. It is thus possible for exports to exceed extractions (drawing down tailings) or be a fraction of extractions even if crude ore is shipped and NAS is zero (if export quantity is estimated refined content while extractions refer to actual tonnage lifted). DMI is a more robust indicator than consumption of metals and minerals because it minimizes such accounting problems.

Even if the numerator properly accounted for metals and minerals in terms of refined content it would give a distorted view of the material intensity of economic activity. A country deriving most of its value added (GDP) from mining and exporting all it extracts would be shown as having low material intensity of GDP. This is as misleading as indicating low material intensity in countries that depend almost entirely on imported metals and minerals. The problem is failure to view GDP in terms of the P=I=E tautology. GDP in both countries of extraction and consumption depends on the same material flow although it is hard to trace in the latter since it involves intermediate consumption, netted out in calculating GDP. DMI is a more analytically useful indicator than consumption of metals and minerals because it is equally meaningful in countries of extraction and consumption.

While the CSD Methodology Sheet seeks a measure whose numerator is in physical terms, practical and analytic reasons led to use of a value measure in the RioJo Dashboard. On the practical side differences between volume and weight measures can be significant; UNCTAD’s online reports on trade in metals and minerals are only in value terms. And since the denominator is in money terms, there is a gain in analytic clarity from expressing the

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**Indicator** | COMENERGY  
**Indicator #** | 281  
**Indicator Name** | Commercial Energy Use  
**Units** | Kilogram of oil equivalent per capita  
**Reference Year** | 2000  
**Source** | US DOE Energy Information Administration  
**Methodology** | Commercial energy use refers to apparent consumption, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transportation.

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**Indicator** | ENRGYINT  
**Indicator #** | 282  
**Indicator Name** | Energy Intensity of GDP  
**Units** | Kilogram of oil equivalent per dollar of GDP.  
**Reference Year** | circa 2000  
**Source** | US DOE Energy Information Administration  
**Methodology** | GDP per unit of energy use is the U.S. dollar estimate of real GDP (at 1995 prices) per kilogram of oil equivalent of commercial energy use. Commercial energy use refers to apparent consumption, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transportation.
**Indicator**  SOLWAST  **Collection**  Rio to Johannesburg Dashboard

**Indicator #**  283  **Sub-Index**

**Indicator Name**  Adequate solid waste disposal

**Units**  Percent of total waste disposal

**Reference Year**  1998

**Source**  UN-Habitat database, http://www.unhabitat.org/guo/gui/index.html

**Methodology**  While the CSD Thematic Framework calls for a measure of municipal and industrial waste, the lead agency for this indicator (UN-Habitat) only reports city-level data on percent distribution of municipal waste disposal by process. The RioJo Dashboard distils these into (unweighted) averages for a country’s reporting cities of forms considered adequate (recycling, sanitary landfill, and incineration) for this exercise; open dumps, open burning, and other disposal are inadequate forms.

UN-Habitat reports refer to two surveys (1993, 1998) presented as 1990 and 2000, respectively, in the RioJo Dashboard. Hence, trends between the two surveys refer at best to half the intended time. If a country surveyed some city in 1993 but not 1998, RioJo Dashboard’s standard for use of carry-forward means it shows the single (1993) report as both 1990 and 2000. Cell-level comments flag where only one or two cities participated in the surveys and simple use of this carry-forward standard.

Where surveys cover different cities in 1993 and 1998, a more complex carry-forward is required to minimize noise in inter-temporal comparisons. Assuming differences are greater across surveyed cities than over time, the pool of cities for a country is gap-filled by carrying back 1998 estimates as well as carrying 1993 cities forward. Conceptually, country results should be population-weighted averages of city surveys. However, this presumes survey respondents are a representative sample of a country’s cities while a cursory review suggests surveys are skewed toward most populous cities. Use of an unweighted average of respondents minimizes this bias by assigning greater relative weight to less populous cities.

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**Indicator**  HAZWAST  **Collection**  Rio to Johannesburg Dashboard

**Indicator #**  284  **Sub-Index**

**Indicator Name**  Hazardous waste generate

**Units**  Grams per US$ GDP

**Reference Year**  Most recent estimate


**Methodology**  The CSD Methodology Sheet identifies the Secretariat to the Basel Convention as lead agency and specifies presentation either in tonnes or tonnes per unit of GDP. Online reports by the Secretariat, in metric tons, are expressed in grams per US$ of GNP as estimated for this exercise, where available. In a few cases, flagged by pop-up notes in the Dashboard, the numerator is from 1998 reports to the Secretariat and refers to hazardous and other waste; or from UNDP reports which may also refer to this broader category. Available data referring to 1990 are too sparse to report.
Indicator: WASTREC
Collection: Rio to Johannesburg Dashboard

Indicator #: 285
Sub-Index

Indicator Name: Waste Recycling as a Percentage of Waste Disposal

Units: Percentage of total waste disposal

Reference Year: 1998


Methodology:
While the CSD Thematic Framework calls for a measure of municipal and industrial waste, the lead agency for this indicator (UN-Habitat) only reports city-level data on percent distribution of municipal waste disposal by process. The RioJo Dashboard distils these into (unweighted) averages for a country’s reporting cities of forms considered adequate (recycling, sanitary landfill, and incineration) for this exercise; open dumps, open burning, and “other” disposal are inadequate forms.

UN-Habitat reports refer to two surveys (1993, 1998) presented as 1990 and 2000, respectively, in the RioJo Dashboard. Hence, trends between the two surveys refer at best to half the intended time. If a country surveyed some cities in 1993 but not 1998, RioJo Dashboard’s standard for use of carry-forward means it shows the single (1993) report as both 1990 and 2000. Cell-level comments flag where only one or two cities participated in the surveys and simple use of this carry-forward standard.

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Indicator: INTERNT
Collection: Rio to Johannesburg Dashboard

Indicator #: 286
Sub-Index

Indicator Name: Internet Subscribers per 1000 Inhabitants

Units: Number of hosts per 1000 Inhabitants

Reference Year: 2001

Source: International Telecommunication Union, World Telecommunication Development Report, early years reported via WB SIMA

Methodology:
Given the newness of the Internet and its explosive growth in recent years, the time periods considered here have been adjusted relative to the conventions used elsewhere in the RioJo Dashboard. In 1990, the Internet was used almost entirely by scientists in a few countries. For the present exercise, 1990 refers to the earliest user estimate, up to 1994. For countries that only begin reporting after 1994, Internet usage was almost certainly negligible in those early years and is shown as zero. To reflect the dramatic rise in Internet usage in many developing countries in the very recent past, ITU data for 2001 are shown as 2000 in this exercise (falling back on 2000 or 1999 data in a few cases).
**Indicator**  MPHONE  **Collection**  Rio to Johannesburg Dashboard

**Indicator #**  287  **Sub-Index**

**Indicator Name**  Main Phone Lines  **Units**  Number of mainlines per 1000 population

**Reference Year**  2001  **Source**  International Telecommunication Union, World Telecommunication Development Report, reported via WB SIMA.

**Methodology**  Number of telephone exchange mainlines per 1000 persons. A telephone mainline connects the subscriber’s equipment to the switched network and has a dedicated port in the telephone exchange. Note that for most countries, main lines also include public payphones.

**Indicator**  RDEXP  **Collection**  Rio to Johannesburg Dashboard

**Indicator #**  288  **Sub-Index**

**Indicator Name**  Research and Development Expenditures  **Units**  Percentage of GNP

**Reference Year**  1997  **Source**  UNESCO UIS

World Bank SIMA and WDI online

**Methodology**  Expenditures on any creative, systematic activity undertaken to increase the stock of knowledge (including knowledge of people, culture and society) and the use of this knowledge to devise new applications. Included are fundamental research, applied research, and experimental development work leading to new devices, products, or processes. Total expenditures for R&D comprise current expenditure, including overhead, and capital expenditure.

---

**Collection 5: Wellbeing of Nations**

**Indicator**  WI  **Collection**  Wellbeing of Nations

**Indicator #**  289  **Sub-Index**

**Indicator Name**  Wellbeing Index  **Units**  The WI is the average of HWI and EWI (0 is the worst possible score and 100 is the best)


**Methodology**  The Wellbeing Index combines the HWI and EWI reflects a community’s readiness to achieve sustainability, measuring a combination that allows the least environmental costs in exchange
for a high quality of life for human lives.

The data identifies three integral components that contribute to a high WI score: freedom, sound governance and education.

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0%</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>3%</td>
<td>Fair</td>
</tr>
<tr>
<td>86</td>
<td>48%</td>
<td>Medium</td>
</tr>
<tr>
<td>89</td>
<td>49%</td>
<td>Poor</td>
</tr>
<tr>
<td>0</td>
<td>0%</td>
<td>Bad</td>
</tr>
</tbody>
</table>

Details:

The Wellbeing Index (WI) is the average of HWI and EWI (HWI+EWI / 2)

The Human Wellbeing Index (HWI) is the lower of the HWI including equity (HWI + equity) and the HWI excluding equity (HWI - equity). The former is the unweighted average of indices of health and population, wealth, knowledge, community, and equity. The latter is the unweighted average of indices of health and population, wealth, knowledge, and community. Taking the lower version of the HWI prevents equity from offsetting poor performance in the other human dimensions.

The Ecosystem Wellbeing Index (EWI) is the lower of the EWI including resource use (EWI + RU) and the EWI excluding resource use (EWI - RU). The former is the unweighted average of indices of land, water, air, species and genes, and resource use. The latter is the unweighted average of indices of land, water, air, and species and genes. Taking the lower version of the EWI prevents resource use (a set of indicators of human pressure on the ecosystem) from offsetting poor performance in the other ecosystem dimensions (primarily sets of indicators of the state of the ecosystem).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>HWI</th>
<th>Collection</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>290</td>
<td>WELLBEING</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Human Wellbeing Index</td>
<td>Wellbeing of Nations</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Composite Index (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Human Wellbeing Index (HWI) is the average of indices of health and population, wealth, knowledge, community, and equity or average of indices of health and population, wealth knowledge, and community, whichever is lower. The resulting HWI measures the success level of the intended goals to a higher level of human well-being (with respect to the topics mentioned above).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Good</td>
<td>(2%)</td>
</tr>
<tr>
<td>34</td>
<td>Fair</td>
<td>(19%)</td>
</tr>
<tr>
<td>52</td>
<td>Medium</td>
<td>(29%)</td>
</tr>
<tr>
<td>51</td>
<td>Poor</td>
<td>(28%)</td>
</tr>
<tr>
<td>40</td>
<td>Bad</td>
<td>(22%)</td>
</tr>
</tbody>
</table>
The gap between the best and worst off countries is enormous:

The median HWI of the highest 10% scoring countries is almost eight times that of the bottom 10%.

Details:

The Human Wellbeing Index (HWI) is the lower of the HWI including equity (HWI + equity) and the HWI excluding equity (HWI - equity). The former is the unweighted average of indices of health and population, wealth, knowledge, community, and equity. The latter is the unweighted average of indices of health and population, wealth, knowledge, and community. Taking the lower version of the HWI prevents equity from offsetting poor performance in the other human dimensions.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EWI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>291</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Ecosystem Wellbeing Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Score between 0 and 100, which is taken from the lower of two scores. 1. EWI, including resource use. 2. and the EWI, excluding resource use. (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Ecosystem Wellbeing Index (EWI) is the average of the following indices: land, water, species and genes, and resource use, or average of indices of land, water, air, and species and genes, whichever is lower. A good Ecosystem Wellbeing is a position where the ecosystem maintains its diversity and quality, in which the country is able to support humans and other life forms, including its capacity to change and provide opportunities for adaptability, as it becomes necessary. The EWI measures a state's tension on a wider scope of the ecosystem - inclusive of its effects on natural life outside the country's borders.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of country performance:

Countries that measure a poor or bad EWI make up almost half of the world's land and inland water surfaces (at 48.4%). Countries scoring a medium rank for EWI amount to 43%. Only 8.6% of the countries received a fair score.

