



Summary for Policymakers

2005 Environmental Sustainability Index

Benchmarking National Environmental Stewardship

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World Economic Forum
Geneva, Switzerland

Joint Research Centre of the European Commission
Ispra, Italy

Environmental Sustainability Index – Rankings and Scores

ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank
1	Finland	75.1	1		50	Cameroon	52.5		32	99	Azerbaijan	45.4		73
2	Norway	73.4	2		51	Ecuador	52.4		33	100	Kenya	45.3		74
3	Uruguay	71.8		1	52	Laos	52.4		34	101	India	45.2		75
4	Sweden	71.7	3		53	Cuba	52.3		35	102	Poland	45.0	27	
5	Iceland	70.8	4		54	Hungary	52.0	19		103	Niger	45.0		76
6	Canada	64.4	5		55	Tunisia	51.8		36	104	Chad	45.0		77
7	Switzerland	63.7	6		56	Georgia	51.5		37	105	Morocco	44.8		78
8	Guyana	62.9		2	57	Uganda	51.3		38	106	Rwanda	44.8		79
9	Argentina	62.7		3	58	Moldova	51.2		39	107	Mozambique	44.8		80
10	Austria	62.7	7		59	Senegal	51.1		40	108	Ukraine	44.7		81
11	Brazil	62.2		4	60	Zambia	51.1		41	109	Jamaica	44.7		82
12	Gabon	61.7		5	61	Bosnia & Herze.	51.0		42	110	United Arab Em.	44.6		83
13	Australia	61.0	8		62	Israel	50.9		43	111	Togo	44.5		84
14	New Zealand	60.9	9		63	Tanzania	50.3		44	112	Belgium	44.4	28	
15	Latvia	60.4		6	64	Madagascar	50.2		45	113	Dem. Rep. Congo	44.1		85
16	Peru	60.4		7	65	United Kingdom	50.2	20		114	Bangladesh	44.1		86
17	Paraguay	59.7		8	66	Nicaragua	50.2		46	115	Egypt	44.0		87
18	Costa Rica	59.6		9	67	Greece	50.1	21		116	Guatemala	44.0		88
19	Croatia	59.5		10	68	Cambodia	50.1		47	117	Syria	43.8		89
20	Bolivia	59.5		11	69	Italy	50.1	22		118	El Salvador	43.8		90
21	Ireland	59.2	10		70	Bulgaria	50.0		48	119	Dominican Rep.	43.7		91
22	Lithuania	58.9		12	71	Mongolia	50.0		49	120	Sierra Leone	43.4		92
23	Colombia	58.9		13	72	Gambia	50.0		50	121	Liberia	43.4		93
24	Albania	58.8		14	73	Thailand	49.7		51	122	South Korea	43.0	29	
25	Central Afr. Rep.	58.7		15	74	Malawi	49.3		52	123	Angola	42.9		94
26	Denmark	58.2	11		75	Indonesia	48.8		53	124	Mauritania	42.6		95
27	Estonia	58.2		16	76	Spain	48.8	23		125	Philippines	42.3		96
28	Panama	57.7		17	77	Guinea-Bissau	48.6		54	126	Libya	42.3		97
29	Slovenia	57.5		18	78	Kazakhstan	48.6		55	127	Viet Nam	42.3		98
30	Japan	57.3	12		79	Sri Lanka	48.5		56	128	Zimbabwe	41.2		99
31	Germany	56.9	13		80	Kyrgyzstan	48.4		57	129	Lebanon	40.5		100
32	Namibia	56.7		19	81	Guinea	48.1		58	130	Burundi	40.0		101
33	Russia	56.1		20	82	Venezuela	48.1		59	131	Pakistan	39.9		102
34	Botswana	55.9		21	83	Oman	47.9		60	132	Iran	39.8		103
35	P. N. Guinea	55.2		22	84	Jordan	47.8		61	133	China	38.6		104
36	France	55.2	14		85	Nepal	47.7		62	134	Tajikistan	38.6		105
37	Portugal	54.2	15		86	Benin	47.5		63	135	Ethiopia	37.9		106
38	Malaysia	54.0		23	87	Honduras	47.4		64	136	Saudi Arabia	37.8		107
39	Congo	53.8		24	88	Côte d'Ivoire	47.3		65	137	Yemen	37.3		108
40	Netherlands	53.7	16		89	Serbia & Mont.	47.3		66	138	Kuwait	36.6		109
41	Mali	53.7		25	90	Macedonia	47.2		67	139	Trinidad & Tob.	36.3		110
42	Chile	53.6		26	91	Turkey	46.6	24		140	Sudan	35.9		111
43	Bhutan	53.5		27	92	Czech Rep.	46.6	25		141	Haiti	34.8		112
44	Armenia	53.2		28	93	South Africa	46.2		68	142	Uzbekistan	34.4		113
45	United States	52.9	17		94	Romania	46.2		69	143	Iraq	33.6		114
46	Myanmar	52.8		29	95	Mexico	46.2	26		144	Turkmenistan	33.1		115
47	Belarus	52.8		30	96	Algeria	46.0		70	145	Taiwan	32.7		116
48	Slovakia	52.8	18		97	Burkina Faso	45.7		71	146	North Korea	29.2		117
49	Ghana	52.8		31	98	Nigeria	45.4		72					

