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Measuring performance in achieving SDG targets

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Preface

We are living in a world increasingly threatened by overlapping crises not likely to end soon – the tail end of the pandemic, the war in Ukraine, the energy and food crises, and the inflation and budget crises. Unfortunately, these all tend to obscure and distract from the climate crisis that has started to ravage many countries, developing and developed alike, in the form of climate-induced natural disasters (i.e., floods and landslides, hurricanes and tornadoes, droughts and fires), loss and damage, refugees, and instability. As the Economist put it on its news on 28th October 2022 eloquently and succinctly: *"Climate change touches everything. It is reshaping weather systems and coastlines, altering where crops can be grown, which diseases thrive, and how armies fight. Rising temperatures affect geopolitics, migration, ecosystems, and the economy. It will remake societies and the world".*

So far, little has been achieved regarding more ambitious emission reduction targets. Last year, the significant move towards a 43 percent reduction by 2030 pushed to COP26 in Glasgow did not materialize, and actual emissions are still rising. This year, much of the debate at COP27 in Egypt was to avoid backsliding away from the 1.5°C commitment. A proposal to expand the breakthrough language from Glasgow to "phase down unabated coal" to include all fossil fuels, coal, oil, and gas, did not make it. To add to this, some European countries have returned to or postponed phasing out fossil fuels like coal to circumvent the impacts of war on energy, food, and inflation. Despite over 30 million Pakistanis being affected by devastating floods in the summer of 2022, there was no significant progress at COP27 linked to adaptation. And Pakistan depends on international support to provide many flood-affected people with food, shelter, and other basic needs.

GGGI will continue to advocate linking green growth with crisis response and combine its green growth development work with humanitarian support. It will thus promote an accelerated green transformation that will, longer term, be a critical contribution to a better world for our children, despite the crises and the risks. In this regard, measurement tools are essential to help assess the country's performance in the green transition. GGGI has a package of quantitative tools to support its members and partners in assessing the impacts of their climate actions and plans for achieving their international commitments on not only mitigation and adaptation but also biodiversity goals. These include the Green Growth Index and its Simulation Tool, which measure performance in achieving sustainability targets for the Sustainable Development Goals (SDGs), the Paris Climate Agreement, and the Aichi Biodiversity Targets. They are based on a framework representing four green growth dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Social inclusion covers humanitarian aspects essential to climate adaptation and social well-being, like access to basic services and resources, gender balance, social equity, and protection.

I am pleased to introduce the fourth global edition of the Green Growth Index report, which covers scores and ranks for 147 countries. With Turkmenistan, Bahrain, Nepal, and Kazakhstan joining as new GGGI members in 2022 and Tajikistan, Togo, Zambia, and several others close to finalizing the ratification process, the annual publication of the Green Growth Index with global coverage become even more crucial to keep track of the performance of its growing members, allowing comparison with peer countries in their respective regions. In 2022, GGGI started to roll out the application of the Green Growth Index at the national level, including Zambia, Laos, and Qatar, to support the development of their national green growth strategies. In addition to the global coverage, this year's edition of the Green Growth Index report features the Zambia Green Growth Index. Like in the global Green Growth Index, the design process for the national Green Growth Index is characterized by participatory approaches, allowing experts to take part in the review and selection of the green growth indicators and interpretation of the Index scores and trends. GGGI appreciates the support of over 80 experts from government, non-government, and academic institutions in Zambia who participated in the series of webinars, participatory workshops, and online surveys to develop the national index. These activities have been very rigorous and systematic, with these experts assessing the policy relevance of 80 indicators for Zambia's Green Growth Index and interpreting the challenges and opportunities for the country's green growth transition based on the Index scores. The design process thus facilitated building the capacity of the national experts to develop and use their own national Green Growth Index for policy and planning.

I want to thank the GGGI Country Teams who advocated the development of a national Green Growth Index for their government partners in 2022 (i.e., Zambia, Laos, Qatar). Equally deserving of gratitude are country teams in Burkina Faso and Ethiopia who supported the application of the Green Growth Simulation Tool to assess the SDG co-benefits in the Low Emissions Development Strategy (LEDS). The international expert group, which consists of professionals and specialists from relevant international organizations, non-government organizations, and the academe, who participated in the review of the green growth indicators for the Zambia Green Growth Index, also deserves the sincerest appreciation. GGGI's Green Growth Performance Measurement (GGPM) Global Program, under the leadership of Dr. Lilibeth Acosta, is responsible for developing and applying the Green Growth Index and Simulation Tool.

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The Green Growth Performance Measurement (GGPM) team expresses its deepest gratitude to the GGGI country teams and their government partners who have facilitated the application and dissemination of the Green Growth Index and its Simulation Tool in various projects in 2022. In Zambia, Ms. Angela Nantulya, GGGI's Country Lead and Project Lead for Zambia GCF readiness, and Mr. Hedges Tembo, Chief Green Economy Officer, Ministry of Green Economy and Environment (MoGEE), have successfully coordinated the webinars and participatory workshops and mobilized many Zambian experts from government, non-government, and academic institutions to participate in these events. Mr. John Msimuko, MoGEE Permanent Secretary, and Mr. Francis Mpampi, GCF/Adaptation Fund NDA Coordinator, also from the MoGEE, supported the dissemination of the Zambia Green Growth Index during the Global Green Growth Week in 2022. Mr. John Msimuko provided the opening remarks for the session on Approaches, Experiences, & Opportunities for Measuring Performance in Green Growth Transition at the Global, Regional & National Levels, which was held on 27 October 2022. Mr. Francis Mpampi made a presentation for sharing experiences on the participatory development of the Zambia Green Growth Index.

The GGPM would like to thank the over 80 Zambian experts who closely work with the team in selecting the green growth indicators and assessing the implications of the Index scores on Zambia's green growth transition. During the two participatory workshops, they showed dedication in responding to many Mentimeter votes and long online surveys and commitment to deliberating and discussing with each other in their breakout sessions. The GGPM team members have learned a lot from them during these workshops. It is also important to acknowledge with gratitude the support of the international expert group in reviewing the 80 green growth indicators, which the Zambian experts selected for the Zambia Green Growth Index.

The GGPM team experienced the same enthusiasm in developing the Lao PDR Green Growth Index with the GGG country team, the Ministry of Planning and Investment (MPI), and 45 experts from various ministries. Mr. Rowan Fraser, GGGI Country Representative, and Bounma Thor, GGGI Program Officer, in close collaboration with Mme. Sisavanh Didaravong, Deputy Director General, DRI, MPI, have successfully organized the first webinar and participatory workshop in 2022. In close collaboration with Dr. Pranab Jyoti Baruah, GGGI Country Representative, and two GGGI Senior Officers - Mr. Chiden Oseo Balmes and Ms. Nadia Laribi, the GGPM team identified green growth indicators for Qatar. The team looks forward to continuing the Green Growth Index projects in Lao PDR and Qatar in 2023.

Several colleagues have supported the application of the Green Growth Simulation (GGSim) to assess SDG co-benefits in the LEDS projects in 2022 and deserve acknowledgment in this report. In Burkina Faso, these include Ms. Laura Jalasjoki, GGGI Country Representative, Mr. Omar Diouf, GGGI Regional Lead Africa, and Mr. Lamine Ouedraogo, GGGI Specialist. In Ethiopia, Mr. Shiferaw Tafesse Gobena, GGGI Senior Program Officer, supported validating the data for the GGSim models. The colleagues in the Climate Action and Inclusive Development unit (CAID) coordinating the LEDS projects – Dr. Stelios Grafakos, Principal Economist; Dr. Shivenes Shammugam, Senior Economic Officer; and Mr. Basil Oberholzer, Economic Officer, have been helpful in the validation of the GGSim results.

And last but not least, in Hungary, the Country team in Hungary led by Dr. Stelios Grafakos, and with support from Miklos Szekely, CAID Officer, have been instrumental in disseminating the GGSim results on the assessment of selected SDGs and their co-benefits in Hungary's National Clean Development Strategy (NCDS). The webinar on SDG assessments, which was held on the 8th of December 2022, was supported by the Ministry of Energy in Hungary, with Dr. Barbara Botos, Ambassador-at-large for Climate, giving opening remarks, and Dr. Monika Rabai, Head of Climate Policy Department, giving closing remarks. The GGPM team is very much appreciative of this support. Equally important was the support extended by Dr. János Abonyi, Professor, Head of Abonyi Lab, and Dr. Viktor Sebestyén, Professor at the University of Pannonia in Veszprém, Hungary, not only to this webinar but also to collaborating with the GGPM team to develop a framework for network science tool, which will complement GGSim's system dynamics models.