Details:

The Ecosystem Wellbeing Index (EWI) is the lower of the EWI including resource use (EWI + RU) and the EWI excluding resource use (EWI - RU). The former is the unweighted average of indices of land, water, air, species and genes, and resource use. The latter is the unweighted average of indices of land, water, air, and species and genes. Taking the lower version of the EWI prevents resource use (a set of indicators of human pressure on the ecosystem) from offsetting poor performance in the other ecosystem dimensions (primarily sets of indicators of the state of the ecosystem).
**Indicator**: DALE  
**Collection**: Wellbeing of Nations

**Indicator #**: 292  
**Sub-Index**

**Indicator Name**: Disability-adjusted life expectancy at birth  
**Units**: The life expectancy at birth minus the number of years that the new-born child could expect to live with various degrees of disability

**Reference Year**: 2000


**Original Sources**:

**Methodology**
Disability-adjusted life expectancy at birth (DALE) is an indicator of a long and healthy life but until recently was compiled in only a few countries. In 2000, the World Health Organization adopted DALE as its sole indicator of the overall health of a population, and published estimates of DALE for 191 countries (Mathers et al. 2000; World Health Organization 2000). Life expectancy at birth is the average number of years that a child born in a given year could expect to live. It is calculated from the death rates of specific age groups commonly 0-1, 1-5, and then 5-year groups for ages above 5. It reflects all the causes of death (including vehicle and other travel accidents, murders and suicides), and the death rates from those causes, that a typical person would be exposed to as she or he passes through each age group.

DALE is life expectancy at birth minus the number of years that the new-born child could expect to live with various degrees of disability. It incorporates the likely incidence, duration and severity of disability. Disability includes a wide range of diseases and injuries, including neuro-psychiatric disorders. As such DALE is an excellent indicator of overall health, the healthfulness of living conditions, and the availability and effectiveness of health services. Nevertheless, it is subject to large uncertainties (actual DALE may be several years higher or lower than estimated DALE). Uncertainty ranges for each country are given in Mathers et al. (2000) and World Health Organization (2000).

---

**Indicator**: HEALTH  
**Collection**: Wellbeing of Nations

**Indicator #**: 293  
**Sub-Index**

**Indicator Name**: The Health Index  
**Units**: The standardized score for disability adjusted life expectancy (DALE). The lowest DALE is 24 years and the highest is 79 years.

**Reference Year**: 2001


**Original Sources**:
- International Conference on Population and Development (Cairo, 1994) and the World Summit for Social Development (Copenhagen, 1995)
Methodology

The Health Index (HEALTH) examines the life expectancy, given the year of birth, in comparison to others born at that time. The life expectancy is calculated with adjustments for any time lost to disease and injury.

Summary of country performance:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Good</td>
<td>15%</td>
</tr>
<tr>
<td>32</td>
<td>Fair</td>
<td>18%</td>
</tr>
<tr>
<td>59</td>
<td>Medium</td>
<td>33%</td>
</tr>
<tr>
<td>31</td>
<td>Poor</td>
<td>17%</td>
</tr>
<tr>
<td>31</td>
<td>Bad</td>
<td>17%</td>
</tr>
</tbody>
</table>

The average life expectancy age for the entire planet rose by six years in twenty years, at 64.5 years of age (Data taken from Year 1999).

Details:

Health Index (Health) is the score for healthy life expectancy. They are derived from performance criteria for life expectancy at birth unadjusted for disability. The base of the scale (24 years) and the top point of the good band (79 years) encompass the current range of healthy life expectancy (from 25.8 years for males in Sierra Leone to 77.2 years for females in Japan), and are six years below the corresponding points for unadjusted life expectancy (for which the range is from 33.2 years for males in Sierra Leone to 80.9 years for females in Japan).

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>POP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>294</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Population Index</td>
</tr>
<tr>
<td>Units</td>
<td>Composite Index (theoretical range from 0-100, with 100 representing the highest score). The score is based on the total fertility rate, or average number of children per woman. The highest fertility rate score is 1.2 and the lowest is 8.2.</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000 estimate</td>
</tr>
</tbody>
</table>
Population Index (POP) is represented by a single indicator: the total fertility rate (the average number of children born alive by a woman in her lifetime) derived from age-specific fertility rates (or sometimes surveys) (United Nations 1996, United Nations Population Division 1998a).

Summary of country performance:

<table>
<thead>
<tr>
<th>Quality</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>60</td>
<td>33%</td>
</tr>
<tr>
<td>Fair</td>
<td>16</td>
<td>9%</td>
</tr>
<tr>
<td>Medium</td>
<td>27</td>
<td>15%</td>
</tr>
<tr>
<td>Poor</td>
<td>35</td>
<td>19%</td>
</tr>
<tr>
<td>Bad</td>
<td>42</td>
<td>23%</td>
</tr>
</tbody>
</table>

Indicator: Health and Population Index (H&P)

Units: The lower score between the Health and Population Index (theoretical range from 0-100, with 100 representing the highest score)

Reference Year: 2001


Methodology: When comparing the HEALTH and POP Indices, it is understood that a sustainable society makes allowances so that the physical/health/economic environment is appropriate to live a long life in good health.

Because both HEALTH and POP indicate the sustainability of a society within its environment, we must take the lower of the two indices to measure HEALTH and POP. While a long life is treasured because of an implication of good health and more time to live, a longer life also gives us access to more opportunity, the stressors of overpopulation result in imbalanced consumption and therefore, a negative burden on the environment.

Summary of country performance:

<table>
<thead>
<tr>
<th>Quality</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>26</td>
<td>14%</td>
</tr>
<tr>
<td>Fair</td>
<td>22</td>
<td>12%</td>
</tr>
<tr>
<td>Medium</td>
<td>49</td>
<td>27%</td>
</tr>
<tr>
<td>Poor</td>
<td>34</td>
<td>19%</td>
</tr>
<tr>
<td>Bad</td>
<td>49</td>
<td>27%</td>
</tr>
</tbody>
</table>

Details: The Health and Population Index (H&P) is the lower of a health index (HEALTH) and a
population index (POP). The lower score was chosen to avoid a high score for population offsetting a low score for health, and vice versa.

**Indicator** LOWFOOD  
**Collection** Wellbeing of Nations

**Indicator #** 296  
**Sub-Index**

**Indicator Name** Percentage of the population with insufficient food  
**Units** percentage  
**Reference Year** 1995-1997  

Original Sources:


**Methodology** LOWFOOD is the percentage of the population with insufficient food. Insufficient food means food consumption below minimum energy requirement. Data are for 1995-1997 and are from FAO (1999b). They were estimated from food supply data (derived from production and trade data) and household surveys (FAO 1996a).

**Indicator** STUNT  
**Collection** Wellbeing of Nations

**Indicator #** 297  
**Sub-Index**

**Indicator Name** Prevalence of Stunted Children  
**Units** percentage  
**Reference Year** mid-1990s  

Original Sources:


**Methodology** STUNT is the prevalence of stunting [percentage] of children under five years with low height-for-age. The World Health Organization (WHO) regards height-for-age as the best
indicator for monitoring child growth, because it measures cumulative deficient growth associated with long term factors, including chronic insufficient daily food intake, frequent infection, and poor feeding practices (Visschedijk & Siméant 1998; World Health Organization

<table>
<thead>
<tr>
<th>Indicator</th>
<th>UNDERWT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>298</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Under Weight Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>mid-1990s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Under Weight Percentage (UNDERWT) is the prevalence of low weight-for-age in children under five years.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note to the original table: Data are for the latest year available and are from Onis &amp; Blössner (1997), if indicated by the letter h, or UNICEF (1999b), if indicated by the letter c. Data are for the latest year in the period 1990-1997 and are from UNICEF (1999b), if indicated by the letter c, or World Health Organization (1996-1998a), if indicated by the latter h. A score with an asterisk (*) has been reduced in accordance with the insufficient data.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LOWBWT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>299</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Low Birth Weight Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>mid-1990s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Methodology | Low Birth Weight Percentage (LOWBWT) is the percentage of babies whose birth weight is
less than 2500 grams, as a percentage of babies born alive.

Note to the original table: Data are for the latest year available and are from Onis & Blössner (1997), if indicated by the letter h, or UNICEF (1999b), if indicated by the letter c. Data are for the latest year in the period 1990-1997 and are from UNICEF (1999b), if indicated by the letter c, or World Health Organization (1996-1998a), if indicated by the latter h. A score with an asterisk (*) has been reduced in accordance with the insufficient data.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FOODSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>300</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Food Sufficiency Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>mid-1990s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Fourth World Conference on Women (Beijing, 1995)


Second World Conference on Human Settlements (Habitat II, Istanbul, 1996)


World Summit for Social Development (Copenhagen, 1995)

Methodology

FOODSC is the food sufficiency score. The performance criteria for the food indicators are shown in Table 3a of the report (p. 161). For stunting, the top of the medium band corresponds to the WHO target of less than 20% in all countries by 2010 (World Health Organization 1998b;
For low weight-for-age children and low birth-weight babies, the top of the fair band corresponds to the general target of WHO’s General Strategy for Health of no more than 10% (United Nations 1996). The criteria for percentage of the population with insufficient food match those for the other food indicators.

Note to the original table:

Data are for the latest year available and are from Onis & Blössner (1997), if indicated by the letter h, or UNICEF (1999b), if indicated by the letter c.

Data are for the latest year in the period 1990-1997 and are from UNICEF (1999b), if indicated by the letter c, or World Health Organization (1996-1998a), if indicated by the latter h.

A score with an asterisk (*) has been reduced in accordance with the insufficient data.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>NEEDSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>301</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Needs Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>The lower of two scores: Food Sufficiency and Basic Services Score (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Need Score (NEEDSC) is the lower of the food sufficiency and basic services scores.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ECONSZSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>302</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Size of the Economy Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Size score = size of economy score, based on GDP/person, in current international purchasing power parity dollars (or, exceptionally, in current US dollar).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DEBTSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>303</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Debt Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best) representing the lower of the external debt and public debt scores.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Debt Score = the lower of the external debt and public debt scores. The external debt score is the lowest score of present value of external debt service as a % of exports of goods and services, or present value of external debt service as a % of GNP, or the ratio of short-term debt to international reserves. The public debt score is the weighted average [weights in brackets] of the scores for gross public debt as % of GDP [2] and annual central government deficit/surplus as % of GDP [1].

The performance criteria are shown in Table 4a of the original table (p. 165). For the two debt service indicators, the tops of bad and poor match the points at which the World Bank classifies a country as severely and moderately indebted respectively (World Bank 2000b). For the ratio of short-term debt to international reserves, the top of medium is the benchmark suggested by IMF Policy Development and Review Department (2000) for the reverse indicator—the ratio of international reserves to short-term debt. The benchmark is less applicable to economies (such as those of industrialized countries), in which much of the private sector has unrestricted access to international capital markets, and which typically have ratios that would qualify as poor or bad according to these criteria. In less open or well regulated markets, the benchmark (a ratio of 1.0) matches the point above which a country is vulnerable to creditor panic, according to Sachs & Woo (1999). For the public debt and deficit indicators, the top of medium matches the Treaty of Maastricht’s criteria of no more than 60% for an acceptable ratio of government debt to GDP and no more than 3% for an acceptable budget deficit (Black 1997).
**Indicator Name** National Wealth Index Score

**Units** Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year** 2001


**Methodology** National Wealth Index Score = the average of three weighted indicators: Size of the economy (Size score), inflation and unemployment score (IU score), and debt (Debt score).