Note: The 2005 ESI scores are not directly comparable to the 2002 ESI scores. See Appendix A for details on methodological changes.

The 2005 Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and a society’s capacity to improve its environmental performance – into 21 indicators of environmental sustainability.

These indicators permit comparison across the following five fundamental components of sustainability: Environmental Systems; Environmental Stresses; Human Vulnerability to Environmental Stresses; Societal Capacity to Respond to Environmental Challenges; and Global Stewardship.

The issues reflected in the indicators and the underlying variables were chosen through an extensive review of the environmental literature, assessment of available data, rigorous analysis, and broad-based consultation with policymakers, scientists, and indicator experts.

The ESI provides a powerful environmental decisionmaking tool tracking national environmental performance and facilitating

comparative policy analysis. It enables a more data-driven and empirical approach to policymaking.

While absolute measures of sustainability remain elusive, many aspects of environmental sustainability can be measured on a relative basis with results that provide a context for policy evaluations and judgments. Such comparisons are especially important in the new context of worldwide efforts to advance the environment-related aspects of the Millennium Development Goals.

Higher ESI scores suggest better environmental stewardship. The five highest-ranking countries are Finland, Norway, Uruguay, Sweden, and Iceland – all countries that have substantial natural resource endowments, low population density, and have managed the challenges of development with some success.

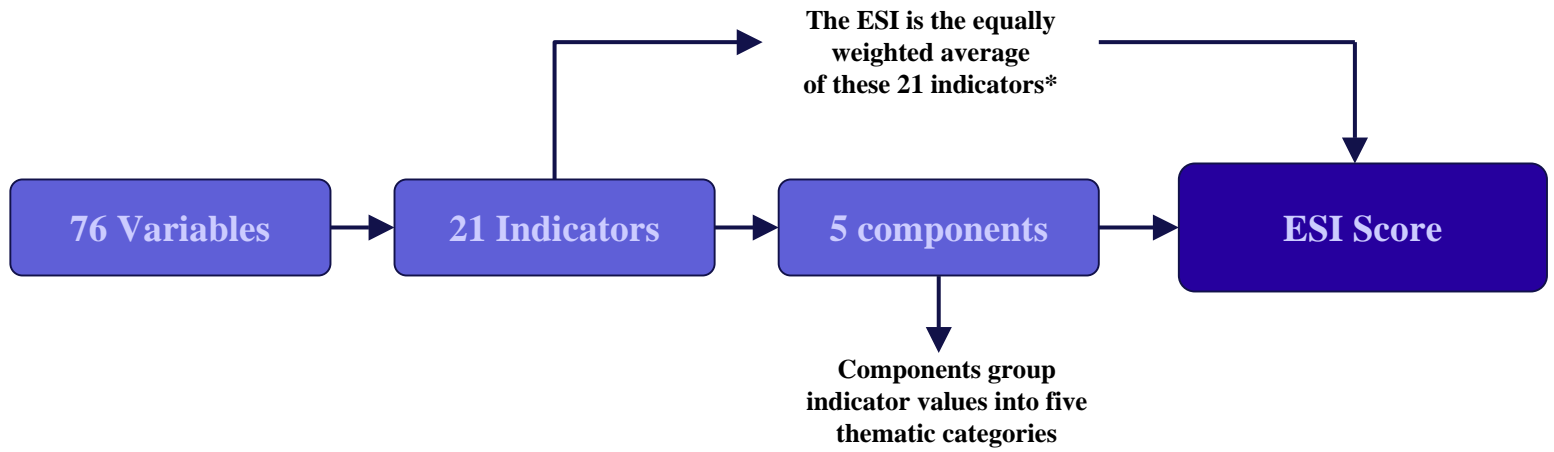
The lowest ranking countries are North Korea, Iraq, Taiwan, Turkmenistan, and Uzbekistan. These countries face numerous issues, both natural and manmade, and have not managed their policy choices well.