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Acronyms and Abbreviations

8NDP	8th National Development plan
AB	Access to Basic Services and Resources
ADB	Asian Development Bank
AfDB	African Development Bank
AFOLU	Agriculture, Forestry, and Other Land Use
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BE	Biodiversity and Ecosystem Protection
BLI	Bird Life International
BoP	Balance of Payments
BP	British Petroleum Company plc
CAID	Climate Action and Inclusive Development
CAIT	Climate Analysis Indicators Tool
CH_4	Methane
CO_2	Carbon Dioxide
CO_2eq	Carbon Dioxide Equivalent
COMESA	Common Market for Eastern and Southern Africa
COVID-19	Coronavirus disease
CV	Cultural and Social Value
DALY	Disability-Adjusted Life Year
DMC	Domestic Material Consumption
EE	Efficient and Sustainable Energy
EMBER	Ember Climate Organization
EQ	Environmental Quality
ESRU	Efficient and Sustainable Resource Use
EU	European Union
EW	Efficient and Sustainable Water Use
F-gas	Fluorinated gases
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FOLU	Forestry, and Other Land Use
GB	Gender Balance
GDP	Gross Domestic Product
GE	GHG Emissions Reduction
GEO	Green Economic Opportunities
GEP	Green Economy Progress
GGGI	Global Green Growth Institute
GGPM	Green Growth Performance Measurement
GGSim	Green Growth Simulation Tool
GRI	Green Recovery Index
GHG	Greenhouse Gas
GJ	Green Employment
GN	Green Innovation
GNI	Gross National Income
GPI	Gender Parity Index
GT	Green Trade
GV	Green Investment
GW	Gigawatts
HF	Heritage Foundation
IEA	International Energy Agency
IHME	Institute for Health Metrics and Evaluation
ILO	International Labour Organization
IMF	International Monetary Fund
IISD	International Institute for Sustainable Development
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPU	Inter-Parliamentary Union
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
LEDS	Low Emission Development Strategies
LPI	Logistics Performance Index
ME	Material Use Efficiency
MERCOSU	Mercado Común del Sur
MF	Material Footprint
MJ	Megajoule
MOF	Zambia Ministry of Finance
MSW	Municipal solid waste
Mt	Metric tons
N_2O	Nitrous Oxide
NAFTA	North American Free Trade Agreement
NBSAP-2	National Biodiversity Strategy and Action Plan
NAP	National Adaptation Plan
NCP	Natural Capital Protection
NDC	National Determined Contributions
NDP	National Development Plan
NGO	Non-government organizations
NPCC	National Policy on Climate Change
NWASCO	National Water Supply and Sanitation Council
OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
OHI	Ocean Health Index
PA	Protected Area
PAGE	Partnership for Action on Green Economy
PM2.5	Particulate matter with a diameter of less than 2.5 micrometers
PPP	Purchasing power parity
PSE	Emerging Senegal Plan
R&D	Research and Development
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SAARC	South Asian Association for Regional Cooperation
SDG	Sustainable Development Goal
SDSN	Sustainable Development Solutions Network
SE	Social Equity
SEA	Strategic Environmental Assessment
SI	Social Inclusion
SL	Sustainable Land Use
SP	Social Protection
Sum4All	Sustainable Mobility for All
UHC	Universal Health Coverage
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UN COMTRADE	United Nations International Trade Statistics Database
UNDP	United Nations Development Programme
UN ECLAC	Economic Commission for Latin America and the Caribbean
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP	The United Nations Environment Programme
UNEP-WCMC	UN Environment Programme World Conservation Monitoring Centre
UN-Habitat	United Nations Human Settlements Programme
UNICEF	United Nations International Children's Emergency Fund
UNIDO	United Nations Industrial Development Organization
UNISDR	United Nations International Strategy for Disaster Reduction Secretariat
UNODC	United Nations Office on Drugs and Crime
UNSTATS	United Nations Statistics Division
USD	United States Dollar
WB	World Bank
WB WBL	Word Bank Women Business and Law
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WHO	World Health Organization
ZICTA	Zambia Information and Communications Technology Authority

Executive Summary

1 The Green Growth Index measures a country's performance in achieving sustainability targets, including Sustainable Development Goals (SDGs), Paris Climate Agreement, and Aichi Biodiversity Targets. It consists of four green growth dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. The Green Growth Index scores range from 1 to 100, classifying 1-20 as very low, 20-40 as low, 40-60 as moderate, 60-80 as high, and 80-100 as very high green growth performance. The highest score of 100 indicates that sustainability targets were achieved because the green growth indicators were benchmarked against these targets. The 40 green growth indicators in this fourth edition of the Green Growth Index were reviewed and validated to be policy relevant by over a hundred experts from 2019 to 2021.

In the following years, the experts will continue to review the green growth indicators to replace proxy variables with SDG indicators and to fill in the eight missing indicators for green economic opportunities due to a need for more data. Twenty-nine out of the 40 indicators are from the SDGs. The data sources for the indicators were published online by international organizations. Analysis of the databases downloaded from these sources in 2021 and 2022 showed some degree of divergences for some indicators in several countries. For this reason, the Index scores published in this report are not directly comparable with those in the 2021 Green Growth Index Report.

2 The 2022 Green Growth Index presents scores for 186 countries in efficient and sustainable resource use (ESRU), 197 countries in natural capital protection (NCP), 151 countries in green economic opportunities (GEO), and 174 countries in social inclusion (SI). Between 42 and 43 percent of the 186 countries with ESRU scores have either high (80 countries) or moderate (78 countries) performance. The NCP is dominated by high scores, with 122 countries, or 62 percent of the 197 countries with scores for this dimension. GEO has the highest number of countries with a very low score, 43 percent of the 151 countries. Moreover, it is the only dimension where no country scores either high or very high. With 40 countries scoring above 80, SI has the highest number of countries with very high scores.

The geometric aggregation of the dimension scores resulted in 147 countries with Green Growth Index scores. The four green growth dimensions are equally important, so Index scores were not computed for countries with missing scores for at least one dimension. No countries score very low or very high on the 2022 Green Growth Index. Of the 147 countries, 43 countries (29 percent) have high scores, and 89 countries (61 percent) have moderate scores. The remaining 15 countries have a low Green Growth Index score, mainly in Asia. The highest-scoring country is Austria, with a score of 77.78, which still needs to reach the sustainability target of 100. The lowest-scoring country is Syria, with only a 25.86 score. Between 2010 and 2021, the countries showing above five percent increase in scores were predominantly in Asia (21 countries) and Europe (18 countries).

3 The regional distribution of the 147 country scores are 39 countries in Africa, 22 countries in the Americas, 41 countries in Asia, 38 countries in Europe, and four countries in Oceania. The Green Growth Index scores in the five African subregions, i.e., Eastern, Middle, Northern, Southern, and Western, were moderate, ranging between 42.40 and 52.15 in 2021. Between 2010 and 2021, the score gain was highest for social inclusion, particularly in Northern Africa, with at least 7 points increase. The Americas and its four subregions, including the Caribbean, Central America, Northern America, and South America, also showed moderate scores between 54.37 and 60.89 in 2021. But the most significant score increase was in green economic opportunities, with a 4.43 score gain in the Caribbean from 2010 to 2021. The subregions of Central, Eastern, South-eastern, Southern, and Western Asia scored between 42.51 to 57.06 on the Green Growth Index in 2021. Green economic opportunities also showed the most significant score gain, as high as 9 points in Eastern Asia. Europe's Eastern, Northern, Southern, and Western subregions performed best on the Green Growth Index, with high scores that range from 63.93 to 71.12 in 2021. Europe's gain in the score is highest in natural capital protection, with Western Europe increasing by 7.78 points in this dimension between 2010 and 2021. Data for green economic opportunities indicators remains insufficient in many Oceania countries, with Green Growth Index scores available only for Australia, New Zealand, Fiji, and Tonga. The scores for these Oceania countries ranged from 50 and 60 in 2021, with Australia gaining the highest score of about 5.5 in natural capital protection and social inclusion from 2010. Overall, social inclusion scores across all regions have risen from 2010 to 2021, particularly in many developing countries like Asia and Africa.

Looking into regional economic groups, including the European Union (EU), North American Free Trade Agreement (NAFTA), Mercado Común del Sur (MERCOSUR), Common Market for Eastern and Southern Africa (COMESA), Association of Southeast Asian Nations (ASEAN), and South Asian Association for Regional Cooperation (SAARC), the EU scored the highest in Green Growth Index, mainly due to its high performance in natural capital protection and very high performance in social inclusion. However, with an overall score of about 70, the EU's performance remained in the moderate range in 2021. NAFTA had a slightly higher score than the EU in green economic opportunities due to higher scores for green employment in the United States of America and Canada. MERCOSUR and ASEAN remained to have moderate scores from 2010 to 2021, with ASEAN's scores in social inclusion lagging behind those of MERCOSUR. COMESA and SAARC were the least-performing economic groups with low scores in the last decade.

4 The country-level scatter analysis of the Green Growth Index scores by region showed that European countries' scores gather around the high range, between 60 and 80, in 2021. This contrasts with the African and Asian countries, whose scores gather around the moderate range, between 40 and 60. There were three African countries with scores below 40, including Niger, Sudan, and Libya. Compared with Africa, more countries in Asia had scores below 40. These Asian countries include Syria, Yemen, Iraq, Kuwait, Afghanistan, Pakistan, Bahrain, Uzbekistan, Iran, Saudi Arabia, Oman, and Qatar. Gabon was the only African country with a score above 60, showing a high green growth performance. In Asia, Japan and Thailand were the countries reaching high scores. The scores for the Americas and Oceania countries tended to split above and below 60, corresponding to high and moderate performance, respectively. In Oceania, Tonga's score was located farther away from the other scores in the scatter diagram. Trinidad and Tobago and Guatemala were farthest from the other countries in the Americas. Nonetheless, these countries in Oceania and the Americas performed moderately, unlike many countries in Africa and Asia, which showed low performance.

In the 2021 Green Growth Index, the top-ranking countries by region were Austria in Europe with a score of 77.78, Japan in Asia with a score of 65.03, Paraguay in the Americas with a score of 62.47, New Zealand in Oceania with a score of 62.37, and Gabon in Africa with a score of 61.56. All countries' scores for green economic opportunities were the lowest in 2021. In Europe, Austria, with a score of 93.45 in social inclusion, occupied the second rank in this dimension. Although Sweden occupies the first rank with a score of 94.71 in social inclusion, Austria surpassed Sweden's very high performance in the other three green growth dimensions. Like Austria, Japan performed best in social inclusion, almost reaching the social equity target with a score of 95.69 in 2021. Although Japan's scores in access to basic services and resources and social protection were also very high, it scored only moderate in gender balance. Paraguay performs best in natural capital protection, occupying the top ranks for cultural and social value and environmental quality in the Americas, with scores of 96.12 and 91.06, respectively, in 2021. New Zealand scored 87.11 for social inclusion in 2021, with very high scores for all pillars in this dimension. Although Australia's social inclusion score was higher, New Zealand performed better in natural capital protection, occupying 1st rank in cultural and social value and 2nd rank in biodiversity and ecosystems protection in Oceania. Gabon's Green Growth Index score was close to New Zealand's due to its relatively high scores in efficient, sustainable resource use and natural capital protection. Performance in social inclusion was only moderate due to low scores in universal health coverage and equal gender pay in Gabon.

5 The 2022 Green Growth Index features Zambia's national Green Growth Index. The GGGI supports the Government of Zambia through a collaborative project to benchmark the country's green growth performance and establishes its readiness to transition to a green economy growth model using GGGI's Green Growth Performance Measurement (GGPM) framework and tools, including the Green Growth Index. The Zambia Green Growth Index includes 80 green growth indicators, which were identified by experts from government, non-government, and academic institutions as policy-relevant for the country. The indicators were aligned with the green growth framework, representing 20 indicators (5 for every four pillars) in each dimension. Of the 80 indicators, 34 are part of the global Green Growth Index (i.e., this report), including 11 in efficient and sustainable resource use, 10 in natural capital protection, 3 in green economic opportunities, and 10 in social inclusion. And 45 are SDG indicators, with 8 in efficient and sustainable resource use, 13 in natural capital protection, 8 in green economic opportunities, and 16 in social inclusion. The indicators that are SDGs and no sustainability targets, the experts agreed to use the top five performers among developing countries instead of global to benchmark Zambia's green growth performance.

