



02

Key purpose, issues and findings

Green Growth Index measures country performance in achieving sustainability targets including Sustainable Development Goals, Paris Climate Agreement, and Aichi Biodiversity Targets for four green growth dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities and social inclusion.

The four dimensions of green growth are closely interlinked. Efficient and sustainable resource use entails more productive use of natural resources and more cumulative economic value with less resources (ECN, 2013;p.3) and without endangering needs of future generations. It focuses on physical resources, such as water, energy, land, and materials but also on ecosystem services (ECN, 2013; Flachenecker & Rentschler, 2018). These are natural capital, which consists of living and nonliving

components of ecosystems that people use to produce goods and services (Guerry et al., 2015). Natural capital provides basic conditions, such as fertile soil, multifunctional forests, productive land and seas, good quality freshwater and clean air, and pollination (EEA, 2015). Without natural capital protection, these conditions that support ecosystem services are at risk. Green growth emphasizes the role of natural capital in generating new sources of growth and expanding economic opportunities in the form of green investment and jobs, among other opportunities (OECD, 2011). This new model of growth focuses on people (Bass et al., 2016), where social inclusion becomes a key mechanism to ensuring people's contribution to, sustaining opportunities, and distributing benefits from economic growth. Chapter 4 discusses further details on the relevance of the dimensions to green growth.

Figure 1 Indicator Framework for the Green Growth Index

	Dimensions [Goals]	Indicator categories [Pillars]	Indicators [metrics]
Green Growth Index	Efficient and sustainable resource use	Efficient and sustainable energy	EE1 Ratio of total primary energy supply to GDP (MJ per \$2011 PPP GDP)
			EE2 Share of renewables to total final energy consumption (Percent)
		Efficient and sustainable water use	EW1 Water use efficiency (USD per m ³)
			EW2 Share of freshwater withdrawal to available freshwater resources (Percent)
		Sustainable land use	SL1 Average soil organic carbon content (Tons per hectare)
			SL2 Share of organic agriculture to total agricultural land area (Percent)
		Material use efficiency	ME1 Total domestic material consumption (DMC) per unit of GDP (DMC kg per GDP)
			ME2 Total material footprint (MF) per capita (MF tons per capita)
	Natural capital protection	Environmental quality	EQ1 PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m ³)
			EQ2 DALY rate as affected by unsafe water sources (DALY lost per 100,000 persons)
			EQ3 Municipal solid waste (MSW) generation per capita (Tons per year per capita)
		Greenhouse gas emissions reductions	GE1 Ratio of CO ₂ emissions, excluding AFOLU to population (Metric tons per capita)
			GE2 Ratio of non-CO ₂ emissions excluding AFOLU to population (Tons per capita)
			GE3 Ratio of non-CO ₂ emissions in agriculture to population (Gigagrams per 1,000 persons)
		Biodiversity and ecosystem protection	BE1 Average proportion of Key Biodiversity Areas covered by protected areas (Percent)
			BE2 Share of forest area to total land area (Percent)
			BE3 Soil biodiversity, potential level of diversity living in soils (Index)
		Cultural and social value	CV1 Red list index (Index)
			CV2 Tourism and recreation in coastal and marine areas (Score)
			CV3 Share of terrestrial and marine protected areas to total territorial areas (Percent)
Green economic opportunities	Green investment	GV1 Adjusted net savings, minus natural resources and pollution damages (Percent GNI)	
	Green trade	GT1 Share of export of environmental goods (OECD and APEC class.) to total export (Percent)	
	Green employment	GJ1 Share of green employment in total manufacturing employment (Percent)	
	Green innovation	GN1 Share of patent publications in environmental technology to total patents (Percent)	
Social inclusion	Access to basic services and resources	AB1 Population with access to safely managed water and sanitation (Percent)	
		AB2 Population with access to electricity and clean fuels/technology (Percent)	
		AB3 Fixed Internet broadband and mobile cellular subscriptions (Number per 100 people)	
	Gender balance	GB1 Proportion of seats held by women in national parliaments (Percent)	
		GB2 Ratio of female to male with account in financial institution, age 15+ (Percent)	
		GB3 Getting paid, covering laws and regulations for equal gender pay (Score)	
	Social equity	SE1 Inequality in income based on Atkinson (Index)	
		SE2 Ratio of urban to rural, access to safely managed water/sanitation and electricity (Percent)	
		SE3 Share of youth not in education, employment or training, aged 15-24 years (Percent)	
Social protection	SP1 Proportion of population above statutory pensionable age receiving pension (Percent)		
	SP2 Healthcare access and quality index (Index)		
	SP3 Proportion of urban population living in slums (Percent)		