A number of core policy conclusions emerge from the ESI analysis:

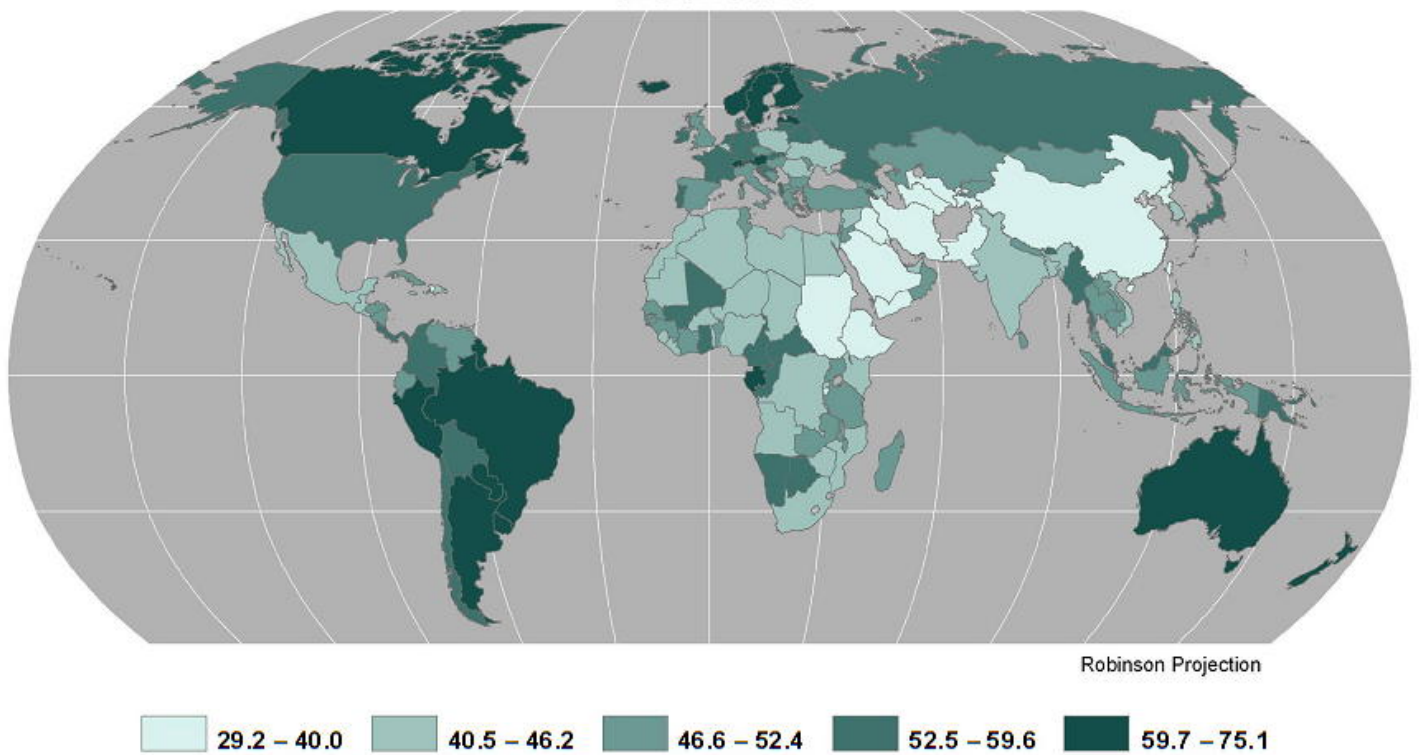
- The ESI provides a valuable tool for benchmarking environmental stewardship and permits comparative policy analysis.
- Environmental stewardship demands attention to a wide range of pollution control and natural resource management issues.
- Developing and developed countries face distinct environmental challenges – the pollution pressures of industrialization on one hand and the stresses of poverty and incapacity on the other.
- Economic success contributes to the potential of environmental success but does not guarantee it. Environmental stewardship depends on both policy efforts and a society’s over-arching social, political, and economic systems.
- While it appears that no country is on a fully sustainable trajectory, at every level of development, some countries are managing their environmental challenges better than others.
- Measures of governance, including the rigor of regulation and the degree of cooperation with international policy efforts, correlate highly with overall environmental success. This result suggests that emphasis on good governance may be justified.
- The lack of reliable data to measure performance on a number of issues and across many countries hinders attempts to move toward more data-driven and empirical decisionmaking.