Size of the economy represented by Gross Domestic Product (GDP) per person, inflation and unemployment represented by the annual inflation rate or the annual unemployment rate for the same period (whichever gives the lower score), and debt score, represented by an external debt indicator or a public debt indicator (whichever gives the lower score)

---

**Indicator Name** Education Score

**Units** Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year** 2001


Original sources:


**Methodology** Education Score is the average of two unweighted indicators: primary and secondary school enrollment, the unweighted average score of the net primary school enrollment rate, the net secondary enrollment rate, and tertiary school enrollment per 10,000 population.

---

**Indicator Name** Communication Score

**Units** Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year** late 1990s


Original Sources:

**Methodology**

Communication Score is the average score of two unweighted indicators: a telephone indicator, represented by the lower score of main telephone lines and cellular phone subscribers per 100 persons, fault per 100 main telephone lines per year, and internet users.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>KI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>307</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Knowledge Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

Knowledge Index = is the average of two weighted indicators: an education score (ESC) and a communication score (CSC). Education has a higher weight than communication because the quality of communication depends on education.

**Methodology**

Freedom and Governance Score is the average of four unweighted indicators: political rights rating (PRR), civil liberties rating (CLR), press freedom rating (PFR), and corruption perceptions index (CPI).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FGSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>308</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Freedom and Governance Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


The PFR and CPI overlap with the CLR, which includes press freedom and corruption. However, all four indicators are used because each has its own strengths. The PRR and CLR together cover almost all aspects of human rights and freedoms, but the basis of each rating is not disclosed. The PFR and CPI cover only one aspect each, but the basis of each rating is fully described.

**Indicator** POSC
**Collection** Wellbeing of Nations
**Indicator #** 309
**Indicator Name** Peace and Order Score
**Units** Unitless scale (0 is the worst possible score and 100 is the best)
**Reference Year** 2001

Original Sources:

**Methodology** Peace and Order Score is the average of two unweighted indicators: peace, represented by deaths from armed conflicts per year or military expenditure as a percentage of Gross Domestic Product, whichever gives the lower score, and crime, represented by the unweighted average of the homicide rate and other violent crimes.

**Indicator** CI
**Collection** Wellbeing of Nations
**Indicator #** 310
**Indicator Name** Community Index
**Units** Unitless scale (0 is the worst possible score and 100 is the best)
**Reference Year** 2001

Original Sources:
Methodology

Community Index is the lower of a freedom and governance score and a peace and order score. See Freedom and Governance Score and Peace and Order Score.

Indicator | CRMSC | Collection | Wellbeing of Nations
Indicator # | 311 | Sub-Index
Indicator Name | Crime Score | Units | Unitless scale (0 is the worst possible score and 100 is the best)

Original Sources:

Methodology

Crime Score is the average of two unweighted indicators: homicide rate and other violent crimes. The unweighted average of scores for the rape rate, robbery rate, and assault rate. Homicides are distinguished from other violent crimes because they are more serious and are reported less inconsistently. Homicides include intentional homicides (murder) and unintentional homicides (manslaughter, except as a result of traffic accidents). Rape is sexual intercourse without valid consent. Robbery is the use of force or the threat of force to steal property. Assault is physical attack against the body of another person, other than rape or robbery.

All data are from United Nations Crime Prevention and Criminal Justice Division (1997 & 1999), except for Canada, which are from Canadian Centre for Justice Statistics (1999), and the United States which are from Federal Bureau of Investigation (1999). Rates are per 100,000 population.

Indicator | HESC | Collection | Wellbeing of Nations
Indicator # | 312 | Sub-Index
Indicator Name | Household Equity Score | Units | Unitless scale (0 is the worst possible score and 100 is the best)
Reference Year | 2001
Household Equity Score consists of a single indicator: the ratio of the richest 20%’s income share to the poorest 20%.

**Indicator**
- **GESC**
- **Sub-Index**
- **Wellbeing of Nations**

**Indicator #**
- 313

**Indicator Name**
- Gender Equity Score

**Units**
- Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year**
- 2001

**Source**

Original Resources:

**Methodology**
- Gender Equity Score is the average of three unweighted indicators: gender and wealth, represented by the ratio of male income to female income, gender and knowledge, represented by the average difference between the male and female school enrollment rates, and gender and community, represented by the percentage of women in the national parliament.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>EI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>314</td>
<td>Sub-Index</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Equity Index</td>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
</tr>
<tr>
<td>Methodology</td>
<td>Equity Index is the unweighted average of a household equity score (HESC) and a gender equity score (GESC).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LANDDSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>315</td>
<td>Sub-Index</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Land Diversity Score</td>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
</tr>
<tr>
<td>Methodology</td>
<td>Land Diversity Score is the average of two weighted indicators: land modification and conversion and land protection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>LANDQSC</td>
<td>Collection</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Indicator #</td>
<td>316</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Land Quality Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Methodology

Land Quality Score consists of one indicator: the area of degraded land as a percentage of the area of cultivated and modified land, weighted according to severity of degradation.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>317</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Land Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


OECD Centre for Co-operation with the Economies in Transition. 1996. Environmental
Methodology

Land Index is the lower of a land diversity score and a land quality score.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WWSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>318</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Water Withdrawl Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Food and Agriculture Organization of the United Nations, Rome.


Food and Agriculture Organization of the United Nations, Rome.


Food and Agriculture Organization of the United Nations (FAO). 1997d. Irrigation potential in

Food and Agriculture Organization of the United Nations (FAO). 1998a


**Methodology**

Water Withdrawal Score = annual withdrawals of ground and surface water for domestic, agricultural, and industrial uses, in cubic kilometers per year (km\(^3\)/y)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WQSC</th>
<th><strong>Collection</strong></th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>319</td>
<td><strong>Sub-Index</strong></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Water Quality Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Food and Agriculture Organization of the United Nations (FAO). 1995a. Irrigation in Africa in
Methodology

Water Quality Score is the average of drainage basins in each country. Each basin score is the lowest score of six indicators: oxygen balance, nutrients, acidification, suspended solids, microbial pollution, and arsenic and heavy metals.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>IWI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>320</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Inland Water Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Food and Agriculture Organization of the United Nations, Rome.


Food and Agriculture Organization of the United Nations, Rome.


Food and Agriculture Organization of the United Nations (FAO). 1998a


Methodology

Inland Water Index or IWI is the lowest of three sub-elements: inland water diversity, water withdrawal, and inland water quality.

Summary of country performance:

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Fair</td>
<td>26%</td>
</tr>
<tr>
<td>42</td>
<td>Medium</td>
<td>23%</td>
</tr>
<tr>
<td>32</td>
<td>Poor</td>
<td>18%</td>
</tr>
<tr>
<td>52</td>
<td>Bad</td>
<td>29%</td>
</tr>
<tr>
<td>8</td>
<td>No Data</td>
<td>4%</td>
</tr>
</tbody>
</table>

Details:

The objective is the measure of success for "all major aquatic ecosystems maintained or restored in large units with minimal loss of the communities and habitats within them and minimal stress from pollution and water uses."

Inland water diversity is represented by river conversion by dams, measured by dam capacity as % of total water supply or, if unavailable, river flow dammed for hydropower as a percentage of dammable flow. Hydropower includes large (more than 10 megawatts) and small (under 10 megawatts) schemes.
Methodology

Global Atmosphere Score (GASC) is the lower of two indicators: greenhouse gases, represented by carbon dioxide emissions per person and use - production or consumption, whichever is higher - of ozone depleting substances per person.

<table>
<thead>
<tr>
<th>Summary:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Good</td>
</tr>
<tr>
<td>43</td>
<td>Fair</td>
</tr>
<tr>
<td>30</td>
<td>Medium</td>
</tr>
<tr>
<td>34</td>
<td>Poor</td>
</tr>
<tr>
<td>26</td>
<td>Bad</td>
</tr>
<tr>
<td>1</td>
<td>No Data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LASC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>322</td>
<td><strong>Sub-Index</strong></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Local Air Quality Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Methodology

Local Air Quality Score is the average of city scores in each country, each city score being the lowest score of six indicators: sulfure dioxide, nitrogen dioxide, ground-level ozone, carbon monoxide, particulates, and lead.

Summary:

<table>
<thead>
<tr>
<th>Score</th>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Good</td>
<td>0%</td>
</tr>
<tr>
<td>12</td>
<td>Fair</td>
<td>7%</td>
</tr>
<tr>
<td>27</td>
<td>Medium</td>
<td>15%</td>
</tr>
<tr>
<td>12</td>
<td>Poor</td>
<td>7%</td>
</tr>
<tr>
<td>2</td>
<td>Bad</td>
<td>1%</td>
</tr>
<tr>
<td>127</td>
<td>No Data</td>
<td>71%</td>
</tr>
</tbody>
</table>

Details:

Particulates are "tiny solid or liquid that damage health and reduce visibility."

"All six pollutants listed above, are hazards to health. The main source of contaminants in the measurements is road transport. The fair scores should be treated cautiously since none reflects measurement of all six pollutants in a representative sample of cities."

Note that although the measurement of local air quality is very important, the above statistics demonstrate that the is an alarmingly large percentage of countries that do not have data, or it is insufficient for measurements.

We have included this indicator to bring attention to the gross lack of data on a key component of the ecosystem's wellbeing.

Indicator | AI | Collection | Wellbeing of Nations
Indicator # | 323 | Sub-Index
Indicator Name | Air Index
Units | Unitless scale (0 is the worst possible score and 100 is the best)
Reference Year | 2001

Original Sources:


Methodology

Air Index is the lower of a global atmosphere score and a local air quality score.

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Performance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Good</td>
<td>0%</td>
</tr>
<tr>
<td>82</td>
<td>Fair</td>
<td>46%</td>
</tr>
<tr>
<td>27</td>
<td>Medium</td>
<td>15%</td>
</tr>
<tr>
<td>42</td>
<td>Poor</td>
<td>23%</td>
</tr>
<tr>
<td>28</td>
<td>Bad</td>
<td>16%</td>
</tr>
<tr>
<td>1</td>
<td>No Data</td>
<td>1%</td>
</tr>
</tbody>
</table>

Details:

Due to a "lack of data on local air quality all of the countries with a ‘Fair’ air index and 15 with a ‘Medium’ index were assessed on global atmosphere alone."

Indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WDSC</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>324</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Wild Diversity Score</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Methodology

Wild Diversity Score is the average of two unweighted indicators: threatened wild plant species in a group as percentage of total wild plant species in that group and threatened wild animal species in a group as percentage of total wild animal species in that group.

Summary

<table>
<thead>
<tr>
<th>Score</th>
<th>Performance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Good</td>
<td>0%</td>
</tr>
<tr>
<td>28</td>
<td>Medium</td>
<td>16%</td>
</tr>
<tr>
<td>77</td>
<td>Fair</td>
<td>43%</td>
</tr>
<tr>
<td>55</td>
<td>Poor</td>
<td>31%</td>
</tr>
<tr>
<td>20</td>
<td>Bad</td>
<td>11%</td>
</tr>
</tbody>
</table>
The objective or high score in the WDSC is the maintenance of all native wild species and reduction of extinctions to background rates.