Figure 1 presents the indicator framework of the Green Growth Index, summarizing the indicator categories and indicators utilized in each green growth dimension. The framework is structured based on four levels: the Index as an overarching measure of green growth performance; the four dimensions as intermediate goals

for achieving green growth; the four indicator categories serving as sustainability pillars in each dimension; and the different indicators that provide policy-relevant metrics for measuring green growth performance and distance to sustainability targets. Definitions of the indicator categories are presented in Box 1 below.

Box 1 Definitions of the indicator categories in Figure 1

1. **Efficient and sustainable energy** refers to delivering more services or products per unit of energy used and meeting present needs by using renewable sources to ensure sustainability of energy for future use. (IRENA and C2E2, 2015; Kutscher, Milford, & Keith, 2018).
2. **Efficient and sustainable water use** refers to delivering more services or products per unit of water used, reducing environmental impact resulting from water scarcity and pollution, and improving water allocation among competing uses. (UNEP, 2014b; Wang, Yang, Deng, & Lan, 2015).
3. **Sustainable land use** refers to delivering more services or products for a fixed amount of land used and without compromising many ecosystem services provided by land. (Auzins, Geipele, & Geipele, 2014; Smith, 2018).
4. **Material use efficiency** refers to delivering more services or products per unit of raw material used and reducing material demand through increased recycling, longer-lasting products, and component re-use, among others. (Allwood, Ashby, Gutowski, & Worrell, 2011; Lifset & Eckelman, 2013).
5. **Environmental quality** refers to properties and characteristics of the environment which may affect the health of human beings and other organisms, including air, water and noise pollution, access to open space, and visual impacts of buildings. (EEA, 2015, 2017).
6. **Greenhouse gas (GHG) emission reduction** refers to the reduction and removal of CO₂ and non-CO₂ emissions from the atmosphere in order to address climate change. (IPCC, 2013; Symon, 2013).
7. **Biodiversity and ecosystem protection** refers to the protection of species, habitats, and ecosystems as well as the services they provide, with protected areas as an important measure to achieve biodiversity conservation. (UNEP-WCMC and IUCN, 2016; IPBES, 2018).
8. **Cultural and social value** refers to the societal value given to natural capital due to its importance to communities and their local culture which encourages sustainable use and protection of natural resources. (Small, Munday, & Durance, 2017; Rocha, Almassy, & Pinter, 2017).
9. **Green investment** refers to public and private investment that promotes in a direct or indirect manner sustainable resource use, including material, water, energy, and land, and natural capital protection, such as environmental protection and climate action, advancing sustainable development and green growth. (Eyraud, Zhang, Wane, & Clements, 2011; Obradović, 2019).
10. **Green trade** refers to the competitiveness of a country to produce and export environmental goods that can contribute to environmental protection, climate action, green growth, and sustainable development. (PAGE, 2017a; European Parliament, 2019).
11. **Green employment** refers to employment created and sustained by economic activities that are more environmentally sustainable; contribute to protecting the environment and reduce people's environmental footprint; and offer decent working conditions. (UNEP, ILO, IOE, & ITUC, 2008; ILO, 2015).
12. **Green innovation** refers to product, process, and service innovations, such as energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management that yields environmental benefits. (Schiederig, Tietze, & Herstatt, 2011; Gao et al., 2018).
13. **Access to basic services** refers to the general availability of services, such as telecommunications, financial, water and sanitation, and energy services, to people regardless of income and location, and which requires an effective governance at multiple scales due to the local nature of these services. (OECD and WB, 2006; UCLG, 2014).
14. **Gender balance** refers to equality based on gender in terms of rights, resources, opportunities, and protection, and the ability to use them to make strategic choices and decision. Women's social and economic empowerment at work, home, and communities increases inclusive growth and reduces poverty. (UNICEF, 2011; UN Women, 2018).
15. **Social equity** refers to a fair and equitable public and social policy, giving equal opportunities to all by a fair allocation of and access to resources that take into account social inequalities. Addressing and embedding equity issues in the design of a policy will lead to sustainable economic growth over the long term. (Clench-Aas & Holte, 2018; OECD, 2018).
16. **Social protection** refers to programs designed to provide benefits to ensure income security and access to social services, contributing to social equity and inclusive society and reducing poverty and exposure to risks. (UNRISD, 2010; ESCWA, 2015).