Zambia's national Green Growth Index showed a moderate score in 2021. It scored very high in GHG emissions reduction and high in gender balance, environmental quality, efficient and sustainable energy, and waste and material use efficiency. However, its performance in green trade was very low, and green employment was low. The trend in Green Growth Index scores increased from 2010 to 2021, with social inclusion and green economic opportunities mainly contributing to this development. The Zambian experts identified opportunities to improve the country's green growth performance further. For example, in green trade, the Zambian experts emphasized diversifying their export base because extracting and exporting copper is not sustainable. Moreover, they considered it essential to evaluate trade barriers, improve exports' added value, and impose product standards. In green employment, local skills development in light manufacturing presents an opportunity for jobs. Youth unemployment is very high, so local innovation technologies must be exploited to create jobs. The renewable energy and eco-tourism sectors could provide employment opportunities. Other opportunities related to innovation were also identified. With the government's plan to gradually expand irrigated areas throughout the country to boost agricultural production and productivity, water use efficiency could be enhanced by introducing affordable water-saving technologies and infrastructures, e.g., harvest rainfall. Moreover, while productivity is essential, it is also crucial to consider adopting new practices such as climate-smart and organic agriculture, which need proper education and training as well as change in farmers' lifestyles.


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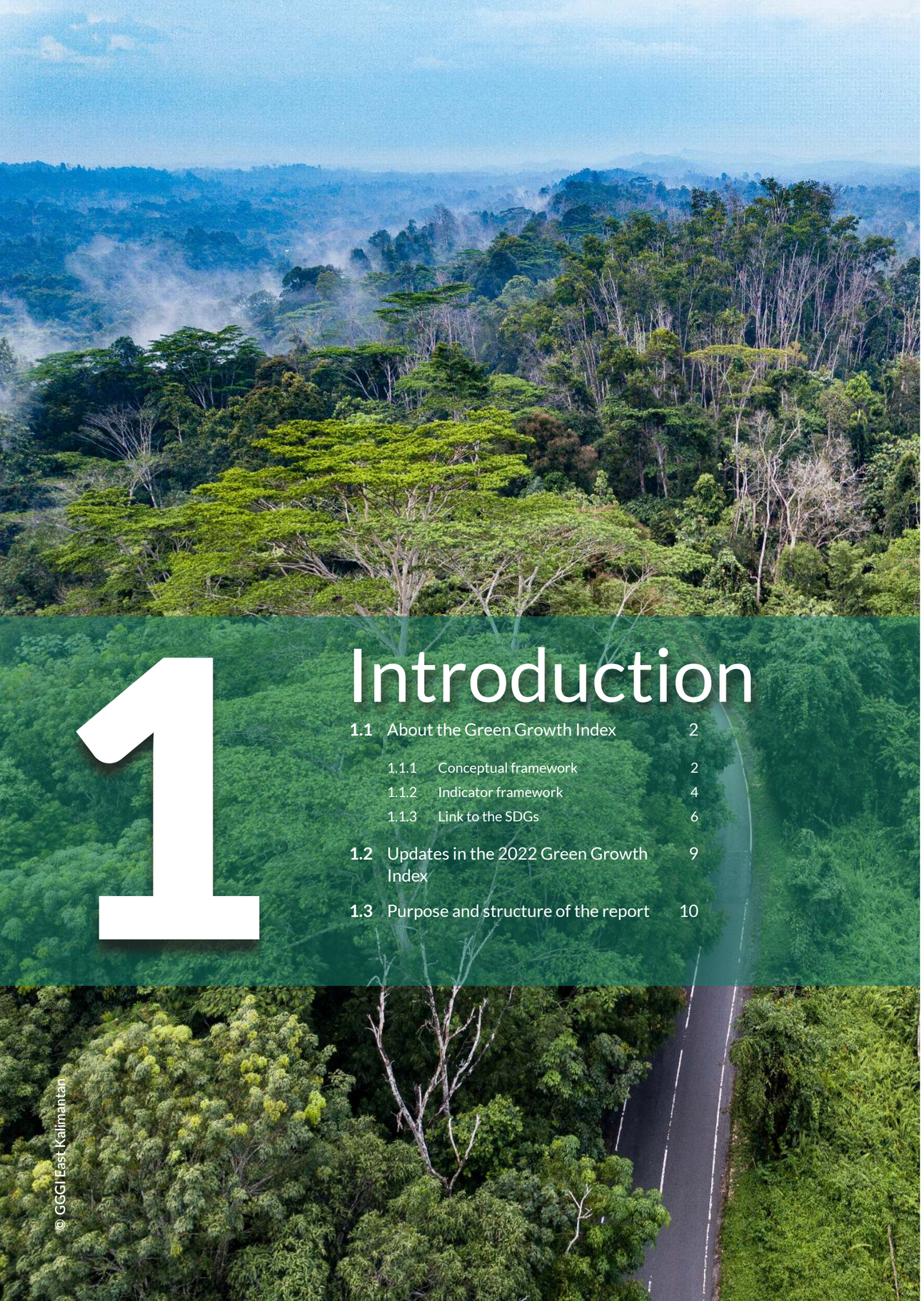
6 The design process for developing the national Green Growth Index followed the same systematic and participatory approaches applied to the global Green Growth Index. It is systematic because the output from each activity feeds in as input into the following activity. It is participatory because the Zambian experts, identified before the process, were not only recipients but also sources of knowledge for developing the Index. Throughout the consultation process, the experts discussed, suggested, and selected the indicators that are policy relevant – with GGGI providing the needed technical support and expertise. The process combined different forms and mediums to allow interactive participation with and among the experts, including seminars/webinars, participatory workshops, online surveys, and dissemination (e.g., global conference). The dissemination of the Zambia Green Growth Index dealt with the presentation of the results in the session on Approaches, Experiences, & Opportunities for Measuring Performance in Green Growth Transition at the Global, Regional & National Levels during the Global Green Growth Week 2022, which was held virtually on 24-28 October 2022. Mr. John Msimuko, Permanent Secretary of the Ministry of Green Economy and Environment, provided the opening remarks for this session, and Mr. Francis Mpampi, the National Coordinator for the Green Climate Fund's National Designated Authority, shared his experiences in participating in the development of the Zambia Green Growth Index. Other speakers and panelists in the session included experts from the Organisation of Eastern Caribbean States (OECS) Commission, Economic Commission for Latin America and the Caribbean (UN-ECLAC), African Development Bank Group (AfDB), Asian Development Bank (ADB), and Organisation for Economic Co-operation and Development (OECD).

No new indicator was added in this year's global Green Growth Index edition. Moreover, none of the proxy variables was replaced due to inadequate data for several countries and years of the relevant SDG indicators. The international experts will continue to support the Global Green Growth Index, providing feedback on the policy relevance of the 80 indicators for the Zambia Green Growth Index. The international experts' ratings on the Zambia Green Growth Index indicators were generally high and very high, with very few exceptions. In the following years, international experts will support the review of additional indicators of green economic opportunities, which is the only dimension that needs to meet the target number of indicators (12 per dimension). Moreover, several indicators in the other dimensions are only proxy variables, which will need to be replaced when data for relevant SDG indicators become available. Here, international experts will also be consulted.

7 In addition to the Zambia Green Growth Index, the GGPM framework and tools were applied to different projects. The Green Growth Simulation Tool (GGSim), which is closely linked to the Green Growth Index, was applied to the Low Emission Development Strategies (LEDS) in Ethiopia and Burkina Faso and to the Green Emerging Senegal Plan (PSE) in Senegal to assess the SDG co-benefits of the policy interventions in these policy documents. The SDG indicators included in the co-benefit assessments include SDG 7.3.1 energy intensity level of primary energy supply and SDG 7.2.1 renewable energy share in the total final energy consumption for the energy sector, SDG 6.4.1 water use efficiency, SDG 6.4.2 level of water stress, and SDG 6.3.1 proportion of wastewater safely treated for the water and waste sector, SDG 12.3.1 food loss and food waste and SDG 15.3.1 nutrient balance per unit area for the agriculture sector, SDG 15.1.1 forest area as a percent of total land area, SDG 15.2.1 above-ground biomass stock in the forest, and SDG 15.3.1 proportion of (forest) land that is degraded over the total land area for the forest sector. The SDG coverage for the assessment will be expected to increase in upcoming projects with the development of the framework for applying network science tools to complement GGSim's system dynamics models.

Other ongoing applications of the GGPM framework and tools include the development of the national Green Growth Index for Lao PDR and Qatar in collaboration with government partners. A collaborative project with the ADB was initiated last year to assess Azerbaijan and Central Asian countries' inclusive and green growth transition. Across the Central Asian subregion, governments recognize the urgent need to reduce fiscal dependency on oil revenues and diversify the economy by finding new drivers of non-oil growth to achieve macroeconomic stability and more sustainable development. A central question of interest for the ADB is to take stock of the ongoing efforts towards green growth and the opportunities, challenges, and options for Azerbaijan and selected Central Asian countries as they move towards a net zero economy.



1 Introduction

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1.1 About the Green Growth Index

The Green Growth Index measures a country's performance in achieving sustainability targets, including Sustainable Development Goals (SDGs), Paris Climate Agreement, and Aichi Biodiversity Targets. The scores for the Green Growth Index range from 1 to 100, with 1 having the lowest or very low performance and 100 having the highest or very high performance. The Green Growth Index is a composite index that combines green growth indicators for four dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Since the first publication of the Green Growth Index in 2019, the indicators have changed and improved as they have been reviewed by over a hundred experts to ensure their relevance to green growth and replace proxy variables with relevant SDG indicators (Table 1). The reviews were conducted through online surveys, allowing experts to participate worldwide. The total number of countries represented by experts increased from 37 in 2019 to over 50 in 2020 and 2021. During these last two years, selected experts contributing to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and Intergovernmental Panel on Climate Change (IPCC) assessment reports were also invited to participate in the reviews. The higher number of countries represented in 2019 can be attributed to the series of participatory workshops conducted during that year.

In this year's Green Growth Index, no new indicator was added, and none of the proxy variables was replaced due to inadequate data for several countries and years of the relevant SDG indicators. However, the data available for the existing indicators have improved so that the number of countries covered in the Green Growth Index increased from 119 in 2021 to 147 in 2022. Moreover, the applications of the Green Growth Index have expanded from global (this report) to regional and national levels. The first regional application was the Green-Blue Growth Index for the Organisation of Eastern Caribbean States (OECS), published in 2021.[1] The Zambia Green Growth Index, published in 2022 and featured in this report (I), is the first application at the national level. The regional and national applications include additional green growth indicators relevant to the economic, social, and environmental contexts of a group of countries or a country. The conceptual framework of the Green Growth Index also guides the selection of indicators at these levels of applications.