Wild diversity has a higher weight because it is measured in terms of species, the extinction of which represents a greater genetic loss than the extinction of breeds and varieties, the measurement units for domesticated diversity.

---

**Indicator** DDSC  
**Collection** Wellbeing of Nations

**Indicator #** 325  
**Sub-Index**

**Indicator Name** Domesticated Diversity Score

**Units** Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year** 2001


Original Sources:


**Methodology**

Domesticated Diversity Score is the average of two unweighted indicators: breed diversity, represented by the number of not at risk breeds per million head of a species and threatened breeds, represented by the ratio of threatened to not at risk breeds of a species.

Details:

A high score indicates the "maintenance of as much as possible of the heritage of livestock breeds."

---

**Indicator** SGI  
**Collection** Wellbeing of Nations

**Indicator #** 326  
**Sub-Index**

**Indicator Name** Species and Genes Index

**Units** Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year** 2001


Original Sources:

Guveya, Emmanuel, Freddie Kachote & Misael Kokwe. 1999. A wellbeing assessment of


**Methodology**

Species and Genes Index, or SGI is the weighted average of a wild diversity score and a domesticated diversity score.

**Summary of country performance:**

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Good</td>
<td>0%</td>
</tr>
<tr>
<td>19</td>
<td>Fair</td>
<td>11%</td>
</tr>
<tr>
<td>89</td>
<td>Medium</td>
<td>49%</td>
</tr>
<tr>
<td>60</td>
<td>Poor</td>
<td>33%</td>
</tr>
<tr>
<td>12</td>
<td>Bad</td>
<td>7%</td>
</tr>
</tbody>
</table>

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EMSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>327</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Energy Materials Score</td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
</tr>
</tbody>
</table>

Original Sources:


**Methodology**

Energy and Materials Score is the lower score of two indicators: energy consumption per

192
Hectare of total area and energy consumption per person. The energy and materials index is limited to an energy index because of a lack of data on consumption of materials and waste generation.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RSSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>328</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Resources and Sectors Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Methodology

Resource and Sectors Score is the unweighted average of three sub-elements: agriculture, fisheries, and timber.

Timber is represented by a single indicator: fellings + imports as a percentage of net annual increment; or, if that is not available, production + imports as a percentage of volume.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RUI</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>329</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Resources Use Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Original Sources:


Methodology

Resource Use Index is the unweighted average of the energy and materials score and the resource sectors score.

Energy and Materials Score is the lower score of two indicators: energy consumption per hectare of total area and energy consumption per person.

Resource and Sectors Score is the unweighted average of three sub-elements: agriculture, fisheries, and timber.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MODTOT</th>
<th>Collection</th>
<th>Sub-Index</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>330</td>
<td>Indicator Name</td>
<td>Total Modified Land</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>1000s of hectares</td>
<td>Reference Year</td>
<td>mid-1990s</td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


Methodology

Modified land is land "that is moderately to heavily human-influenced, but not cultivated or built. Uncultivated permanent pasture is counted as modified. Otherwise this category is a residual obtained as follows: total land - natural land - cultivated land - built land = modified land."

"The proportions of the land that are converted, modified, and natural reveal the scale and rate of a society's overall impact on the ecosystem, both within and beyond its borders."

Indicator | MODPCT | Collection | Wellbeing of Nations
---|---|---|---
Indicator # | 331 | Sub-Index
Indicator Name | Percentage of Modified Land
Units | Percentage
Reference Year | mid-1990s

Original Sources:


MODPCT is the percentage of land that is modified in relation to the subtotal that is natural, cultivated, and built land.

**Indicator**
- **Indicator #**: 332
- **Indicator Name**: Total cultivated land
- **Units**: 1000s of hectares
- **Reference Year**: mid-1990s

**Methodology**

CULTOT is cultivated land = cropland + plantation forest + cultivated pasture. The areas of cropland (C), plantation forest (F) and cultivated pasture (P) are given in the Cultivated [Built] notes column.

Cropland (C) = land under permanent or temporary agricultural crops, including temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow (under five years). Data are for 1997 and are from FAO (1999a), except for Belgium and Luxembourg which are from Organisation for Economic Co-operation and Development (1999).

Plantation forest (F) = forests that have been established artificially, usually consisting of non-indigenous species or stocks.

Cultivated pasture (P) = sown (not wild) meadows and pastures. Except for Australia, data are WoN estimates, and are either 10% of the area of permanent pasture (land used for five years or more for wild or cultivated herbaceous forage crops) or the same area as cropland, whichever is smaller. Permanent pasture data are for 1994.

In the case of Australia, FAO and OECD figures for arable land include 30 million ha of cultivated grassland. This has been subtracted from cropland and recorded separately as
cultivated pasture. The FAO and OECD figures for permanent pasture are assumed to be all uncultivated."

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PRODHA</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>333</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Tons of food produced per hectare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Metric tons of food crop production per harvested hectare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>mid-1990s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology
Metric tons of food crop production is divided by harvested hectares.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CULPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>334</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of Land Cultivated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology
CULPCT is the percentage of a countries total land areas that is cultivated.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BLDTOT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>335</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Built Land</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Units: 1000s of hectares
Reference Year: mid-1990s

Original Sources:


Methodology: Built land (BLDTOT) is land that is "occupied by buildings, transport infrastructure (roads, railways, docks, airports, etc.) and other human structures, including mines and quarries, waste tips, derelict land, and urban and suburban parks and gardens."

Indicator: BLDPCT
Indicator #: 336
Indicator Name: Percentage of Land that is Built
Units: Percentage
Reference Year: mid-1990s

Original Sources:


Methodology: BLDPCT is the percentage of land that is built in relation to the subtotal that consists of natural, modified, and cultivated land.
**Protected Area Size Score**

**Unitless scale (0 is the worst possible score and 100 is the best)**

**Reference Year**: mid-1990s


**Original Sources**:


**Methodology**

The protected area is the size score (SIZESC). The performance criteria is shown in the table below.

<table>
<thead>
<tr>
<th>Band</th>
<th>Top point on scale</th>
<th>PA as % of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>fair</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>medium</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>poor</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>bad</td>
<td>20</td>
<td>2.5</td>
</tr>
<tr>
<td>base</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Protected Area Diversity Score**


**Original Sources**:


Units
Unitless scale (0 is the worst possible score and 100 is the best)

Reference Year
mid-1990s

Source

Original Sources:


Methodology
The protected area diversity indicator (Div score) is intended to measure how much of each major ecosystem type occurs within protected areas. Ideally, it would use a classification of major ecosystem types that distinguished either the main vegetation types or the main groups of ecological communities. The classification needs to be consistent across countries and regions and at a scale that would provide adequate detail for small countries but not unmanageable detail for large countries. World Wildlife Fund has developed such a classification for the Americas (Dinerstein, Olson, Graham et al. 1995; Ricketts, Dinerstein, Olson et al. 1998) and has used it to assess protected area coverage of ecosystem diversity. However, the assessment was by ecoregion only, not by country and ecoregion, and so could not be used here. Asian Bureau for Conservation & World Conservation Monitoring Centre (1997) cover Southern Asia and Papua New Guinea thoroughly but in a non-standard way, particularly their treatment of totally and partially protected areas. The two assessments used here (World Conservation Monitoring Centre [1997] and Iremonger, Ravilious, & Quinton [1997]) reviewed coverage of ecosystem diversity by country and ecosystem type. World Conservation Monitoring Centre’s ecofloristic zone classification is not as detailed as World Wildlife Fund’s ecoregion classification. However, the detail is adequate, except for Central America and the Caribbean where only major ecofloristic zones are identified. The forest type classification covers a narrower array of ecosystem types, and the types are crudely defined. In many countries remarkably few types are recognized (for example, only one in New Zealand). The ecofloristic zone assessment distinguishes between totally and partially protected areas; the forest type assessment does not.

Country performance summary:
9  Good  5%
39  Medium  22%
45  Fair  25%
27  Poor  15%
60  Bad  33%

"Good" and "Fair" scores go to countries that keep substantial proportions of their various land and inland water ecosystems in large totally protected areas.

**Indicator**  LPSC
**Collection**  Wellbeing of Nations
**Indicator #**  339
**Sub-Index**
**Indicator Name**  Land Protection Score
**Units**  Unitless scale (0 is the worst possible score and 100 is the best)
**Reference Year**  1990

Original Sources:


**Methodology**
Land protection is the average of two weighted indicators [weights in brackets]:

Protected area size (Size score) [2]: protected area as % of total area, weighted for size.

Protected area diversity (Div score) [1]: protected area as % of total area, weighted for diversity.
Protected area diversity was given a lower weight than protected area size because the data are less reliable.

The protected area size indicator measures how much of a country's land and inland water area is protected, weighted according to degree of protection and size of the protected areas. All data are in thousand hectares (000 ha), and all percentages are in terms of total (land + inland water) area. Data are for 1997 and are from the United Nations list of protected areas 1997 (IUCN World Commission on Protected Areas & World Conservation Monitoring Centre 1998). Marine protected areas were excluded because information on them is weak and incomplete.

As defined by IUCN - World Conservation Union, totally protected areas are maintained in a natural state and are closed to extractive uses. Partially protected areas are managed for specific uses (e.g., recreation) or to provide optimum conditions for certain species or ecological communities. Totally protected areas are more likely to protect a wide range of natural ecological communities. For such communities to persist and evolve "naturally," buffered as far as possible against human activities, the areas need to be large. The bigger the area, the more protective it will be (Reid & Miller 1989).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>340</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of Cultivated and Modified Land Area with Light Soil Degradation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>LPCT is a percentage of land with somewhat reduced agricultural suitability, where the light degree explains the level of soil degradation affecting an area given the weighted total percentage &quot;by the factors given; restoration to full productivity possible by modifying management; original biotic functions still largely intact&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>341</td>
<td>Sub-Index</td>
<td></td>
</tr>
</tbody>
</table>
**Indicator Name**: Percentage of Cultivated and Modified Land Area with Moderate Soil Degradation  
**Units**: Percentage  
**Reference Year**: 1990  

Original Sources:


**Methodology**: MPCT is a percentage of land with greatly reduced agricultural suitability; major improvements required to restore productivity; original biotic functions are partly destroyed.

---

**Indicator Name**: Percentage of Cultivated and Modified Land Area with Strong Soil Degradation  
**Units**: Percentage  
**Reference Year**: 1990  

Original Sources:


Methodology

SPCT is a percentage of land that is "non-reclaimable at farm level; major engineering works required for restoration; original biotic functions destroyed."

Indicator | EPCT | Collection | Wellbeing of Nations
Indicator # | 343 |
Indicator Name | Percentage of Cultivated and Modified Land Area with Extreme Soil Degradation |
Units | Percentage |
Reference Year | 1990 |

Original Sources:


Methodology

EPCT is a percentage of land that is unreclaimable and beyond restoration; original biotic functions fully destroyed.

Indicator | GGSC | Collection | Wellbeing of Nations
Indicator # | 344 |
Indicator Name | Greenhouse Gas Score |
Units | kilograms of carbon per person |
Reference Year | 1997 |

Original Sources:


**Methodology**

GGSC is the score for carbon dioxide emissions per person. The top of the fair band matches the point below which carbon emissions per person must fall to keep atmospheric concentrations at less than double the pre-industrial level. Dangerous climate change could occur above this level (Corner House 1997). To stay below it, global emissions would have to be cut from 6.6 billion metric tons of carbon in 1997 to between 3.7 and 4.9 billion metric tons. If the intermediate amount of 4.3 billion were shared equally by the world population of 10.8 billion projected for 2050 (UN’s medium variant projection [United Nations Population Division 1998c]), each person would have an emissions allowance of just under 400 kilograms.