The scores for the Green Growth Index and its dimensions range from 1 to 100, with 1 having the lowest or very low performance and 100 having highest or very high performance (Figure 2 and Figure 3). Because the indicators are benchmarked against sustainability targets, namely the SDGs, other globally agreed targets, and top country performers, a score of 100 in the index, dimensions, and indicator categories means that a country has reached a given target. The scores are classified in a given range and can be interpreted as follows:

- 80–100 are very high scores, having reached or almost reached the target.
- 60–80 are high scores, taking a strategic position to completely reach the target.
- 40–60 are moderate scores, finding the right balance to move forward to and avoid moving away from the target.
- 20–40 are low scores, identifying the right policies to align development toward achieving the target.
- 1–20 are very low scores, requiring significant actions to improve position relative to the target.

Several countries, albeit mainly developed ones, have reached the goals for social inclusion (Figure 2). Many countries in Africa have low scores and thus continue to lag behind other regions in achieving targets for this dimension, which include indicators on access to basic services, gender balance, social equity, and social protection. Performance in achieving targets in natural capital protection is relatively better for many countries across regions, including Africa, with scores ranging from moderate to high. This dimension covers indicators on environmental quality, GHG emissions reduction, biodiversity and ecosystem protection, and cultural and social value. Only very few countries perform well on efficient and sustainable resource use, which include the Congo Republic, Gabon, and Chad in the African region (see chapter 6.3). These African countries have high to very high scores on the share of renewable to total final energy consumption and share of freshwater withdrawal to available freshwater resources, reaching the sustainability targets of 51.4 percent (Sachs, Schmidt-Traub, Kroll, Lafortune, & Fuller, 2019) and 25 percent (FAO, 2017), respectively. Their scores on total domestic material consumption per unit of GDP and total material footprint per capita are likewise very high. Among European countries, Sweden has high scores for efficient and sustainable resource use which is attributed to it reaching its targets for three indicators, including share of renewable to total final energy consumption, water use efficiency (265.76 USD per m³, OECD, 2019a) and

share of organic agriculture to total agricultural land area (11.9 percent, OECD, 2017b). Among the four green growth dimensions, performance in achieving targets in green economic opportunities is the poorest, with only three countries, namely Denmark, Czech Republic, and Germany, achieving scores between 60 and 64. Scores of other European countries range from moderate to very low. The green economic opportunities include indicators on green investment, green trade, green jobs, and green innovation. Due to the dearth of data for the indicators, no scores can be calculated for many countries, particularly in the African region.

Figure 3 presents overall Green Growth Index results for countries that received scores for all four green growth dimensions. Non-substitutability among dimensions is assumed, so the Index is not computed if the score for one dimension is missing. See chapter 5.8 for further details.

There are 115 countries with complete scores for all dimensions, with 18 percent in Africa, 18 percent in the Americas, 28 percent in Asia, 33 percent in Europe, and only 3 percent in Oceania. The lowest overall score in the Green Growth Index is 16.96 (Sudan) and highest score is 75.32 (Denmark). The scores range from very low to high; no countries have reached a very high score. The 23 countries with high scores are all in Europe. Fifty-four countries have moderate scores in green growth performance, and 36 countries have low scores. A large number of countries in the Americas have moderate green growth performance. The low performing countries are mainly in Africa (14 countries) and Asia (15 countries). Four countries have very low scores for the Green Growth Index including Nigeria, Algeria, and Sudan in Africa, and Iraq in Asia. The top-ranking countries in each region include Botswana in Africa; the Dominican Republic in the Americas; Singapore in Asia; Denmark in Europe; and New Zealand in Oceania. Detailed results for all countries are presented in the statistical tables in Appendix 1 (Table A1.13).