Table 1 Number of experts who participated in the review of the green growth indicators, 2019-2021

Year	Total number of experts	Total number of countries	Number of countries represented by the experts				
			Africa	Americas	Asia	Europe	Oceania
2019	101	37	25	18	36	10	3
2020	110	54	11	10	16	13	4
2021	102	51	10	9	15	12	5

1.1.1 Conceptual framework

The Green Growth Index is framed through the interlinkages among the four green growth dimensions, which are defined by four sustainability concepts - low carbon economy, ecosystem health, inclusive growth, and resilient society (Figure 1). Efficient and sustainable use of resources contributes to natural capital protection and supports a low-carbon economy. While using resources like water, energy, land, and materials is key to climate mitigation, protecting natural capital ensures a healthy ecosystem that increases economic productivity and creates new economic opportunities (i.e., green jobs, trade, investment, and innovation) for society. Social inclusion is an essential mechanism to allow people in all parts of society to contribute to creating these opportunities and, at the same time, benefit from them. Green growth thus ensures inclusive growth, enhancing society's resilience. Benefits from green growth should include access to basic services and resources, equal gender opportunities, and social equity and protection, all of which are key to climate adaptation.

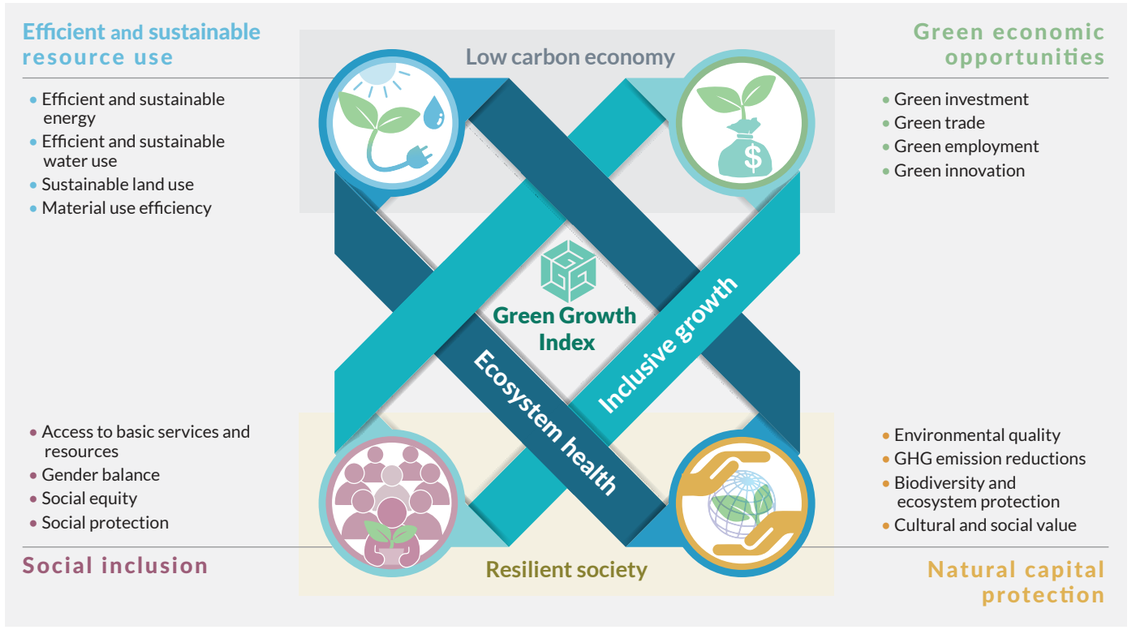
The conceptual framework for the Green Growth Index builds on GGGI's definition of green growth: "Green growth is a development approach that seeks to deliver economic growth that is both environmentally sustainable and socially inclusive. It seeks opportunities for economic growth that are low-carbon and climate resilient, prevent or remediate pollution, maintain healthy and productive ecosystems, and create green jobs, reduce poverty and enhance social inclusion.[2]

Each dimension consists of four indicator categories, which can be interpreted as "pillars" of green growth, forming the basis for the transition to efficient and sustainable resource use, enhancement of natural capital protection, creation of green economic opportunities, and enablement of social inclusion. Box 1 presents the definitions of these pillars. Each pillar consists of green growth indicators, mainly SDG indicators, which are benchmarked against sustainability targets. This complementary set of internationally accepted targets and related indicators is a reliable reference for the Green Growth Index. It allows governments to align their pathway to green growth with achieving the SDGs and national climate and biodiversity goals.[3]

Because the indicators are benchmarked against sustainability targets (see chapter 1.1.3 and Annex 1), a score of 100 on the index, dimensions, and pillars means that a country has reached a given target. The scores are classified in each 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.

Figure 1 Conceptual Framework for the Green Growth Index



1.1.2 Indicator framework

Figure 2 presents the indicators in each pillar of the four green growth dimensions. Each pillar consists of three indicators, except for green economic opportunities. Potential indicators for green investment, trade, employment, and innovation cannot be included in the Green Growth Index due to inadequate time series data and country coverage. Adding these indicators will have two implications for the Green Growth Index: first, only a few countries will have an overall score, and second, the scores will have lower confidence levels (see chapter 6.2.2). A strategic decision is thus to wait for the data to improve for the indicators of green economic opportunities. With this dimension only having four indicators, while efficient and sustainable resource use, natural capital protection, and social inclusion have 12 indicators, the former will automatically receive significant weights during the Index aggregation. The results of the Monte Carlo analysis, which was conducted to compare the impacts of weighted and unweighted indicators on the Index, revealed that (a) globally, the variance from using weighted indicators is less than unweighted indicators; and (b) for selected countries, the normal distributions for weighted indicators have less spread than unweighted indicators. [4] The 40 green growth indicators in Figure 2 are assigned equal weights to overcome these limitations. The detailed descriptions of these indicators, including their definition, sources, policy relevance, and limitations, are available in the Metadata: Green Growth Index 2021.[5]

Recognizing the challenges in finding green growth indicators with sufficient data for at least 100 countries, the aim is to have three indicators for each pillar to apply the Green Growth Index at the global level. Thus, GGGI will continue to collaborate with the experts until the 12 indicators for green economic opportunities have been completed and the proxy variables in the other dimensions have been replaced (see chapter 6.2.1). Table 1 shows that four proxy variables have been so far replaced by green growth indicators in the period 2019-2020 and another two in the period 2020-2021. These indicators are mainly SDGs from the UNSTATS database. Four new indicators have been added to the efficient and sustainable resource use in the period 2019-2020.

Box 1 Definitions of the green growth pillars 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 & 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, 2014; 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 CO_2 and non-CO_2 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 & 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; da 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, Wane, Zhang, & Clements, 2011; Lović 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 jobs refer 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 & 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).

Figure 2 Indicator Framework for the 2022 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 $2017 PPP GDP)
			EE2	Share renewable to total final energy consumption (Percent)
			EE3	Efficiency in sustainable transport (Score)
		Efficient and sustainable water use	EW1	Water use efficiency (USD per m^3)
			EW2	Share of freshwater withdrawal to available freshwater resources (Percent)
			EW3	Sustainable fisheries as a proportion of GDP (Percent)
		Sustainable land use	SL1	Soil nutrient budget (Nitrogen kilogram per hectare)
			SL2	Share agriculture organic to total agriculture land area (Percent)
			SL3	Share of ruminant livestock population to agricultural area (Percent)
		Material use efficiency	ME1	Total domestic material consumption (DMC) per unit of GDP (Kilogram per GDP)
			ME2	Total material footprint (MF) per capita population (Tons per capita)
			ME3	Share of food loss to production and food waste to food consumption (Percent)
	Natural capital protection	Environmental quality	EQ1	PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m3)
			EQ2	DALY rate due to 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 to population, including AFOLU (Tons per capita)
			GE2	Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population (CO_2eq tons per capita)
			GE3	Ratio non-CO_2 emissions (CH_4 , N_2O and F-gas) in Agriculture and LUCF to population (CO_2eq tons per capita)
		Biodiversity and ecosystem protection	BE1	Average proportion of Key Biodiversity Areas covered by protected areas (Percent)
			BE2	Share forest area to total land area (Percent)
			BE3	Above-ground biomass stock in forest (Tons per hectare)
		Cultural and social value	CV1	Red list index (Score)
			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	Ratio of adjusted net savings to GNI, including particulate emission damange (5 yrs moving ave.)
		Green trade	GT1	Share 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 (7 yrs moving ave.)
	Social inclusion	Access to basic services and resources	AB1	Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels (Percent)
			AB2	Prevalence of undernourishment (Percent)
			AB3	Universal access to sustainable transport (Score)
		Gender balance	GB1	Proportion of seats held by women in national parliaments (Percent)
			GB2	Gender ratio of an account at a financial institution or mobile-money-service provider (Ratio)
			GB3	Getting paid, laws and regulations for equal gender pay (Score)
		Social equity	SE1	Inequality in income based Palma ratio (Ratio)
			SE2	Population with access to basic services by urban/rural, i.e. electricity (Ratio)
			SE3	Share of youth (aged 15-24 years) not in education, employment or training (Percent)
		Social protection	SP1	Proportion population above statutory pensionable age receiving a pension (Percent)
			SP2	Universal health coverage (UHC) service coverage index (Score)
			SP3	Proportion of urban population living in slums (Percent)

Table 2 Summary of the changes in the indicators from 2019 to 2021

Dimension	2019-2020		2020-2021	
	New indicators	Replaced proxy variables	New indicators	Replaced proxy variables
Efficient and sustainable resource use	0	1	4	0
Natural capital protection	0	1	0	0
Green economic opportunities	0	0	0	0
Social inclusion	0	2	0	2

1.1.3 Link to the SDGs

Out of the 40 indicators in the Green Growth Index, 29 (or 72%) are SDG indicators. But because ME3, BE1, and AB1 indicators combined different SDG indicators in one green growth indicator (i.e., composite indicators), the total number of SDG indicators included in the Index is 37 (Figure 3). The natural capital protection dimension has the most significant number of SDG indicators, while the green economic opportunities dimension has the least number. SDG 9 on the industry, innovation, and infrastructure includes SDG 9.2.2 on manufacturing employment as a proportion of total employment. The indicator GJ1 Share of green employment in total manufacturing (percent) is thus represented in SDG 9.2.2, albeit focusing on the green aspect of manufacturing employment.