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>79</td>
<td>Good</td>
<td>44%</td>
</tr>
<tr>
<td>20</td>
<td>Fair</td>
<td>11%</td>
</tr>
<tr>
<td>29</td>
<td>Medium</td>
<td>16%</td>
</tr>
<tr>
<td>34</td>
<td>Poor</td>
<td>19%</td>
</tr>
<tr>
<td>15</td>
<td>Bad</td>
<td>8%</td>
</tr>
<tr>
<td>3</td>
<td>No Data</td>
<td>2%</td>
</tr>
</tbody>
</table>

**Indicator**

ODSMT

**Collection**

Wellbeing of Nations

**Indicator #**

345

**Sub-Index**

Annual Use of Ozone Depleting Substances

**Units**

Metric tons of ozone depleting potential

**Reference Year**

1995

**Source**


Original Sources:


**Methodology**

ODSMT is the annual use of ozone depleting substances (ODS) in metric tons of ozone depleting potential (mt odp). ODS include chlorofluorocarbons (CFCs), halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, HCFCs, and methyl bromide. These substances are used in automobile and truck air conditioning units, domestic and commercial refrigeration and air conditioning/heat pump equipment, aerosol products, portable fire extinguishers, pre-polymers, and insulation boards, panels and pipe covers (Ozone Secretariat, United Nations Environment Programme 1997). Data are from Ozone Secretariat, United Nations Environment Programme (1999) and United Nations Environment Programme (1998).

"The protective stratospheric zone is being weakened by these gases, known as ODS. One of the most common of these is the CFCs or chlorofluorocarbons, a gas that is used in air conditioners, refrigerators and plastics among other things."
<table>
<thead>
<tr>
<th>Indicator</th>
<th>ODPHA</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>346</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Use of Ozone Depleting Substances per Land Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>use of ozone depleting substances per hectare of total (land and inland waters) area in grams of ozone depleting potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>ODPHAG refers to the use of ozone depleting substances per hectare of total (land and inland waters) area in grams of ozone depleting potential (g odp).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ODPPG</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>347</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Use of Ozone Depleting Substances Per Capita</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>use of ozone depleting substances per person in grams of ozone depleting potential.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>ODPPG refers to the use of ozone depleting substances per person in grams of ozone depleting potential (g odp).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ODSSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>348</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Ozone Depleting Substances Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology

ODSSC is the score for use of ozone depleting substances per person. The top of the good band (zero consumption/production) corresponds to international agreements to eliminate ODS. When measuring ozone depleting substance use, the higher of the two "uses" is utilized (production or consumption).

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Performance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>Good</td>
<td>37%</td>
</tr>
<tr>
<td>27</td>
<td>Fair</td>
<td>15%</td>
</tr>
<tr>
<td>28</td>
<td>Medium</td>
<td>16%</td>
</tr>
<tr>
<td>17</td>
<td>Poor</td>
<td>9%</td>
</tr>
<tr>
<td>15</td>
<td>Bad</td>
<td>8%</td>
</tr>
<tr>
<td>26</td>
<td>No Data</td>
<td>14%</td>
</tr>
</tbody>
</table>

Indicator

**MAMTOT**

Collection: Wellbeing of Nations

Indicator # 349

Sub-Index

Indicator Name: Total Native Species of Mammals

Units: Number of species

Reference Year: 1995


Original Sources:


Methodology

Total mammals, excluding oceanic mammals. "Total" means total native species. Data are from the UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b).

Indicator

**MAMTHR**

Collection: Wellbeing of Nations

Indicator # 350

Sub-Index

Indicator Name: Threatened Mammals

Units: Number of species

Reference Year: 1995


Original Sources:

### Methodology

MAMTHR refers to mammals that are threatened. The definition of a good percentage of threatened species (below 2%) is based on the estimated natural rate of extinction of less than 0.01% per century.

"Total" means total native species. Data are from the UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b).

Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MAMPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>351</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Native Species as a Percentage of Total Native Mammal Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)


### Methodology

MAMPCT is threatened native species of mammals as a percentage of total native species.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BRDTOT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>352</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Native Species of Birds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology
BRDTOT includes the birds total native species present. Birds include only species that breed in the country concerned, because of widely differing standards in recording vagrants, accidentals, and irregular migrants. The number of breeding bird species in Bolivia was extrapolated from the number of total bird species.

Total = total native species. Data are from the UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BRDTHR</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>353</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Birds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

Methodology
BRDTHR refers to birds that are threatened. Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BRDPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>354</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Native Bird Species as a Percentage of Total Native Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:
- UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)
<table>
<thead>
<tr>
<th>Indicator</th>
<th>RPTTOT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>355</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Native Reptile Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

RPTTOT includes the total reptiles species present. Total = total native species. Data are from the UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RPTTHR</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>356</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Reptiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

RPTTHR refers to the number of threatened reptiles, for that given country. Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>RPTPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>357</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Native Reptiles as a Percentage of Total Native Reptile Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### RPTPCT

RPTPCT is threatened native species of reptiles as a percentage of total native species.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>AMTOT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>358</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Native Amphibian Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

- UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)

Methodology

The wild animal species indicator covers four higher animal classes. AMTOT includes the total amphibians species present. Total = total native species. Data are from the UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>AMTHR</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>359</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Amphibians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

Methodology
AMTHR refers to the number of threatened amphibians, for that given country. Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994).

Indicator | AMPCT | Collection | Wellbeing of Nations
--- | --- | --- | ---
Indicator # | 360 | Sub-Index |  
Indicator Name | Threatened Native Amphibians as a Percentage of Total Native Amphibian Species |  
Units | Percentage |  
Reference Year | 1995 |  
Original Sources:
UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)

Methodology
AMPCT is threatened native species of amphibians as a percentage of total native species.

Indicator | MBPCT | Collection | Wellbeing of Nations
--- | --- | --- | ---
Indicator # | 361 | Sub-Index |  
Indicator Name | Average Percentage of Mammals and Birds Threatened |  
Units | Percentage |  
Reference Year | 1995 |  
Original Sources:
**MBPCT** is the average percentage of native mammal and bird species threatened.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MBRAPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>362</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Average Percentage of Mammals, Birds, Reptiles and Amphibians Threatened</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

- UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)

**CLASCOV**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>CLASCOV</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>363</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Number of Classes For Which Species Threat Data Are Available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

Methodology


UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)


Methodology

CLASCOV is the number of classes covered. If all four classes are covered, then the indicator for that country is complete. If fewer than four are covered, then the result may be due to the lack of data. If the class does not exist in the country (for example, reptiles in Iceland), it is included in the number in brackets but is not counted in the calculation of the average percentage.

Indicator

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Indicator Name</th>
<th>Collection</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>364</td>
<td>Wild Animal Species Score</td>
<td>Wellbeing of Nations</td>
<td></td>
</tr>
</tbody>
</table>

Units

Unitless scale (0 is the worst possible score and 100 is the best)

Reference Year

1995

Source


Original Sources:


UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)


Methodology

WASSC is the wild animal species score. This is based on either the average percentage of mammals and birds or the average percentage of mammals, birds, reptiles and amphibians, whichever gives the lower score. The mammal and bird data are more reliable than the data on reptiles and amphibians, and ideally the indicator would be based on these two classes alone. However, the reptile and amphibian data are no worse than the plant data, and excluding them would give misleadingly high scores to several countries, such as Barbados and Turkey. Scores are based on mammals and birds alone in 160 countries, and on the four classes in 23 countries (11 in the Americas, 2 in Africa, 4 in Europe, 6 in Asia). Mammals exclude ocean-dwelling whatles and dolphins because they cannot be assigned to particular counties.

Summary of country performance:

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>Fair</th>
<th>Medium</th>
<th>Poor</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>3</td>
<td>22</td>
<td>54</td>
<td>73</td>
<td>28</td>
</tr>
<tr>
<td>Percent</td>
<td>2%</td>
<td>12%</td>
<td>30%</td>
<td>41%</td>
<td>16%</td>
</tr>
<tr>
<td>Indicator</td>
<td>BDTHR</td>
<td>Collection</td>
<td>Wellbeing of Nations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>------------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator #</td>
<td>365</td>
<td>Sub-Index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Ratio of Threatened to Not-At-Risk Breeds of Animal Species</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNEP World Conservation Monitoring Centre Threatened Animals Database (WCMC 1998b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>BDTHR measures the mean threatened breeds to the ratio of threatened to not at risk breeds of animal species, taking the average of the three species chosen for mean breed diversity. Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>WSPRNK</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>366</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Wild Species Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Average rank of each of the 180 countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The WSPRNK or wild species rank is the average rank of each of the 180 countries in total numbers of wild native species in seven groups: three plant groups (flowering plants, gymnosperms, pteridophytes); and four animal groups (mammals, breeding birds, reptiles, amphibians). Countries were ranked separately for each group, and the average taken of the ranks. The wild plant species indicator covers wild higher plants in three groups: Flowering Plants= angiosperms Gymnosperms = conifers, cycads, and gnetophytes Pteridophytes = ferns, horsetails, and clubmosses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>FLPTOT</td>
<td>Collection</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
<td>------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Indicator #</td>
<td>367</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Native Species of Flowering Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>FLPTOT indicates the total native species of flowering plants (angiosperms).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FLPTHr</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>368</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Native Species of Flowering Plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>FLPTHr measures threatened native species among flowering plants (angiosperms). Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994). Data are for 1998 and are from the UNEP World Conservation Monitoring Centre Threatened Plants Database (WCMC 1998a).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FLPPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>369</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Flowering Plants Species as a Percentage of all Wild Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original Sources:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

LPPCT measures threatened native species as a percentage of total native species among flowering plants (angiosperms).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GYMTOT</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Total Gymnosperms</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

GYMTOT indicates the total native species of gymnosperms (conifers, cycads, and gnetophytes).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GYMTHR</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>371</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Native Species of Gymnosperms</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

GYMTHR measures threatened native species among Gymnosperms (conifers, cycads, and gnetophytes). Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994). Data are for 1998 and are from the UNEP World Conservation Monitoring Centre Threatened Plants Database (WCMC 1998a).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>GYMPCT</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>372</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Threatened Gymnosperms as a Percentage of Total Native Species of Gymnosperms</td>
<td>Wellbeing of Nations</td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>Source</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


**Methodology**

GYMPCT measures threatened gymnosperms' native species as a percentage of total native species (conifers, cycads, and gnetophytes).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTETOT</td>
<td>Wellbeing of Nations</td>
</tr>
</tbody>
</table>

**Indicator #**

373

**Indicator Name**

Total Native Species of Pteridophytes

**Units**

Number of species

**Reference Year**

1995

**Source**


Original Sources:


**Methodology**

PTETOT indicates the total native species of pteridophytes (ferns, horsetails, and clubmosses).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTETHR</td>
<td>Wellbeing of Nations</td>
</tr>
</tbody>
</table>

**Indicator #**

374

**Indicator Name**

Threatened Native Species of Pteridophytes

**Units**

Number of species

**Reference Year**

1995

**Source**


Original Sources:


**Methodology**

PTETHR measures threatened native species among pteridophytes (ferns, horsetails, and clubmosses.) Threatened means critically endangered (high risk of extinction in the immediate future), endangered (high risk of extinction in the near future) or vulnerable (high risk of extinction in the medium-term future). Full definitions are in IUCN Species Survival Commission (1994). Data are for 1998 and are from the UNEP World Conservation Monitoring Centre Threatened Plants Database (WCMC 1998a).
### Indicator: PTEPCT

**Indicator #**: 375  
**Sub-Index**:  
**Indicator Name**: Threatened Native Species of Pteridophytes as a Percentage of Total Native Species  
**Units**: percentage  
**Reference Year**: 1995  
**Methodology**: PTEPCT measures threatened pteridophytes' native species as a percentage of total native species (ferns, horsetails, and clubmosses).