Figure 4 presents a green growth dashboard summarizing performance in the different indicator categories for each dimension by region. The performance in natural capital protection, particularly environmental quality (EQ) and GHG emissions reduction (GE) is high to very high in almost all the regions. In contrast, performance in green economic opportunities, particularly in green trade (GT) and green innovation (GN), is low to very low in many regions. Europe performs notably better in all indicator categories as compared to the rest of the regions. Many countries in Africa, the Americas and Asia have rather low performance in sustainable land use (SL). Presentation of more detailed results are discussed in chapter 6.

Figure 2 Sub-indices of the green growth dimensions for different countries, by region

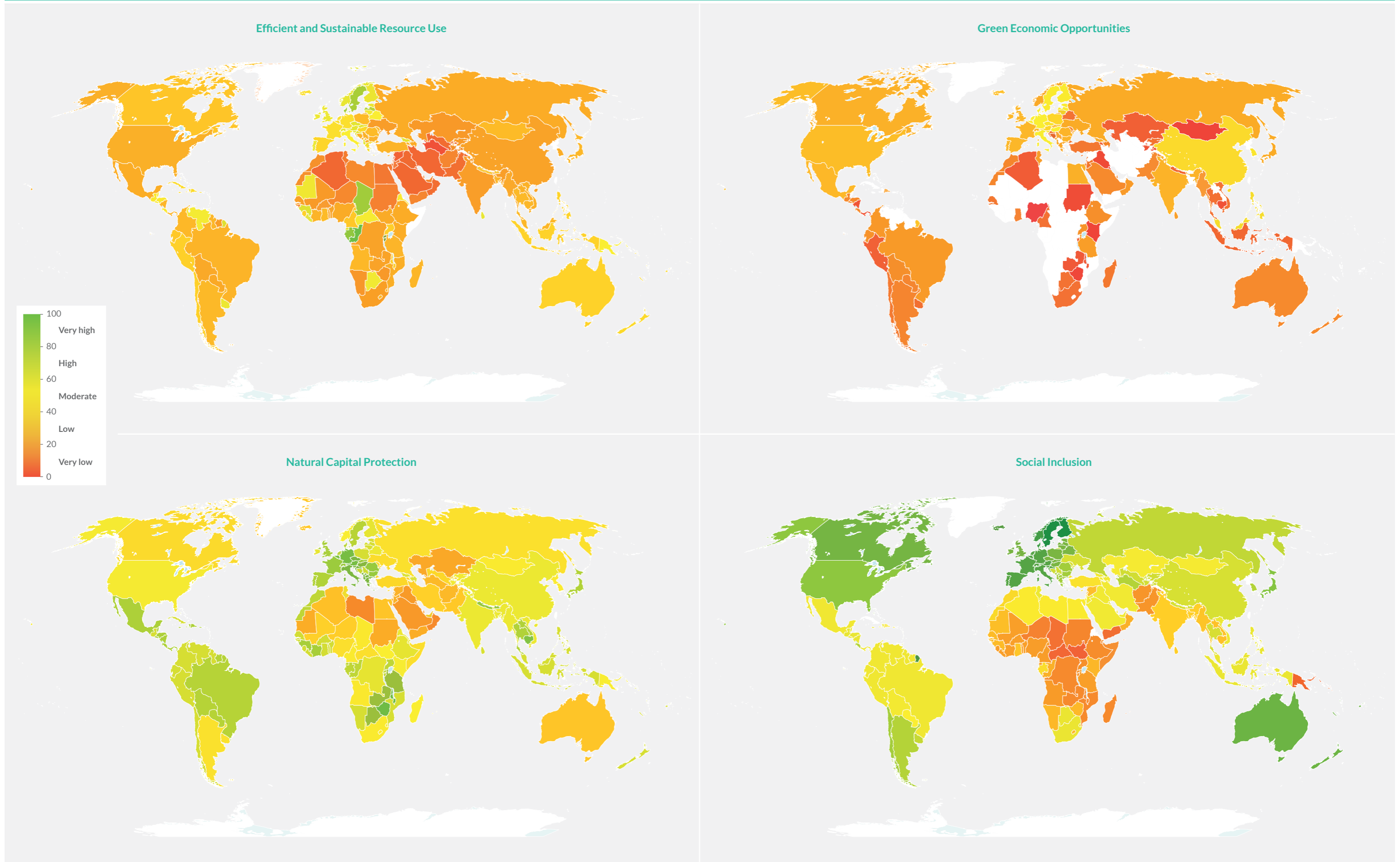
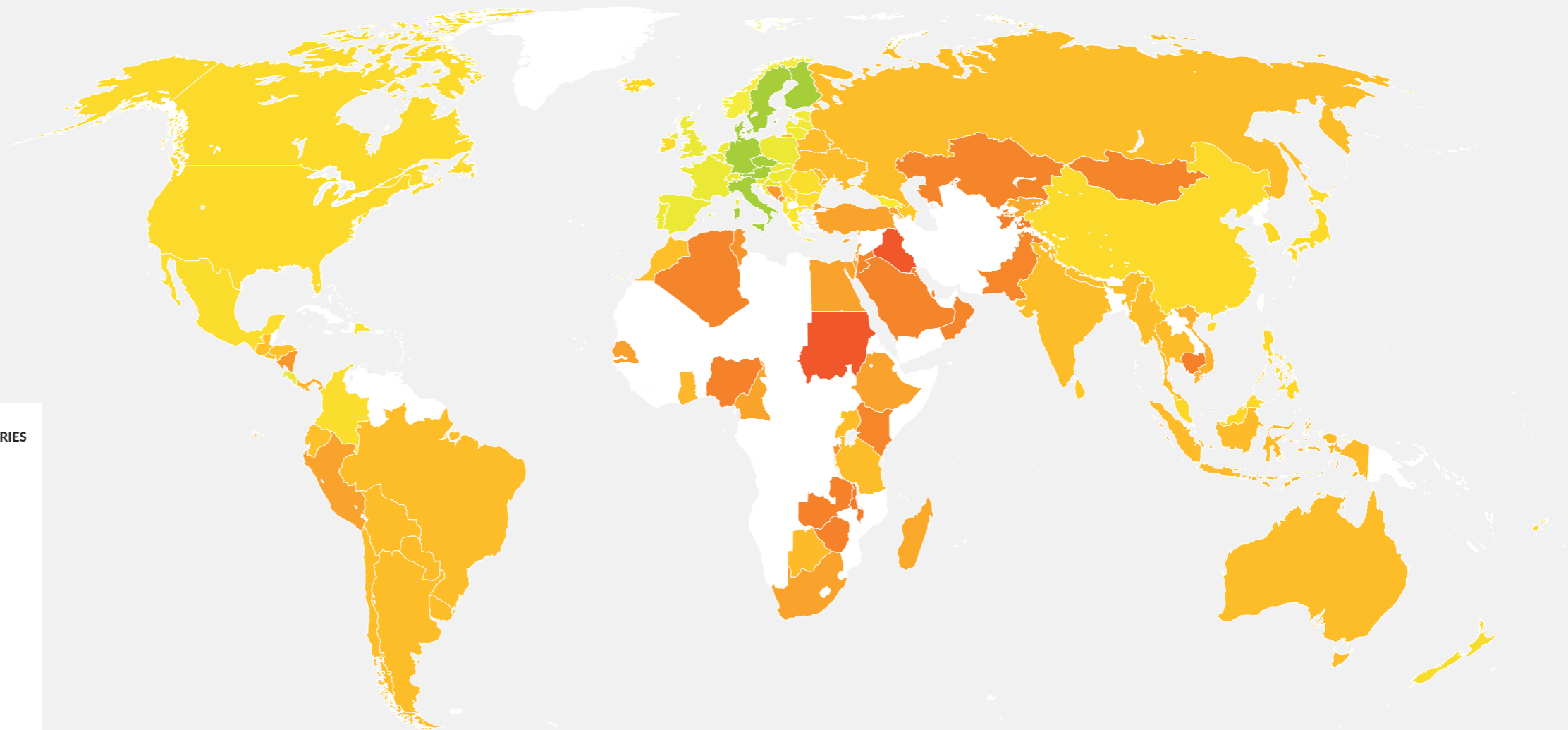
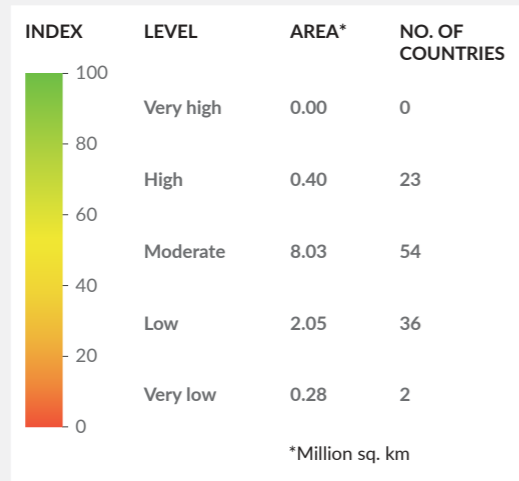