Constructing the ESI



Environmental Sustainability Index Country Scores by Quintile



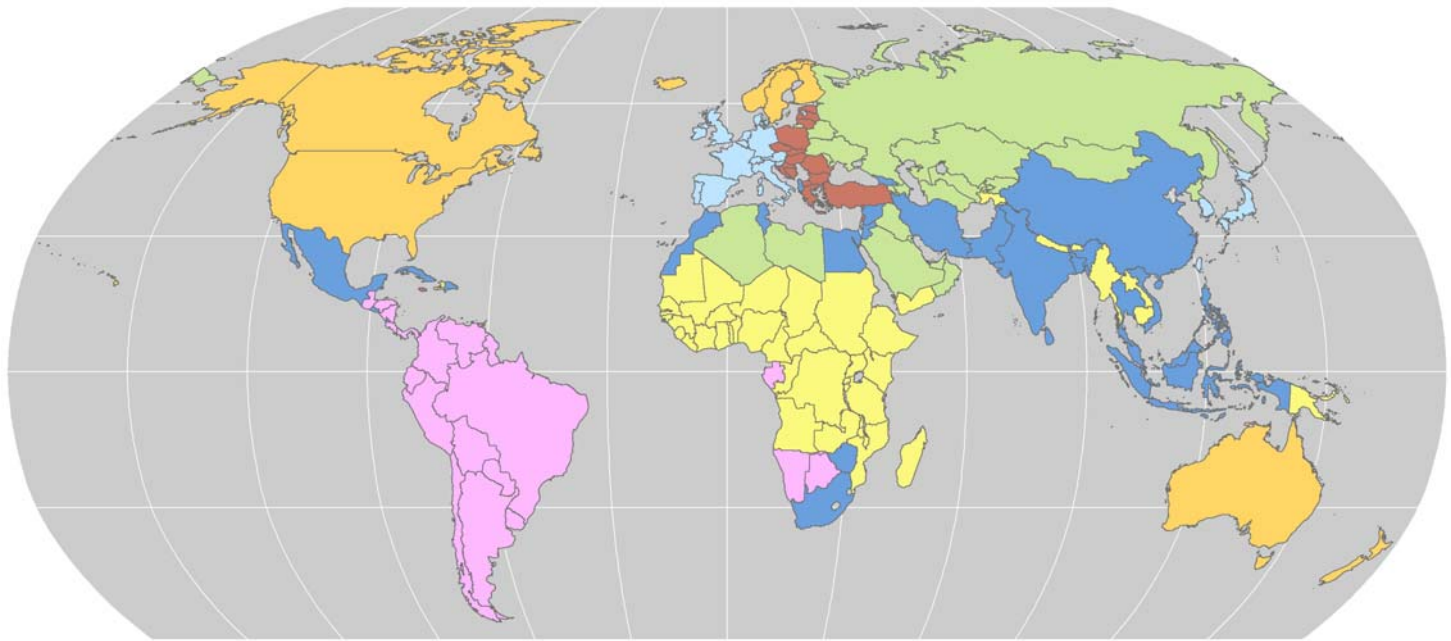
*Note: While the equal weighting of the indicators has some affect on ESI Scores, sensitivity analysis demonstrates the relative robustness of the ESI structure.