### Indicator: PSSC

**Indicator #**: 376  
**Sub-Index**:  
**Indicator Name**: Wild Plant Species Score  
**Units**: Percentage  
**Reference Year**: 1995  
**Methodology**: The PSSC is the wild plant species score whereby the "score of threatened plant species in a group as a percentage of total species of that group (average percentage of three groups: flowering plants, gymnosperms [conifers, cycads, gnetophytes] and ferns and allies).  

**Summary of country performance:**  
2 Good 1%  
61 Fair 17%  
18 Medium 34%  
18 Poor 10%  
32 Bad 18%  
36 No Data 20%  

**Details:**  
The background extinction rate is estimated to be less than 0.01% of species per century (Reid & Miller 1989). It is assumed that the background percentage of threatened species is less than 100 times the extinction rate, or less than 1%. Therefore, the top of the good band was set at 0%, and the top of the fair band at 2%.  

"The plant species results are strongly influenced by the distribution of gymnosperms. Although they never make up more than 2% of the plant species in a country, the percentage of gymnosperms that is threatened is generally high- up to 100%- compared with flowering
plants (up to 51%) and ferns (up to 28%)."

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LMCSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>377</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Land Modification and Conversion Score</td>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
</tr>
</tbody>
</table>

Other sources:

Methodology
The LMCSC represents the average of the following three scores:

1) Forest change score = score for % annual change in native forest area. The performance criteria are shown in Table 10a. The tops of the fair and medium bands have been set so that an increase in forest area gets a good score, a decline of 0.1% or more a medium score or worse, and zero change (stability) a fair score. If the forest area is reported to be exactly the same size at the end of the reporting period as at the beginning (exactly 0.0 change), the score is 80. If there is a decline of less than 0.05%, the score is reduced to 70 - indicated by # (Guyana is the only case).

2) Conversion score = score for converted land as % of total land. The performance criteria are shown in Table 10a. The top of the medium band is based on the landscape pattern theory that habitat becomes dissected into isolated patches below 60% coverage (see Nat score below).

3) Natural land score = score for natural land as % of total land. The performance criteria are shown in Table 10a. Fair performance is defined as better than 60, on the basis of landscape pattern theory, which suggests that if habitat coverage is reduced to less than 59.28% the landscape becomes dissected into isolated patches (O’Neill et al. 1995), which in turn leads to a loss of species.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SPGNSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>378</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Species and Genes Index</td>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
</tr>
</tbody>
</table>

Original Sources:
Methodology

The species and genes index (S&G index) is the weighted average [weights in brackets] of a wild diversity index (WD score) [2] and a domesticated diversity index (DD score) [1]. Wild diversity has a higher weight because it is measured in terms of species, the extinction of which represents a greater genetic loss than the extinction of breeds and varieties, the measurement units for domesticated diversity. The wild diversity index is the average of two unweighted indicators.

Summary of country performance:

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Good</td>
<td>0%</td>
</tr>
<tr>
<td>19</td>
<td>Fair</td>
<td>11%</td>
</tr>
<tr>
<td>89</td>
<td>Medium</td>
<td>49%</td>
</tr>
<tr>
<td>60</td>
<td>Poor</td>
<td>33%</td>
</tr>
<tr>
<td>12</td>
<td>Bad</td>
<td>7%</td>
</tr>
</tbody>
</table>

Details:

- Threatened wild plant species in a group as the percentage of total wild plant species in that group (PS score).
- Threatened wild animal species in a group as the percentage of total wild animal species in that group (AS score).

---

**Indicator**

**HARAR**

**Collection**

Wellbeing of Nations

**Indicator #**

379

**Indicator Name**

Food Crop Harvested Area

**Units**

Thousands of hectares

**Reference Year**

1997

**Source**


Original Sources:


**Methodology**

HARAR refers to the harvested area (food crops only) in thousands of hectares (000 ha); except Haiti, Liberia, Rwanda, Bosnia & Herzegovina and Afghanistan, which is cropland area in thousands of hectares.

**Indicator**

**PRODTON**

**Collection**

Wellbeing of Nations

**Indicator #**

380

**Indicator Name**

Food Crop Production

**Units**

Thousands of metric tons

**Reference Year**

1997

**Source**


Original Sources:

**Methodology**  
PRODTON is the food crop production in thousands of metric tons (000 mt).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FERTTON</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>381</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fertilizer Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Thousands of metric tons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

**Methodology**  
FERTTON is the fertilizer use in thousands of metric tons (000 mt). Although the harvested area and production figures refer to the same set of food crops, the fertilizer data apply to non-food crops as well.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PRODSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>382</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Production Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:

**Methodology**  
PRODSC is the score of one of the agricultural productivity indicators: food produced per harvested hectare.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FERTA</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>383</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fertilizer Use per Hectare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Metric tons of fertilizer used per 1000 harvested hectares</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methodology

FERTA is a measure of the metric tons of fertilizer used per 1000 harvested hectares.

Indicator

FERTSC
Collection  Wellbeing of Nations
Indicator #  384
Sub-Index
Indicator Name  Fertilizer Score
Units  Unitless scale (0 is the worst possible score and 100 is the best)
Reference Year  1997

Methodology

FERTSC refers to the score for fertilizer used per 1000 harvested hectares.

Indicator

APSC
Collection  Wellbeing of Nations
Indicator #  385
Sub-Index
Indicator Name  Agricultural Productivity Score
Units  Unitless scale (0 is the worst possible score and 100 is the best)
Reference Year  1997

Methodology

The APSC is the unweighted average score of food produced per harvested hectare (Production Score) and fertilizer used per 1000 harvested hectares (Fertilizer Score).

Summary of country performance:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Performance</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>No Data</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>CEREAL</td>
<td>Collection</td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>Indicator #</td>
<td>386</td>
<td>Sub-Index</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Cereal Production as a Percentage of Supply</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>CEREAL represents production of cereals as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. &gt;100 indicates that production exceeds supply, the balance being exported.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>STARCH</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>387</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Starchy Roots Production as a Percentage of Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>STARCH gives production rate for starches and roots as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. &gt;100 indicates that production exceeds supply, the balance being exported.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SUGARS</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>388</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Sugar Crops Production as a Percentage of Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original Sources:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

SUGARS gives production rate for sugars as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>OILNUTS</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>389</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Oil Crops Production as a Percentage of Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


**Methodology**

OILNUTS gives production rate for oils and nuts as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>PULSES</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>390</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Pulses Production as a Percentage of Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Sources:


**Methodology**

PULSES gives production rate for pulses as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FRUIT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>391</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fruit Production as a Percentage of Supply</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

225
Units: Percentage
Reference Year: 1997

Original Sources:

Methodology: FRUIT gives production rate for fruit as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

Indicator: MEATS
Indicator #: 392
Indicator Name: Meats Production as a Percentage of Supply
Units: Percentage
Reference Year: 1997

Original Sources:

Methodology: MEATS gives production rate for meats as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

Indicator: DAIRY
Indicator #: 393
Indicator Name: Dairy Production as a Percentage of Supply
Units: Percentage
Reference Year: 1997

Original Sources:

Methodology: DAIRY gives production rate for dairy as a percent of supply. Production means total domestic production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.
production. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. >100 indicates that production exceeds supply, the balance being exported.

**Indicator**  | **FPPCT**  | **Collection** | **Wellbeing of Nations**
--- | --- | --- | ---
**Indicator #**  | 394  | **Sub-Index**
**Indicator Name**  | Food Production as a Percentage of Supply
**Units**  | Percentage
**Reference Year**  | 1997

Original Sources:

**Methodology**
FPPCT is the food production as a percentage of supply, the average of the following eight categories of food: cereals; starchy roots (Stch roots); sugar crops and sweeteners (Sug swtn); oil crops, plant oils and tree nuts (Oils nuts); pulses and vegetables (Pulse veg); fruit; meat, offal, animal fats [except butter, cream, and fish oils] and eggs (Meat eggs); and dairy products [milk, butter, cream, cheese and other milk products] (D’ry). Greater than 100 is counted as 100.

**Indicator**  | **ASRSC**  | **Collection** | **Wellbeing of Nations**
--- | --- | --- | ---
**Indicator #**  | 395  | **Sub-Index**
**Indicator Name**  | Agricultural Self Reliance Score
**Units**  | Unitless scale (0 is the worst possible score and 100 is the best)
**Reference Year**  | 1997

Original Sources:

**Methodology**
ASRSC is the agricultural self-reliance score, the score of food production as percentage of supply.

**Indicator**  | **FSPCT**  | **Collection** | **Wellbeing of Nations**
--- | --- | --- | ---
**Indicator #**  | 396  | **Sub-Index**
**Indicator Name**  | Fish and Seafood Production as a Percentage of Supply
**Units**  | Percentage
**Reference Year**  | 1996

Original Sources:


Methodology

FSPCT is the fish and seafood production as a percentage of supply. Fish and seafood include seaweeds and fish oils. Production means the domestic catch + aquaculture. Supply means the amount available for consumption, which is production + imports - exports ± stock changes. Data are for 1996 and are from the food balance sheets and commodities database in FAO (1998a).

Indicator | FSRSC | Collection | Wellbeing of Nations
Indicator # | 397 | Sub-Index
Indicator Name | Fish and Seafood Self Reliance Score
Units | Unitless scale (0 is the worst possible score and 100 is the best)
Reference Year | 1995

Original Sources:


Methodology

FSR is the fish and seafood self-reliance score, which is based on fish and seafood production as % of supply. Countries that produce more than 90% of their supply of fish and seafood are in a position to control the stress their consumption puts on fisheries. Those producing 50% or less are not.

Summary of country performance:

82 Good 46%
15 Fair 8%
15 Medium 8%
9 Poor 5%
50 Bad 28%
9 No Data 5%

Indicator | SPPTOT | Collection | Wellbeing of Nations
Indicator # | 398 | Sub-Index
Indicator Name | Number of Fishery Species that are the Subject of a Major Fishery
Units | Number of fisheries
Reference Year | 1994

Original sources:

FAO Marine Resources Service, Fishery Resources Division. 1997. Review of the state of

**Methodology**

SPPTOT is the number of fishery species or species groups that are the subject of a major fishery, in which the country concerned is one of the main participants. All data are from FAO Marine Resources Service, Fishery Resources Division (1997).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SPPASS</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>399</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Number of Major Fishery Species that have been Assessed by FAO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original sources:


**Methodology**

SPPASS number of the fishery species included in SPPTOT whose status has been assessed by FAO. All data are from FAO Marine Resources Service, Fishery Resources Division.