Figure 3 Index and rank of the countries on the Green Growth Index, by region



COUNTRY	RANK	INDEX
Botswana	1	45.88
Tanzania	2	44.32
Mauritius	3	42.63
Morocco	4	42.61
Ghana	5	42.42
Uganda	6	40.96
Tunisia	7	38.88
Senegal	8	38.17
Ethiopia	9	37.48
Egypt	10	36.74
South Africa	11	36.62
Cameroon	12	35.30
Madagascar	13	33.79
Malawi	14	29.43
Zambia	15	26.89
Kenya	16	26.19
Zimbabwe	17	25.71
Burundi	18	25.22
Nigeria	19	22.84
Algeria	20	22.36
Sudan	21	16.96

COUNTRY	RANK	INDEX
Dominican Republic	1	55.10
United States	2	54.22
Canada	3	54.04
El Salvador	4	53.94
Mexico	5	52.71
Colombia	6	50.77
Costa Rica	7	50.63
Brazil	8	49.82
Ecuador	9	48.87
Guatemala	10	46.77
Chile	11	46.58
Bolivia	12	46.10
Argentina	13	45.21
Paraguay	14	43.72
Honduras	15	43.08
Uruguay	16	42.99
Bahamas	17	41.36
Peru	18	39.55
Panama	19	38.29
Nicaragua	20	32.74
Trinidad and Tobago	21	29.99

COUNTRY	RANK	INDEX
Singapore	1	58.43
Malaysia	2	55.88
Philippines	3	55.54
Georgia	4	55.45
China	5	55.41
Republic of Korea	6	54.31
Japan	7	53.86
Sri Lanka	8	52.74
India	9	45.58
Azerbaijan	10	44.98
Myanmar	11	44.55
Thailand	12	44.36
Cyprus	13	44.03
Nepal	14	43.54
Israel	15	42.14
Indonesia	16	40.81
Lebanon	17	39.45
Turkey	18	39.22
Viet Nam	19	39.05
Kyrgyzstan	20	36.74
Armenia	21	35.55

COUNTRY	RANK	INDEX
Qatar	22	34.73
Cambodia	23	30.13
Pakistan	24	29.08
Kazakhstan	25	28.10
Saudi Arabia	26	27.92
Mongolia	27	27.33
Jordan	28	26.71
Oman	29	26.25
Tajikistan	30	25.00
Kuwait	31	24.62
Iraq	32	17.32
Denmark	1	75.32
Sweden	2	75.09
Austria	3	72.32
Finland	4	71.69
Czech Republic	5	71.29
Italy	6	70.22
Germany	7	70.04
Estonia	8	68.50
Latvia	9	68.24
Slovakia	10	67.60

COUNTRY	RANK	INDEX
Portugal	11	66.32
Belgium	12	64.94
Hungary	13	64.82
France	14	64.66
Croatia	15	64.49
Slovenia	16	64.00
Spain	17	63.67
Lithuania	18	63.65
Netherlands	19	63.38
United Kingdom	20	63.30
Switzerland	21	62.72
Norway	22	62.10
Poland	23	61.67
Romania	24	59.41
Ireland	25	58.69
Luxembourg	26	58.64
Greece	27	57.42
Bulgaria	28	56.87
Iceland	29	54.42
Serbia	30	52.43
Albania	31	51.66

COUNTRY	RANK	INDEX
Russia	32	49.60
Ukraine	33	46.56
Belarus	34	44.78
Montenegro	35	40.41
Republic of Moldova	36	38.68
Bosnia and Herzegovina	37	34.98
Malta	38	28.13
New Zealand	1	52.17
Australia	2	47.89
Fiji	3	45.48

Figure 4 Dashboard of indicator categories in each green growth dimension, by region