76 Variables		21 Indicators	5 Components
<ul style="list-style-type: none"> •Nitrogen dioxide concentration •Sulfur dioxide concentration 	<ul style="list-style-type: none"> •Particulate concentration •Indoor air quality 	Air Quality	Environmental Systems
<ul style="list-style-type: none"> •Ecoregions at risk •Threatened birds •Threatened mammals 	<ul style="list-style-type: none"> •Threatened amphibians •National Biodiversity Index 	Biodiversity	
<ul style="list-style-type: none"> •Wilderness area 	<ul style="list-style-type: none"> •Developed area 	Land	
<ul style="list-style-type: none"> •Dissolved oxygen •Electrical conductivity 	<ul style="list-style-type: none"> •Suspended solids •Phosphorus concentration 	Water Quality	
<ul style="list-style-type: none"> •Surface water availability 	<ul style="list-style-type: none"> •Groundwater availability 	Water Quantity	
<ul style="list-style-type: none"> •Coal consumption •Nitrogen oxide emissions •Sulfur dioxide emissions 	<ul style="list-style-type: none"> •VOC emissions •Vehicles in use 	Reducing Air Pollution	Reducing Environmental Stresses
<ul style="list-style-type: none"> •Forest cover change 	<ul style="list-style-type: none"> •Acidification 	Reducing Ecosystem Stresses	
<ul style="list-style-type: none"> •Population growth 	<ul style="list-style-type: none"> •Total fertility rate 	Reducing Population Growth	
<ul style="list-style-type: none"> •Ecological Footprint •Waste recycling rates 	<ul style="list-style-type: none"> •Hazardous waste generation 	Reducing Waste & Consumption Pressures	
<ul style="list-style-type: none"> •Industrial organic effluents •Fertilizer consumption 	<ul style="list-style-type: none"> •Pesticide consumption •Area under water stress 	Reducing Water Stress	
<ul style="list-style-type: none"> •Overfishing •Sustainably managed forests •Market distortions 	<ul style="list-style-type: none"> •Salinization due to irrigation •Agricultural subsidies 	Natural Resource Management	Reducing Human Vulnerability
<ul style="list-style-type: none"> •Deaths from intestinal infectious diseases •Child mortality rate 	<ul style="list-style-type: none"> •Child mortality due to respiratory infections 	Environmental Health	
<ul style="list-style-type: none"> •Malnutrition 	<ul style="list-style-type: none"> •Safe drinking water supply 	Basic Human Sustenance	
<ul style="list-style-type: none"> •Casualties due to environmental disasters 	<ul style="list-style-type: none"> •Environmental Hazard Exposure Index 	Reducing Environment-Related Natural Disaster Vulnerability	Social and Institutional Capacity
<ul style="list-style-type: none"> •Gasoline price •Corruption •Government effectiveness •Protected land area •Environmental governance •Strength of rule of law •Local Agenda 21 initiatives 	<ul style="list-style-type: none"> •Civil and political liberties •Sustainable development data gaps •International environmental engagement •Environmental knowledge creation •Democratic institutions 	Environmental Governance	
<ul style="list-style-type: none"> •Energy consumption / GDP 	<ul style="list-style-type: none"> •Renewable energy production 	Eco-Efficiency	
<ul style="list-style-type: none"> •Corporate sustainability (Dow Jones) •Corporate sustainability (Innovest) •ISO 14001 certified companies 	<ul style="list-style-type: none"> •ISO 14001 certified companies •Private sector environmental innovation •Participation in Responsible Care Program 	Private Sector Responsiveness	
<ul style="list-style-type: none"> •Innovation capacity •Digital Access Index •Female primary education 	<ul style="list-style-type: none"> •University enrollment •Research scientists 	Science and Technology	
<ul style="list-style-type: none"> •Intergovernmental environmental activities •Role in international environmental aid 	<ul style="list-style-type: none"> •Participation in international environmental agreements 	Participation in International Collaborative Efforts	Global Stewardship
<ul style="list-style-type: none"> •Greenhouse gas emissions / GDP 	<ul style="list-style-type: none"> •Greenhouse gas emissions / capita 	Greenhouse Gas Emissions	
<ul style="list-style-type: none"> •Transboundary sulfur dioxide spillovers 	<ul style="list-style-type: none"> •Polluting-goods imports 	Reducing Transboundary Environmental Pressures	