**Indicator**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ODR</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>400</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Depletion Status of Assessed Fish Species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Number of fish species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1994</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original sources:


**Methodology**

ODR is the number of assessed fishery species estimated to be overexploited (O), depleted (D), or depleted but recovering (R). Overexploited species are being fished at above a level that is believed to be sustainable, with a high risk of stock collapse or depletion. Catches of depleted species are well below historical levels, irrespective of the amount of fishing effort. Catches of recovering species are increasing after a collapse from a previous high. Non-ODR species are classified as underexploited or undeveloped, moderately exploited, or fully exploited.

Underexploited or undeveloped species are believed to have a significant potential for expanded production. Moderately exploited species are believed to have limited potential for expanded production. Fully exploited species are being fished at or close to an optimal yield level, with no room expected for further expansion.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>ODRPCT</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>401</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Percentage of Fish Species Overexploited and Depleted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>ODRPCT is the percentage of overexploited species + depleted species + depleted but recovering species as a percentage of assessed species.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SPPSC</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>402</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fisheries Protection Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>SPPSC is the species score or the score for the variable ODR. The tops of the fair and medium bands were set at five times those for the wild species indicators, since depleted and overexploited species are not necessarily threatened.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SHELFKM</th>
<th>Collection</th>
<th>Wellbeing of Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>403</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Continental Shelf area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Thousands of square kilometers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original sources:

230
**Methodology**

SHELFKM refers to the continental shelf area in thousands of square kilometers. This data is based on estimates by FAO Fishery Resources Division (1996).

**Indicator**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>TCAPKPM</th>
<th>Collection</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator Name</td>
<td>Fishing Fleet Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Tons of capacity per square kilometer of fish producing area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source**


Original sources:


FAO Fishery Information, Data and Statistics Unit. 1996. Personal communication.


FAO Fishery Resources Division. 1996. Personal communication.


**Methodology**

TCAPKMSC refers to the tons of fishing fleet capacity per square kilometer of fish producing area (continental shelf, inland water area or shelf + inland water as appropriate.)

**Indicator**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>TCAPKMSC</th>
<th>Collection</th>
<th>Sub-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator Name</td>
<td>Fish Catching Capacity per Fish Producing Area Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Unitless scale (0 is the worst possible score and 100 is the best)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source**


Original sources:
Methodology

TCAPKMISC is the score for weight of fish catching capacity per unit of fish producing area. The higher the tons of fish catching capacity per area, the lower the score.

Indicator | MTCATCH | Collection | Wellbeing of Nations
Indicator # | 406 | Sub-Index
Indicator Name | Fish Catch in Marine and Inland Waters
Units | Metric tons of catch
Reference Year | 1995

Original sources:


FAO Fishery Information, Data and Statistics Unit. 1996. Personal communication.


FAO Fishery Resources Division. 1996. Personal communication.


**Indicator:** CATCHSC  
**Sub-Index:** Collection  
**Wellbeing of Nations**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Units</th>
<th>Reference Year</th>
<th>Source</th>
</tr>
</thead>
</table>

**Original sources:**


FAO Fishery Information, Data and Statistics Unit. 1996. Personal communication.


FAO Fishery Resources Division. 1996. Personal communication.


**Methodology**

CATCHSC refers to the score for weight of catch per unit of fish catching capacity.

---

**Indicator:** BRDDSC  
**Sub-Index:** Collection  
**Wellbeing of Nations**

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Units</th>
<th>Reference Year</th>
<th>Source</th>
</tr>
</thead>
</table>

**Methodology**

BRDDSC is the breed diversity score. The performance criteria are shown in Table 20a in the original report (p. 242). It represents the number of not at risk breeds per million head of a species.
**Indicator**  
THRBRSC  
**Collection**  
Wellbeing of Nations

**Indicator #**  
411  
**Sub-Index**

**Indicator Name**  
Threatened Breeds Score

**Units**  
Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year**  
1995

**Source**  

**Methodology**  
The THRBRSC is the mean threatened breeds score. The performance criteria are shown in Table 20a in the original report (p. 242). The tops of the poor, medium and fair bands (0.5, 0.2 and 0.1 threatened breeds per one not at risk breed) correspond to 1 threatened breed per 2, 5 and 10 not at risk breeds respectively.

---

**Indicator**  
FPSC  
**Collection**  
Wellbeing of Nations

**Indicator #**  
408  
**Sub-Index**

**Indicator Name**  
Fishing Pressure Score

**Units**  
Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year**  
1995

**Source**  

**Methodology**  
FPSC refers to the fishing pressure score, the unweighted average of the species (SPPSC), tons per area (TCAPKMSC) and catch scores (CATCHSC).
### Fish and Seafood Selfreliance Score

**Indicator**: Fish and Seafood Selfreliance Score

**Units**: Unitless scale (0 is the worst possible score and 100 is the best)

**Reference Year**: 1995


**Original sources**:
- FAO Fishery Information, Data and Statistics Unit. 1996. Personal communication.
- FAO Fishery Resources Division. 1996. Personal communication.

**Methodology**

FSHSC refers to the fish and seafood self-reliance score, the score of fish and seafood production as % of supply. Higher degrees of self reliance translate to higher scores.

### Total Ecological Footprint

**Indicator**: Total Ecological Footprint

**Units**: global hectares per person (hectares normalized to have world average bioproductivity)

**Reference Year**: 2003


**Methodology**

The Ecological Footprint measures how much biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management.
practices. Ecological Footprints are reported in global hectares, hectares normalized to have world average bioproductivity.

The total national Ecological Footprint reports the number of global hectares necessary to support the consumption of the residents of a nation, regardless of where those hectares are located on the planet. The total Ecological Footprint is the sum of seven major Footprint categories or land types - cropland (CROPFOOT), grazing land (GRAZFOOT), fishing grounds (FISHFOOT), forest (FORESTFOOT), carbon (CARBFOOT), nuclear (NUKEFOOT), and built-up land (BILTFOOT).

The National Footprint Accounts, which calculate the Ecological Footprint and biocapacity of 150 nations from 1961-2003, are maintained by Global Footprint Network on behalf of its 80 partner organizations.

### Indicator CROPFOOT

**Collection**: Ecological Footprint

**Indicator #**: 413

**Sub-Index**: 

**Indicator Name**: Cropland Footprint

**Units**: global hectares per person (hectares normalized to have world average bioproductivity)

**Reference Year**: 2003


**Methodology**: The Cropland Footprint is one of seven major components of the total Ecological Footprint, and represents the total area of harvested and unharvested land planted to food and fibre crops that are necessary to meet the crop product demands of the residents of a nation. Source data are drawn primarily from the UN’s FAOSTAT database.

### Indicator GRAZFOOT

**Collection**: Ecological Footprint

**Indicator #**: 414

**Sub-Index**: 

**Indicator Name**: Grazing Land Footprint

**Units**: global hectares per person (hectares normalized to have world average bioproductivity)

**Reference Year**: 2003


**Methodology**: The Grazing Land Footprint is one of seven major components of the total Ecological Footprint, and represents the total area of grazing land (also known as range land or pasture land) demanded to support the meat and animal product consumption of residents of a nation. Source data are drawn primarily from the UN’s FAOSTAT database.

### Indicator FORESTFOOT

**Collection**: Ecological Footprint

**Indicator #**: 415

**Sub-Index**: 

**Indicator Name**: Forest Footprint

**Units**: global hectares per person (hectares normalized to have world average bioproductivity)

**Reference Year**: 2003

Methodology

The forest Footprint is one of seven major components of the total Ecological Footprint, and represents the total area of forest land necessary to meet the timber and fuelwood demands of the residents of a nation. Source data are drawn primarily from the UN’s FAOSTAT database and Forest Resource Assessment (FRA).

Indicator FISHFOOT Collection Ecological Footprint
Indicator # 416 Sub-Index
Indicator Name Fishing Ground Footprint
Units global hectares per person (hectares normalized to have world average bioproductivity)
Reference Year 2003

Methodology

The Fishing Grounds Footprint is one of seven major components of the total Ecological Footprint, and represents the total area of marine and inland water area needed to produce all of the aquatic products consumed by the residents of a nation. Data are drawn largely from the UN FAO’s Fisheries and Aquaculture Department. In the 2006 Edition of the accounts, the Footprint of aquaculture is not specifically calculated.

Indicator CARBFOOT Collection Ecological Footprint
Indicator # 417 Sub-Index
Indicator Name Carbon Footprint
Units global hectares per person (hectares normalized to have world average bioproductivity)
Reference Year 2003

Methodology

The Carbon Footprint is one of seven major components of the total Ecological Footprint, and represents the total bioproductive area necessary to meet the waste-absorption demands associated with the emission of fossil carbon from all residents of a nation. Currently, the carbon Footprint is calculated as the amount of forest area, expressed in global hectares, necessary to sequester a nation’s direct and indirect (through the consumption of carbon-intensive goods produced in other nations) fossil carbon emissions.

The carbon Footprint calculation involves adding data on direct carbon emissions, taken from the International Energy Agency, to estimates of carbon embodied in trade, which is estimated using trade flow data for 600 product categories by the UN Statistics COMTRADE database.

Indicator NUKEFOOT Collection Ecological Footprint
Indicator # 418 Sub-Index
Indicator Name Nuclear Footprint
Units global hectares per person (hectares normalized to have world average bioproductivity)
Reference Year 2003
Methodology

The Nuclear Footprint is one of seven major components of the total Ecological Footprint, and represents the total bioproductive area needed to meet the demands for nuclear electricity production of the residents of a nation. Since 2002, the Footprint of one unit of nuclear electricity has been calculated as equivalent to one unit of average fossil fuel electricity. This equivalency method is expected to be revised for the 2008 Edition of the National Footprint Accounts.

Indicator | BILTFOOT | Collection | Ecological Footprint
Indicator #: 419 | Sub-Index
Indicator Name: Built-up Land Footprint
Units: global hectares per person (hectares normalized to have world average bioproductivity)
Reference Year: 2003

Methodology

The Built-up Land Footprint is one of seven major components of the total Ecological Footprint, and represents the total area of physical infrastructure (e.g., buildings, roads, etc.) located within a nation, as well as the estimated area inundated for producing hydroelectricity. Built-up areas are converted into global hectares by assuming that these areas occupy formerly productive cropland.

Indicator | TOTBIOCAP | Collection | Ecological Footprint
Indicator #: 420 | Sub-Index
Indicator Name: Total Biocapacity
Units: global hectares per person (hectares normalized to have world average bioproductivity)
Reference Year: 2003

Methodology

Biocapacity measures the capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies. Similar to Ecological Footprint, biocapacity is reported in global hectares, hectares normalized to have world average bioproductivity.

The total biocapacity of a nation reports the number of global hectares of capacity available for human use within the borders of that nation. Total biocapacity is the sum of five major biocapacity categories or land types - cropland (CROPLAND2), grazing land (GRAZLAND), fishing grounds (FISHERND), forest (FORLAND), and built-up land (BILTFOOT).

The National Footprint Accounts, which calculate the biocapacity and Ecological Footprint of 150 nations from 1961-2003, are maintained by Global Footprint Network on behalf of its 80 partner organizations.