The other green growth indicators listed in Figure 3 are not SDG indicators but directly support the SDG goals' achievement. Moreover, as UN Member Countries continue to review and international organizations are committed to improving SDG databases, some of these green growth indicators may become part of the SDG indicators in the near future. For example, there are ongoing debates on including the Palma Ratio as a measure of income inequality in SDG 10.[6] The Gini index is currently used as an indicator to measure income inequality in SDG 10, specifically SDG 10.4.2 redistributive impact of fiscal policy. But experts recognize the limitations of the Gini index in measuring income inequality and that complementary indicators will be needed to achieve Goal 10 of reducing inequality within and among countries. For transport, SDG 11.2.1 on the proportion of the population that has convenient access to public transport (percent) was added to the UNSTATS database last year. However, data for this SDG indicator remain very scarce. SDG 9.1.2 passenger and freight volumes, by mode of transport cover indicators (i.e., freight volume, passenger volume, maritime container port traffic) that are used to compute WB's LPI indicators in efficiency in sustainable transport (EE3).

In addition to policy relevance, the added value of using SDG indicators in the Green Growth Index is the availability of targets against which to benchmark the green growth indicators. But there are no globally agreed climate targets for some SDG indicators, including GHG emissions reduction. Governments determine national targets in their National Determined Contributions (NDCs). To allow for cross-country comparisons, national targets are not used. To come up with sustainability targets for all green growth indicators, the following criteria were adopted:

1. For SDG indicators, the SDG targets, both explicit and implicit, which were suggested by the Organisation for Economic Co-operation and Development (OECD, 2019a, 2019b) and UN Sustainable Development Solutions Network (SDSN) (Lafortune et al., 2018; Sachs et al., 2019; Sachs et al., 2018) reports, were used. If the interpretation of implicit targets is different, the SDSN values applied globally were adopted.
2. For non-SDG indicators, the targets suggested in scientific literature, and reports from international organizations were used.
3. For SDG indicators not included in the OECD and SDSN reports, the mean of the top five performers was used.
4. For non-SDG indicators with no available information from the literature and reports, the mean of the top five performers was used.

Criteria 3 and 4 follow methods that were used in other global indices, such as SDSN's SDG Index (Sachs et al., 2019; Sachs et al., 2018) and UNEP's Green Economy Progress (GEP) (PAGE, 2017b, 2017a). The details on the sustainability targets used to benchmark the indicators of the 2020 Green Growth Index are discussed in Chapter 6.2.3.

Figure 3 Links of the Green Growth Index to Sustainable Development Goals

A Sustainable Development Goals (SDG) indicators used in the Green Growth Index

Dimensions	Indicators		Sustainable Development Goals (SDGs)*		
			Goal	Target	Indicator
Efficient and sustainable resource use	EE1	Ratio of total primary energy supply to GDP	Affordable and clean energy	7.3	7.3.1
	EE2	Share of renewable to total final energy consumption	Affordable and clean energy	7.2	7.2.1
	EW1	Water use efficiency	Clean water and sanitation	6.4	6.4.1
	EW2	Share freshwater withdrawal to available freshwater resources	Clean water and sanitation	6.4	6.4.2
	EW3	Sustainable fisheries as a proportion of GDP	Life below water	14.7	14.7.1
	ME1	Total domestic material consumption per unit of GDP	Decent work and economic growth	8.4	8.4.2
			Responsible consumption and production	12.2	12.2.2
	ME2	Total material footprint per capita population	Decent work and economic growth	8.4	8.4.2
			Responsible consumption and production	12.2	12.2.2
	ME3	Share of food loss to production and food waste to food consumption	Responsible consumption and production	12.3.1	12.3.1 (a) 12.3.1 (b)
Natural capital	EQ1	PM2.5 air pollution, mean annual population-weighted exposure	Sustainable cities and communities	11.6	11.6.2
	EQ2	DALY rate due to unsafe water sources	Good health and well-being	3.9	3.9.2
	EQ3	Municipal solid waste generation per capita	Responsible consumption and production	12.4	12.4.2
	GE1	Ratio of CO2 emissions to population, including AFOLU	Industry, innovation and infrastructure	9.4	9.4.1
	GE2	Ratio non-CO2 emissions excluding AFOLU to population	Climate action	13.2	13.2.2
	GE3	Ratio non-CO2 emissions in Agriculture and LUCF to population	Climate action	13.2	13.2.2
	BE1	Proportion of KBAs covered by protected areas	Life below water	14.5	14.5.1
			Life on land	15.1 15.4	15.1.2 15.4.1
	BE2	Share of forest area to total land area	Life on land	15.1	15.1.1
	BE3	Above-ground biomass stock in forest	Life on land	15.2	15.2.1
	CV1	Red list index	Life on land	15.5	15.5.1
	CV3	Share of marine protected areas to total territorial areas	Life below water	14.5	14.5.1
Green economic opportunities	GJ1	Share of green employment in total manufacturing	Industry, innovation and infrastructure	9.2.2	6.4

Figure 3 Links of Green Growth Index to Sustainable Development Goals (continued)

Social inclusion	AB1	Population with access to basic services	Clean water and sanitation Affordable and clean energy	6.1 6.2	6.1.1 6.2.1
			Clean water and sanitation Affordable and clean energy	7.1	7.1.1 7.1.2
	AB2	Prevalence of undernourishment	Zero Hunger	2.1	2.1.1
	GB1	Proportion of seats held by women in national parliaments	Gender equality	5.5	5.5.1
	GB2	Gender ratio of account at a financial institution or mobile-money-service	Decent work and economic growth	8.10	8.10.2
	SE2	Ratio of urban-rural access to basic services, i.e. electricity	Affordable and clean energy	17.1	7.1.1
	SE3	Share of youth not in education, employment or training	Decent work and economic growth	8.6	8.6.1
	SP1	Proportion population above statutory pensionable age receiving a pension	No poverty	1.3	1.3.1
	SP2	Universal health coverage service coverage index	Good health and well-being	3.8	3.8.1
	SP3	Proportion of urban population living in slums	Sustainable cities and communities	11.1	11.1.1

* Details on SDG targets and indicators are available on these links: https://unstats.un.org/sdgs/indicators/database/; https://unstats.un.org/sdgs/metadata/

B Link of green growth indicators to SDGs and other sustainability targets

Dimensions	Indicators		Link to SDGs and other targets		
			Sustainable Development Goals (SDGs)*		Other targets
Efficient and sustainable resource use	EE3	Efficiency in sustainable transport	Industry, innovation and infrastructure	9.1	
	SL1	Soil nutrient budget	Life on land	15.3.1	Aichi
	SL2	Share of organic agriculture to total agricultural land area	Zero hunger	2	Aichi
	SL3	Share of ruminant livestock population to agricultural area	Climate action	13.2	Climate
Natural capital Protection	CV2	Tourism and recreation in coastal and marine areas	Responsible consumption and production	12.B	
	CV3	Share of terrestrial protected areas to total territorial areas	Life on land	15.1	Aichi
Green economic opportunities	GV1	Ratio of adjusted net savings to GNI, including particulate emission damange	Responsible consumption and production	12	
	GT1	Share of environmental goods to total export	Responsible consumption and production	12	
	GN1	Share of patent publications in environmental technology to total patents	Responsible consumption and production	12	
Social inclusion	AB3	Universal access to sustainable transport	Industry, innovation and infrastructure	9.1	
	GB3	Laws and regulations for equal gender pay	Gender equality	5.c	
			Reduced inequality	10.2	
	SE1	Inequality in income based on Palma ratio	No poverty	1.1.1 1.2.1	
			Reduced inequality	10.1.1	

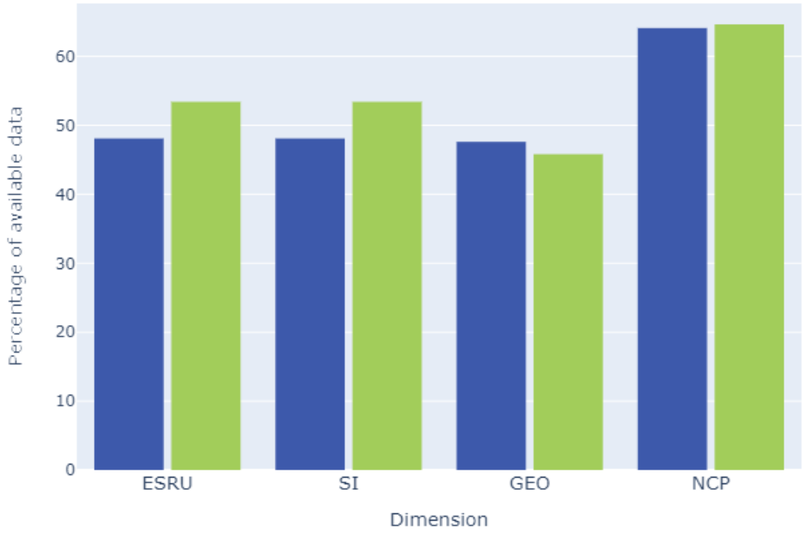
* Details on SDG targets and indicators are available on these links: https://unstats.un.org/sdgs/indicators/database/; https://unstats.un.org/sdgs/metadata/

1.2 Updates in the 2022 Green Growth Index

Although the green growth indicators remain the same, the scores in the 2022 Green Growth Index are not comparable to those in the 2021 Green Growth Index for several reasons:

1. The data sources for the two indicators are different in 2022. The new source of data for domestic material consumption per unit of GDP (ME1) is the UNSTATS database (previously OECD), while that for the share of patents on environmental technologies (GN1) is the OECD (previously WIPO). There are divergences in the data between the new and previous data sources.
2. The database updates for many indicators changed values not only for most recent years but also for previous years. This could be explained by the new knowledge generated for these indicators, which resulted in the correction of values. Annex 2 provides an overview of the divergence of data for the four green growth dimensions from 2010 to 2021.
3. The available data for several indicators have improved in 2022, causing changes in scores for some countries. Figure 4 shows that the largest improvements in data availability for the indicators of efficient and sustainable resource use (ESRU) and social inclusion (SI). The slight deterioration in data availability for green economic opportunities (GEO) in the current report is due to the change in data source for the share of patent publications in environmental technology to total patents (GN1). While more countries are covered in the OECD database, the data available since 2010 are lower than in the WIPO database. For example, in the case of France, 83 percent of the data is available in the former database and 91 percent is available in the latter database from 2010 to 2021.