Cluster Analysis ESI Characteristic-Based Country Groupings



Cluster Component Characteristics

Robinson Projection

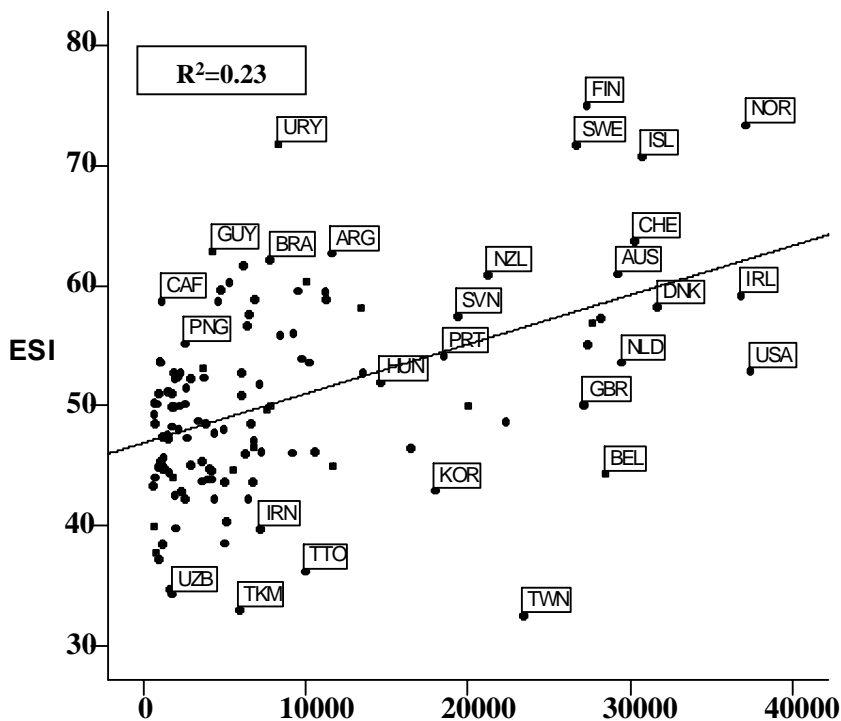
- 1 Low system and stress scores; low vulnerability and high capacity; moderate stewardship
- 2 Moderate system and stress scores; high vulnerability and low capacity; above average stewardship
- 3 Above average system score; low vulnerability; high capacity; moderate stresses and stewardship
- 4 Moderate system, stresses, and capacity scores; low vulnerability and stewardship
- 5 Above average system score, moderate stresses, vulnerability, capacity, and stewardship
- 6 Moderate system, stresses, and vulnerability scores; low capacity and stewardship
- 7 Low system score; moderate stresses, vulnerability, capacity, and stewardship

The ESI offers a mechanism for establishing “peer groups” of countries for the purpose of benchmarking environmental performance. The cluster analysis provides a statistically derived set of seven groupings that links countries based on their environmental characteristics. The clusters facilitate comparative analysis that helps to highlight leaders and laggards on an issue-by-issue basis and permits countries to gauge relative performance and identify best practices.



ESI – GDP Relationship

At every level of development some countries handle their pollution control and natural resource management issues better than others. Countries above the regression line show results that exceed income-based expectations; those below the line are underperforming given their level of development.



- | | | |
|-----------------------|-------------------|----------------------------|
| ARG: Argentina | HUN: Hungary | SWE: Sweden |
| AUS: Australia | IRL: Ireland | SVN: Slovenia |
| BEL: Belgium | IRN: Iran | TKM: Turkmenistan |
| BRA: Brazil | ISL: Iceland | TTO: Trinidad & Tobago |
| CAF: Central Afr. Rep | KOR: South Korea | URY: Uruguay |
| CHE: Switzerland | NLD: Netherlands | USA: United States |
| DNK: Denmark | NOR: Norway | UZB: Uzbekistan |
| FIN: Finland | NZL: New Zealand | Not Labeled: 107 countries |
| GBR: United Kingdom | PNG: P. N. Guinea | |
| GUY: Guyana | PRT: Portugal | |

Critical Role of Governance

Variables Most Highly Correlated with the ESI	Correlation Coefficient
Civil and political liberties	0.59
World Economic Forum Survey on environmental governance	0.54
Government effectiveness	0.51
Political institutions	0.50
Participation in international environmental agreements	0.49

The top five correlations all reflect elements of governance, including variables related to domestic political structure, regulatory effectiveness, and engagement in global-scale environmental efforts. Although these results do not prove a causal relationship, they suggest that the recent policy emphasis placed on good governance may be justified.

The full ESI Report, including methodological appendices and all data, is available at:

www.yale.edu/esi

An interactive version of the ESI permitting the user to adjust the weighting of the indicators is under development.

The ESI in action...

“As a conceptual framework and analytic tool, the Environmental Sustainability Index has now been introduced to the policymaking discourse in the Philippines. As Chair of the Committee on Ecology in the House of Representatives, I have called on the government to be more serious about measuring the efficacy of programs and policies -- and the ESI provides a way to benchmark our performance and identify successful strategies.”

*Neric Acosta
Congressman and Chair of the Committee on Ecology
Manila, The Philippines*

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