Indicator | CROPLAND2 | Collection | Ecological Footprint
Indicator #: 421 | Sub-Index
Indicator Name: Cropland

238
<table>
<thead>
<tr>
<th>Indicator</th>
<th>FORLAND</th>
<th>Collection</th>
<th>Ecological Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>423</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>global hectares per person (hectares normalized to have world average bioproductivity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Forest is one of five major components of the total biocapacity, and represents the total area of forest land located within a nation. Forest area is defined according to the UN FAO Forest Resource Assessment. Forest biocapacity is reported in global hectares.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>FISHGRND</th>
<th>Collection</th>
<th>Ecological Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>424</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Fishing Grounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>global hectares per person (hectares normalized to have world average bioproductivity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Fishing ground is one of five major components of the total biocapacity, and represents the total area of water, both marine and inland, within a nation. Marine areas are measured according to EEZ areas, and inland water includes lakes, rivers, dams, and all other inland</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
water bodies. Fishing ground biocapacity is reported in global hectares.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ECOLDEF</th>
<th>Collection</th>
<th>Ecological Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>425</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Ecological Deficit or Reserve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>global hectares per person (hectares normalized to have world average bioproductivity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>The Ecological Reserve or Deficit of a nation is calculated by subtracting that nation’s total Ecological Footprint from its total biocapacity. A positive remainder indicates that, in the aggregate, the nation has the potential to meet its ecological demands from ecosystems located within its own borders (Ecological Reserve). An Ecological Reserve may be set aside for natural ecosystems or used for export to other nations. A negative remainder indicates that, in the aggregate, the nation is either relying on imports of biological capacity from outside of its borders or is overusing its own domestic ecosystems (Ecological Deficit).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>BILT</th>
<th>Collection</th>
<th>Ecological Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>426</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Built-up Land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>global hectares per person (hectares normalized to have world average bioproductivity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Built-up land is one of five major components of the total biocapacity, and represents the total area of physical infrastructure (e.g., buildings, roads, etc.) located within a nation, as well as the estimated area inundated for producing hydroelectricity. Built-up areas are converted into global hectares by assuming that these areas occupy formerly productive cropland.</td>
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</tbody>
</table>

### Ancillary Data

<table>
<thead>
<tr>
<th>Indicator</th>
<th>LANDLOCKED</th>
<th>Collection</th>
<th>Ancillary Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #</td>
<td>427</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Landlocked Country Dummy Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Dummy variable (1 for landlocked, 0 for not landlocked)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2006</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Indicator** | SIDS | **Collection** | Ancillary Data  
---|---|---|---  
**Indicator #** | 428 | **Sub-Index** |  
**Indicator Name** | Small Island Developing State  
**Units** | Dummy variable (1 for SIDS, 0 otherwise)  
---|---|---|---  
**Indicator** | REGION | **Collection** | Ancillary Data  
**Indicator #** | 429 | **Sub-Index** |  
**Indicator Name** | Geographic Region  
**Units** | Text field  
**Reference Year** | | |  
**Methodology** | Geographic regions are broken down as follows:  
Antartica  
Asia  
Central America & Caribbean  
Europe  
Middle East & North Africa  
North America  
Oceania  
South America  
Sub-Saharan Africa  
---|---|---|---  
**Indicator** | POP90 | **Collection** | Ancillary Data  
**Indicator #** | 430 | **Sub-Index** |  
**Indicator Name** | Population Size  
**Units** | Population in 1000s  
**Reference Year** | 1990  
**Methodology** | Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.  
---|---|---|---  
**Indicator** | POP91 | **Collection** | Ancillary Data  
**Indicator #** | 431 | **Sub-Index** |  
**Indicator Name** | Population Size  
**Units** | Population in 1000s  
**Reference Year** | 1991
Source

Methodology
Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.

Indicator POP92
Collection Ancillary Data
Indicator # 432
Sub-Index
Indicator Name Population Size
Units Population in 1000s
Reference Year 1992

Methodology Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.

Indicator POP93
Collection Ancillary Data
Indicator # 433
Sub-Index
Indicator Name Population Size
Units Population in 1000s
Reference Year 1993

Methodology Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.

Indicator POP94
Collection Ancillary Data
Indicator # 434
Sub-Index
Indicator Name Population Size
Units Population in 1000s
Reference Year 1994

Methodology Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.

Indicator POP95
Collection Ancillary Data
<table>
<thead>
<tr>
<th>Indicator #</th>
<th>435</th>
<th>Sub-Index</th>
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</thead>
<tbody>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1995</td>
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</tr>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
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<tbody>
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<td>Indicator #</td>
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<td>Sub-Index</td>
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</tr>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1996</td>
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</tr>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
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<th>Ancillary Data</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>437</td>
<td>Sub-Index</td>
<td></td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1997</td>
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</tr>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
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<tbody>
<tr>
<td>Indicator #</td>
<td>438</td>
<td>Sub-Index</td>
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</tr>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>1998</td>
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</tr>
<tr>
<td>Indicator</td>
<td>POP99</td>
<td>Collection</td>
<td>POP00</td>
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<tr>
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<tr>
<td>Indicator #</td>
<td>439</td>
<td>Sub-Index</td>
<td>440</td>
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<tr>
<td>Indicator</td>
<td>POP03</td>
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<tr>
<td>-----------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator #</td>
<td>443</td>
<td></td>
<td></td>
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<tr>
<td>Indicator Name</td>
<td>Population Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference Year</td>
<td>2003</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>POP04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
</tr>
<tr>
<td>Indicator #</td>
<td>444</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2004</td>
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<table>
<thead>
<tr>
<th>Indicator</th>
<th>POP05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology</td>
<td>Total population estimate, both sexes combined, in thousands, as of 1 July of the reference year.</td>
</tr>
<tr>
<td>Indicator #</td>
<td>445</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Population Size</td>
</tr>
<tr>
<td>Units</td>
<td>Population in 1000s</td>
</tr>
<tr>
<td>Reference Year</td>
<td>2005</td>
</tr>
</tbody>
</table>
Gross domestic product (GDP) measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. Gross domestic product at purchaser values (market prices) is the sum of gross value added by all resident and nonresident producers in the economy plus any taxes and minus any subsidies not included in the value of the products. The gross domestic product estimates at purchaser values (market prices) are in constant 2000 U.S. dollars and are the sum of GDP at purchaser values (value added in the agriculture, industry, and services sectors) and indirect taxes, less subsidies. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Value added is the net output of an industry after adding up all outputs and subtracting intermediate inputs. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC) revision 3.

To obtain comparable series of constant price data, the World Bank rescales GDP and value added by industrial origin to a common reference year, currently 2000. This process gives rise to a discrepancy between the rescaled GDP and the sum of the rescaled components. Because allocating the discrepancy would give rise to distortions in the growth rates, the discrepancy is left unallocated. As a result, the weighted average of the growth rates of the components generally will not equal the GDP growth rate.


Data Reliability: The World Bank produces the most reliable global GDP estimates available. However, it should be noted that these data do not account for differences in purchasing power (to see national accounts data without these differences, see PPP (purchasing power parity) estimates).

Informal economic activities sometimes pose a measurement problem, especially in developing countries, where much economic activity may go unrecorded. Obtaining a complete picture of the economy requires estimating household outputs produced for local sale and home use, barter exchanges, and illicit or deliberately unreported activity. Technical improvements and growth in services sector are both particularly difficult to measure. The consistency and completeness of such estimates depends on the skill and compilation methods of the compiling statisticians and the resources available to them.

[Adapted from World Bank World Development Indicators online.]
Indicator | Reference Year | Source |
--- | --- | --- |

Methodology: See methodology for the variable GDP90.

Indicator | GDP96 | Collection | Ancillary Data
Indicator # | 452 | Sub-Index
Indicator Name | GDP in 2000 US Dollars
Units | Millions of US Dollars (constant 2000 US$)
Reference Year | 1996

Methodology: See methodology for the variable GDP90.

Indicator | GDP97 | Collection | Ancillary Data
Indicator # | 453 | Sub-Index
Indicator Name | GDP in 2000 US Dollars
Units | Millions of US Dollars (constant 2000 US$)
Reference Year | 1997

Methodology: See methodology for the variable GDP90.

Indicator | GDP98 | Collection | Ancillary Data
Indicator # | 454 | Sub-Index
Indicator Name | GDP in 2000 US Dollars
Units | Millions of US Dollars (constant 2000 US$)
Reference Year | 1998

Methodology: See methodology for the variable GDP90.

Indicator | GDP99 | Collection | Ancillary Data
Indicator # | 455 | Sub-Index
Indicator Name | GDP in 2000 US Dollars
Units | Millions of US Dollars (constant 2000 US$)
Reference Year | 1999

Methodology
See methodology for the variable GDP90.

Indicator GDP00 Collection Ancillary Data
Indicator # 456 Sub-Index
Indicator Name GDP in 2000 US Dollars
Units Millions of US Dollars (constant 2000 US$)
Reference Year 2000
Source World Bank Development Data Group. 2006. World Development Indicators Database.
Methodology
See methodology for the variable GDP90.

Indicator GDP01 Collection Ancillary Data
Indicator # 457 Sub-Index
Indicator Name GDP in 2000 US Dollars
Units Millions of US Dollars (constant 2000 US$)
Reference Year 2001
Source World Bank Development Data Group. 2006. World Development Indicators Database.
Methodology
See methodology for the variable GDP90.

Indicator GDP02 Collection Ancillary Data
Indicator # 458 Sub-Index
Indicator Name GDP in 2000 US Dollars
Units Millions of US Dollars (constant 2000 US$)
Reference Year 2002
Source World Bank Development Data Group. 2006. World Development Indicators Database.
Methodology
See methodology for the variable GDP90.

Indicator GDP03 Collection Ancillary Data
Indicator # 459 Sub-Index
Indicator Name GDP in 2000 US Dollars
Units Millions of US Dollars (constant 2000 US$)
Reference Year 2003
Source World Bank Development Data Group. 2006. World Development Indicators Database.
### Methodology
See methodology for the variable GDP90.

### Indicator
**Indicator** | **GDP04** | **Collection** | **Ancillary Data**
--- | --- | --- | ---
**Indicator #** | 460 | **Sub-Index**
**Indicator Name** | GDP in 2000 US Dollars | **Units** | Millions of US Dollars (constant 2000 US$)
**Methodology** | See methodology for the variable GDP90.

### Indicator
**Indicator** | **GDPPC05** | **Collection** | **Ancillary Data**
--- | --- | --- | ---
**Indicator #** | 461 | **Sub-Index**
**Indicator Name** | GDP Per Capita | **Units** | US Dollars
**Methodology** | Gross domestic product (GDP) measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. For more details on the methodology used to calculate it, see indicators GDP90-GDP04. GDP per capita represents the total GDP divided by national population.

### Indicator
**Indicator** | **LANDAREA** | **Collection** | **Ancillary Data**
--- | --- | --- | ---
**Indicator #** | 462 | **Sub-Index**
**Indicator Name** | Land Area (not including large water bodies and permanent ice) | **Units** | Square Kilometers
**Reference Year** | 2005 |

Methodology: LANDAREA reflects land area only - that is land area net of permanent ice and large water bodies. Large waterbodies are those that are greater than 15 square km as identified in the Digital Chart of the World.

Indicator: WATICEAREA
Collection: Ancillary Data
Indicator #: 463
Sub-Index
Indicator Name: Area of Large Waterbodies and Permanent Ice
Units: Square Kilometers
Reference Year: 2005

Methodology: Large waterbodies are those that are greater than 15 square km as identified in the Digital Chart of the World. Smaller waterbodies are not included.

Indicator: TOTALAREA
Collection: Ancillary Data
Indicator #: 464
Sub-Index
Indicator Name: Total Land Area (including large water bodies and permanent ice)
Units: Square Kilometers
Reference Year: 2005

Methodology: LANDAREA reflects the total territory of the country, including land, large waterbodies, and area under permanent ice. Large waterbodies are those that are greater than 15 square km as identified in the Digital Chart of the World.