Figure 4 Percentage change in data availability for the indicators, by dimension



1.3 Purpose and structure of the report

The Index scores published in this report are not directly comparable with those in the 2021 Green Growth Index Report for two reasons (see Chapter 1.2): First, the databases downloaded last year showed significant divergence from the databases this year, although they were from the same data sources. Second, the data source for the share of patent publications in environmental technology to total patents (GN1) in 2021 was the WIPO database and, this year, the OECD data for green growth indicators. This change was due to more considerable country coverage in the OECD data, allowing to increase the Green Growth Index scores from 119 countries in 2021 to 147 countries in 2022.

To allow comparison of scores and ranks over time, the 2022 Green Growth Index presents the results for 147 countries from 2010 to 2021, including key highlights on differences in green growth performance among countries and regions and across dimensions and indicators. Details on the concept and methods for developing the Green Growth Index were discussed in the report's first edition. But a summary of the methods is provided in this report's Annex 1 to enable readers and users to understand the context for developing the Index. The structure of the report is as follows:

Chapter 1 briefly describes the concept of the Green Growth Index and explains the improvements made to its indicator framework. This chapter also briefly discusses the link of the indicators to the SDGs.

Chapter 2 provides a global overview of the Green Growth Index and its dimensions using maps to present a bird's eye view of the countries' green growth performance. This chapter also presents country and subregional dashboards on the Index, dimensions, and indicators to provide contexts to the geographical differences in performance.

Chapter 3 presents the regional outlook of the Green Growth Index with a particular focus on the performance of regions (i.e., Africa, the Americas, Asia, Europe, and Oceania) on the four green growth dimensions and the trend in performance from 2010 to 2020. This chapter also compares the performance of selected economic groups, including the European Union (EU), North American Free Trade Agreement (NAFTA), Mercado Común del Sur (MERCOSUR), Common Market for Eastern and Southern Africa (COMESA), Association of Southeast Asian Nations (ASEAN), and South Asian Association for Regional Cooperation (SAARC).

Chapter 4 presents the distribution pattern of the Green Growth Index scores by region and discusses the performance of top-performing countries in each region.

Chapter 5 features the national Green Growth Index for Zambia, presenting the green growth indicators selected by experts from government, non-government, and academic organizations. The chapter presents the scores for the Zambia Green Growth Index and the distance to targets of the green growth indicators.

Chapter 6 details the expert consultations conducted to select and review the 80 green growth indicators for Zambia's national Green Growth Index. This chapter describes the participatory activities with the Zambian experts to select the policy-relevant indicators and online survey to collect feedback on the indicators' policy relevance from the international experts. This chapter also discusses the next steps to develop the global Green Growth Index further.

Chapter 7 presents the projects at GGGI, which applied the Green Growth Index and its Simulation Tool to support GGGI Member Countries and its Regional Partners in greening National Development Plans and Frameworks and assessing co-benefits of Low-Emission Development Strategies.

Chapter 8 presents the statistical tables that provide detailed results of the Green Growth Index for each country, including those which cannot be ranked due to a lack of data for some green growth indicators. These tables show the Index, dimensions, and normalized indicators for all countries and are classified by regions.

2 Global Overview

2.1 Maps

Figure 5 presents the maps summarizing the scores for the four green growth dimensions in 2021. Box 2 shows the classification and interpretation of the scores. Among the dimensions, green economic opportunities have the highest number of countries with a very low score, 65 (or 43 percent) of the 151 countries with scores for this dimension. Very low scores can be found in countries across different regions. More countries, however, have low scores – 80 countries representing about 70 million km^2 of land and a population of 5.32 billion people. Green economic opportunities is the only green growth dimension without high or very high scores. Due to data limitations on green employment (GN3) for this dimension, only 151 countries with scores are available in 2021.

In contrast with green economic opportunities, social inclusion is the dimension with the highest number of countries with very high scores, 40 (or 23 percent) of the 174 countries with very high scores for this dimension. These countries, representing a land area of 33 million km^2 and a population of 3.31 billion people, are mainly located in Europe and North America. Most countries have high scores, representing about 40 percent of the 174 countries and occupying about 67 million km^2. The 19 countries with low scores and one with a very low score for social inclusion can be found mainly in the African region. Central African Republic is the only country with a very low score for social inclusion.

After social inclusion, natural capital protection has the second highest number of countries with very high scores, albeit low with only nine countries. These countries are in Europe. Out of the 197 countries with scores for natural capital protection, 122 (or 62 percent) have high scores, representing 63.51 million km^2 of land area and inhabiting 4.34 billion people. Only ten countries have low scores, and two have very low scores on natural capital protection. Oceania (Guam) and Europe (Monaco) are the two countries with very low scores.

Of the 186 countries with scores for efficient and sustainable resource use, only two have very high scores. Most countries have either high (80 countries or 43 percent) or moderate (78 countries or 42 percent) scores, with a land area of 34.94 and 76.83 million km^2 and a population of 1.3 and 3.9 billion, respectively. A relatively large number of countries (22 or 12 percent) have low scores for efficient and sustainable resource use. The four countries with very low scores are in Asia, including Syria, Turkmenistan, Uzbekistan, and Iraq.

The scores for the four green growth dimensions were aggregated using geometric mean to derive the overall scores for the Green Growth Index (Annex 1). Only countries with scores for all four dimensions have scores for the Green Growth Index, corresponding to 147 countries in 2021 (Figure 6). They are distributed in different regions: 39 countries in Africa, 22 countries in the Americas, 41 countries in Asia, 38 countries in Europe, and four countries in Oceania. No countries score very low or very high on the Green Growth Index. About 61 percent (89 countries) of the 147 countries show a moderate performance between 40 and 60. These countries cover 76.21 million km^2 of land area and 5.16 billion people. Forty-three countries have high performance with scores between 60 and 80. The high-scoring countries cover 34.51 million km^2 of land and 1.46 billion people, with a majority found in Europe. Fifteen countries have a low score between 20 and 40 on the Green Growth Index, mainly countries in Asia. The highest-scoring country is Austria, located in Western Europe, with an overall Index score of 77.78, which is still far from reaching the sustainability target of 100. The lowest-scoring country is Syria, with an overall Index score of only 25.86.

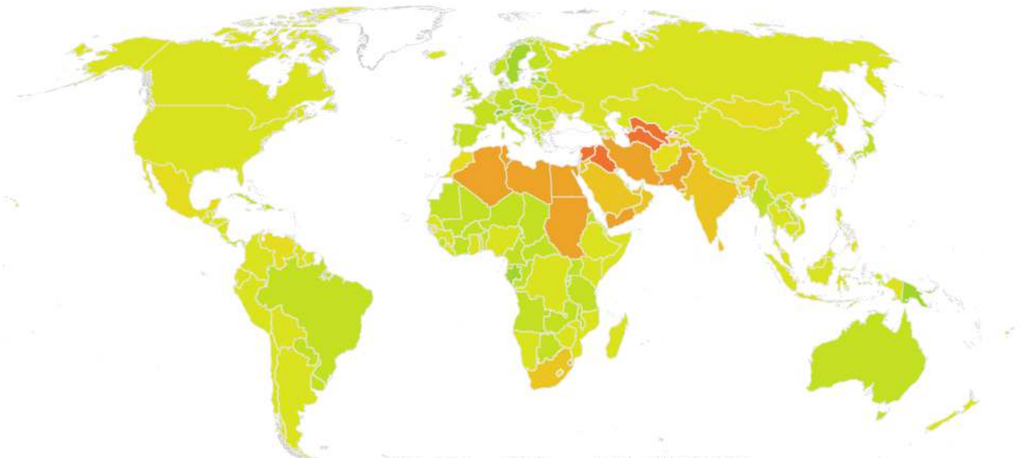
Compared to 2010, the scores of the Green Growth Index increased for most countries in 2021. Figure 6 shows that 103 countries experienced a moderate increase in performance between 0 and 10 percent from 2010 to 2021. Only 12 countries have a high score increase between 10 and 20 percent. One country that shows an increase in performance of more than 20 percent, is Montenegro in Southern Europe. A significant number of countries (28) show declining scores by up to −10 percent on the Green Growth Index. Three countries' scores dropped by more than 10 percent, including Syria, Libya, and Iraq.

Box 2 Classification and interpretation of the scores

80–100 are very high scores, having reached or almost reached the target
60–80 are high scores, taking a strategic position to reach the target completely
40–60 are moderate scores, finding the right balance to move closer to 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

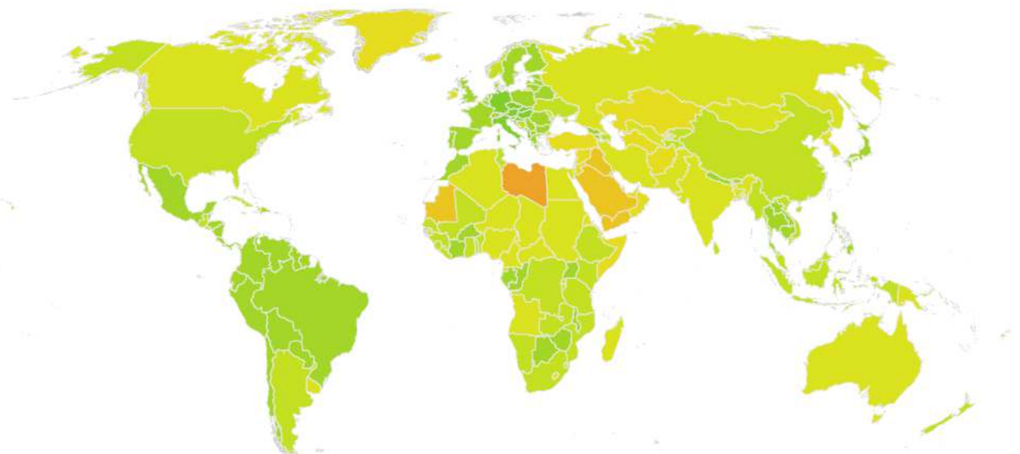
Figure 5 Sub-indices of the green growth dimensions for different countries, 2021

Efficient and Sustainable Resource Use



INDEX	LEVEL	NO. OF COUNTRIES	AREA*	POPULATION**
100	Very high	2	0.004	8.68
80	High	80	34.94	1346.99
60	Moderate	78	76.83	3918.59
40	Low	22	17.64	2070.79
20	Very low	4	1.54	94.97
0				

Natural Capital Protection

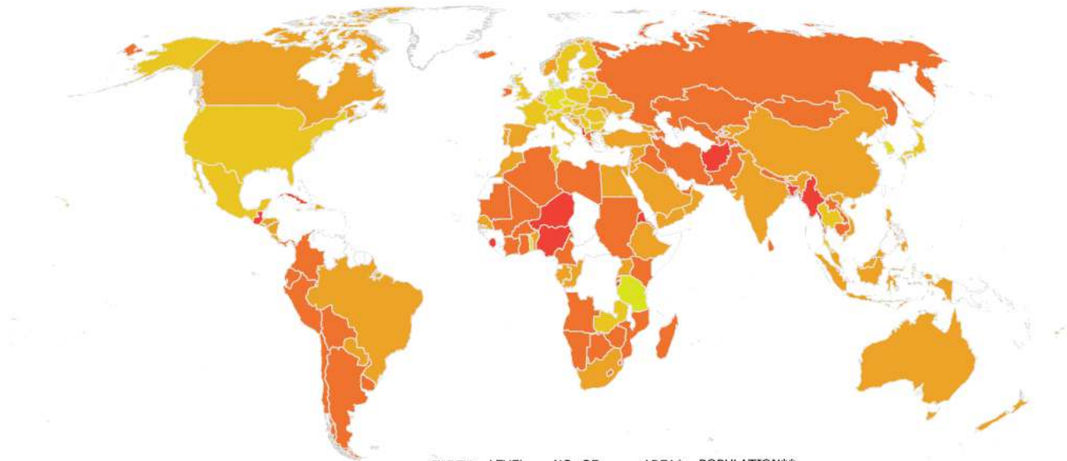


INDEX	LEVEL	NO. OF COUNTRIES	AREA*	POPULATION
100	Very high	9	1.05	185.44
80	High	122	63.51	4336.22
60	Moderate	54	63.87	2881.99
40	Low	10	5.52	120.18
20	Very low	2	0.01	0.20
0				

* Million sq. km
** Million persons

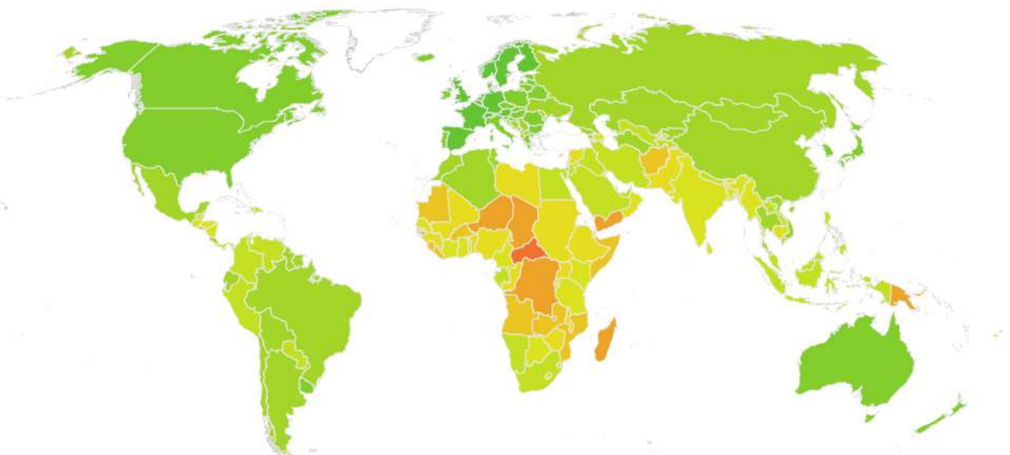
Figure 5 Sub-indices of the green growth dimensions for different countries, 2021 *(continued)*

Green Economic Opportunities



INDEX	LEVEL	NO. OF COUNTRIES	AREA*	POPULATION**
100	Very high	0	0	0
80	High	0	0	0
60	Moderate	6	1.57	214.75
40	Low	80	69.85	5320.46
20	Very low	65	52.54	1744.16
0				

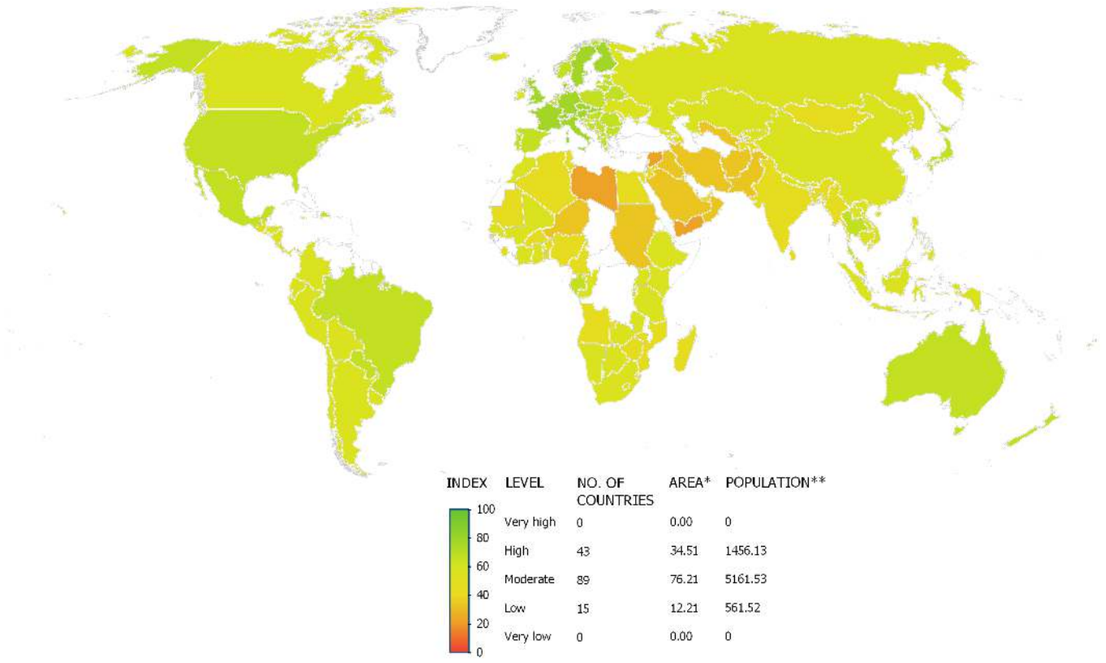
Social Inclusion



INDEX	LEVEL	NO. OF COUNTRIES	AREA*	POPULATION
100	Very high	40	33.08	1124.19
80	High	69	66.57	3309.83
60	Moderate	45	18.43	2593.64
40	Low	19	11.90	360.61
20	Very low	1	0.62	4.63
0				

* Million sq. km
** Million persons

Figure 6 Performance Green Growth Index in 2021 (top) and change in Index scores from 2010 to 2021 (bottom)



2.2 Dashboards

Table 3 presents the country dashboard for the Green Growth Index by region and compares the changes in the Index scores for 147 countries between 2010 and 2021. Only countries with scores for the four green growth dimensions were included in the regional ranks, which include 39 countries in Africa, 22 countries in the Americas, 43 countries in Asia, 39 countries in Europe, and four countries in Oceania. In 2021, Gabon in Africa, Paraguay in the Americas, Japan in Asia, Austria in Europe, and New Zealand in Oceania were the top-performing countries by region. Only Paraguay did not hold the top-ranking regional position among these countries in 2010. Libya in Africa, Trinidad and Tobago in the Americas, Syria in Asia, Malta in Europe, and Tonga in Oceania were the least-performing countries by region. Trinidad and Tobago, Syria, and Tonga were also at the bottom of the list in their respective regions in 2010. In Table 2, multi-directional arrows are used to show the performance of countries over time:

- ↑ pointing straight up represents increasing performance, above 5% increase in scores
- ↗ slightly slanting upward represents modest performance, between <5% and >=1% increase in scores
- → pointing horizontally represents stable or almost no change in performance, between <1 and >=0% change in scores
- ↘ slightly slanting downward represents slight decline in performance, between <0% and >= -5% decrease in scores
- ↓ pointing straight down represents worsening performance, below -5% decrease in scores

A ±5 percent interval was used to measure the performance because the data points gathered around this value. Among the top-performing countries, Montenegro in Europe showed the most significant improvement in performance from 2010 to 2020 at 27 percent compared to those in other regions, with an increase in scores only between 1 and 16 percent. The number of countries with a percentage change in scores above 5 percent was highest in Asia (21) and Europe (18). Moreover, at least half of the ten countries at the bottom ranks showed over 5 percent changes in scores in both regions. While showing significant percentage increases in scores, these countries did not significantly jump in their regional ranks between 2010 and 2021. Togo in Africa showed the most considerable improvement in ranks, from rank 13 in 2010 to 5 in 2021, an increase of 8 points. This was followed by Cote d'Ivoire in Africa, improving from rank 16 to 8 in the same period. The countries that maintained their ranks in the last ten years are five in Africa, five in the Americas, six in Asia, four in Europe, and four in Oceania.

The best performance in Europe compared to other regions can be attributed to the relatively high green economic opportunities dimension scores in many European countries (Table 3). Only Greece, Albania, Ireland, Iceland, and Malta in Europe showed very low scores for this dimension. Between these five countries, Iceland and Malta showed a significant increase in performance by 6 percent and 10 percent over the last decade, respectively. In contrast, 26 out of 39 in Africa, 9 out of 22 in the Americas, and 21 out of 43 in Asia have scores below 20 for green economic opportunities. South Korea, Japan, and Singapore are leading in creating green economic opportunities in Asia. In Africa, these include developing countries like Tanzania and Togo. If appropriate amounts of green investments and innovation were made to enhance green employment and trade, many developing countries in the Asian and African regions would be expected to experience increased performance in the future. In the Americas, the performances of creating green economic opportunities in the United States and Canada are not on par with their peer developed countries in Europe.

The subregional performance for the different indicators is presented in Figure 7. It shows that the scores for the three among the four indicators for green economic opportunities are predominantly low and very low. On average, green trade (GT) scores are also low for all European subregions. The scores for green investment (GV) are moderate for most subregions. After green economic opportunities, scores for efficient and sustainable resource use indicators are least impressive for most subregions, except for material use efficiency (ME). While efficient and sustainable use of energy (EE), water (EW), and land (SL) have low and moderate scores, the latter indicator shows scores from moderate to high.

For the indicators of natural capital protection, the scores for environmental quality (EQ) and GHG emissions reduction (GE) also range from high to very high, with few exceptions. For example, Northern America as well as Australia and New Zealand have scores of only around 44 and 34, respectively, for the reduction of emissions. In contrast, the scores for biodiversity and ecosystem protection (BE) indicators and cultural and social value (CV) are lower than the previous two indicators in most subregions. In the case of the former indicator, subregions like Northern Africa, Central Asia, and Western Asia have very low scores for the protection of biodiversity and ecosystem. Scores are mostly low and moderate for cultural and social value (CV), except Southern and Western Europe with high and very high scores, respectively.

For social inclusion, the scores are somewhat divergent for the different indicators and across the subregions. The social equity (SE) indicator has the most subregions with high or very high scores, except for most African subregions. Social equity in Northern Africa is on par with the rest of the subregions of the world. Except for gender balance (GB) with high scores in Eastern and Southern Africa, the rest of the indicators in this region have mainly low cores. The Eastern, Middle, and Southern African subregions have low scores for access to basic services and resources (AB) and social protection (SP). Although a bit better than Africa, many Oceania subregions also have low social inclusion indicators scores, except for social equity.

Table 3 Country dashboard for dimensions and Green Growth Index performance, by region

		Dimension scores (2022)					2010		2022		
Country	**Sub-region**	**ESRU**	**NCP**	**GEO**	**SI**		**Index**	**Rank**	**Index**	**Rank**	**Performance**
AFRICA											
Gabon	Middle Africa	74.14	73.46	21.55	60.79		61.75	1	61.56	1	
Tanzania	Eastern Africa	63.88	66.78	52.66	51.27		53.45	8	59.44	2	
Botswana	Southern Africa	69.72	72.68	17.34	57.25		57.23	3	57.90	3	
Morocco	Northern Africa	46.59	74.02	21.24	71.83		53.52	7	56.35	4	
Togo	Western Africa	57.19	66.59	40.15	52.15		50.48	13	56.21	5	
Cabo Verde	Western Africa	60.94	63.14	16.25	67.74		59.79	2	55.71	6	
Namibia	Southern Africa	57.99	67.62	18.72	62.72		54.53	4	55.52	7	
Cote d'Ivoire	Western Africa	69.90	70.85	14.86	50.55		49.56	16	54.54	8	
Congo Republic	Middle Africa	66.02	72.23	22.33	44.05		52.30	10	53.90	9	
Mauritius	Eastern Africa	58.41	52.46	15.14	77.85		54.51	5	53.86	10	
Senegal	Western Africa	55.89	65.29	21.31	55.94		52.33	9	53.19	11	
Uganda	Eastern Africa	63.50	70.79	20.06	44.09		49.74	15	52.40	12	
Ghana	Western Africa	59.86	66.73	12.95	52.91		50.54	12	51.14	13	
Kenya	Eastern Africa	57.39	61.28	18.49	53.25		49.43	17	51.10	14	
Ethiopia	Eastern Africa	58.58	68.22	24.58	42.26		47.73	22	50.97	15	
South Africa	Southern Africa	38.59	64.87	23.31	67.47		54.46	6	50.70	16	
Rwanda	Eastern Africa	66.06	67.69	10.35	48.97		49.37	18	50.54	17	
Zambia	Eastern Africa	60.66	70.00	36.17	33.64		48.90	20	50.38	18	
Mali	Western Africa	64.53	62.19	17.53	44.55		49.13	19	50.13	19	
Zimbabwe	Eastern Africa	52.77	78.09	11.93	48.79		50.83	11	49.96	20	
Tunisia	Northern Africa	29.71	60.52	34.29	76.80		46.31	26	49.61	21	
Burkina Faso	Western Africa	65.18	72.28	18.26	35.58		47.97	21	49.37	22	
Benin	Western Africa	60.40	65.53	20.42	40.38		50.16	14	49.21	23	
Cameroon	Middle Africa	60.43	57.10	12.42	52.69		47.16	23	48.68	24	
Mozambique	Eastern Africa	53.00	68.80	15.40	36.92		46.34	25	45.45	25	
Burundi	Eastern Africa	62.86	64.51	7.95	40.66		41.94	34	45.20	26	
Lesotho	Southern Africa	59.36	41.34	14.22	54.84		46.61	24	45.08	27	
Sierra Leone	Western Africa	65.95	63.19	8.81	37.63		45.30	29	44.99	28	
Gambia	Western Africa	61.02	64.65	4.28	49.34		42.85	33	44.65	29	
Angola	Middle Africa	66.58	57.42	10.32	37.41		45.52	28	44.46	30	
Algeria	Northern Africa	27.57	53.01	18.08	73.24		41.15	35	43.11	31	
Nigeria	Western Africa	57.39	60.00	5.70	44.83		43.08	32	42.87	32	
Eswatini	Southern Africa	28.77	60.14	16.52	61.46		40.92	36	42.64	33	
Mauritania	Western Africa	64.74	37.28	16.91	39.55		40.88	37	41.38	34	
Madagascar	Eastern Africa	58.01	56.70	18.48	27.03		44.06	30	40.86	35	
Egypt	Northern Africa	22.79	54.98	23.04	64.12		38.86	38	40.53	36	
Niger	Western Africa	60.98	51.34	7.08	27.19		36.24	39	36.65	37	
Sudan	Northern Africa	26.51	50.68	14.16	43.37		32.39	41	35.05	38	

Table 3 Country dashboard for dimensions and Green Growth Index performance, by region *(continued)*

		Dimension scores (2022)					2010		2022		
Country	**Sub-region**	**ESRU**	**NCP**	**GEO**	**SI**		**Index**	**Rank**	**Index**	**Rank**	**Performance**
Libya	Northern Africa	22.69	28.21	18.86	48.08		33.15	40	29.79	39	
AMERICAS											
Paraguay	South America	63.81	70.90	29.12	69.51		58.43	6	62.47	1	
Brazil	South America	66.51	71.96	20.13	72.55		62.20	1	62.03	2	
United States	Northern America	55.48	61.97	34.16	83.94		60.12	2	61.87	3	
Mexico	Central America	48.89	73.18	31.68	79.10		59.24	3	61.04	4	
Dominican Republic	Caribbean	60.24	75.12	21.87	68.40		59.06	4	60.42	5	
Canada	Northern America	54.51	57.97	29.39	86.26		58.99	5	59.91	6	
Costa Rica	Central America	55.65	71.28	20.08	72.22		58.30	7	58.53	7	
Peru	South America	56.89	72.53	19.88	69.58		56.75	11	58.51	8	
Panama	Central America	60.85	70.04	19.17	67.05		57.72	9	58.22	9	
Bolivia	South America	53.10	75.16	15.98	75.73		57.79	8	58.14	10	
Chile	South America	50.41	73.35	18.13	76.91		54.98	15	57.81	11	
El Salvador	Central America	54.73	64.20	26.35	70.24		54.91	16	57.51	12	
Uruguay	South America	66.79	58.55	11.98	80.79		53.82	17	57.25	13	
Ecuador	South America	54.47	71.47	16.43	72.07		57.45	10	57.01	14	
Nicaragua	Central America	57.84	73.47	22.20	58.67		55.88	13	56.71	15	
Colombia	South America	57.87	72.00	16.33	65.17		52.20	18	56.42	16	
Bahamas	Caribbean	56.48	66.57	23.78	60.61		50.59	20	55.58	17	
Honduras	Central America	57.82	72.51	21.57	55.95		55.96	12	55.52	18	
Jamaica	Caribbean	51.93	66.31	27.87	62.26		50.75	19	55.45	19	
Argentina	South America	56.67	60.33	13.55	76.17		55.43	14	54.69	20	
Guatemala	Central America	58.95	66.27	9.20	56.29		49.28	21	50.01	21	
Trinidad and Tobago	Caribbean	31.17	51.44	23.15	76.38		47.50	22	46.01	22	
ASIA											
Japan	Eastern Asia	60.68	71.04	32.41	80.48		61.92	1	65.03	1	
Thailand	South-eastern Asia	57.00	73.71	30.01	72.40		61.04	2	62.04	2	
China	Eastern Asia	55.71	63.81	28.85	76.56		57.51	5	59.77	3	
Philippines	South-eastern Asia	57.82	74.42	26.75	64.57		56.66	7	59.69	4	
Georgia	Western Asia	53.00	72.71	23.87	74.27		56.07	10	59.54	5	
Cyprus	Western Asia	56.26	69.17	17.80	80.24		60.01	3	59.35	6	
Nepal	Southern Asia	63.35	72.43	15.65	67.70		59.09	4	58.50	7	
Bhutan	Southern Asia	58.73	79.05	22.11	57.32		55.57	11	57.81	8	
Singapore	South-eastern Asia	50.47	58.88	31.03	77.99		56.09	9	57.37	9	
Indonesia	South-eastern Asia	55.74	65.00	25.50	68.26		56.49	8	57.36	10	
Laos	South-eastern Asia	64.92	75.88	13.53	60.90		55.21	12	57.05	11	
Kyrgyz Republic	Central Asia	50.69	63.35	29.62	71.38		57.25	6	56.91	12	
Vietnam	South-eastern Asia	54.34	62.20	21.32	72.44		54.32	13	56.17	13	
South Korea	Eastern Asia	38.40	57.80	41.13	80.83		50.54	19	54.65	14	

Legend:

0 20 40 60 80 100
Very low Low Moderate High Very High

>5% <=5% & >1 <=1% & >0 <=-1% & >-5% <-5%

Legend:

0 20 40 60 80 100
Very low Low Moderate High Very High

>5% <=5% & >1 <=1% & >0 <=-1% & >-5% <-5%

Table 3 Country dashboard for dimensions and Green Growth Index performance, by region *(continued)*

		Dimension scores (2022)				2010		2022		
Country	**Sub-region**	**ESRU**	**NCP**	**GEO**	**SI**	**Index**	**Rank**	**Index**	**Rank**	**Performance**
Armenia	Western Asia	41.73	70.24	21.26	76.11	52.59	16	54.61	15	
Malaysia	South-eastern Asia	50.42	68.38	20.09	64.94	53.94	14	54.36	16	
Cambodia	South-eastern Asia	57.92	78.50	10.41	59.05	50.55	18	53.75	17	
Brunei Darussalam	South-eastern Asia	42.67	59.29	28.20	70.87	49.23	21	52.61	18	
Israel	Western Asia	48.14	47.08	20.94	81.62	51.45	17	51.55	19	
Kazakhstan	Central Asia	51.21	47.73	17.60	78.30	48.23	22	51.19	20	
Azerbaijan	Western Asia	43.97	64.89	19.84	59.54	53.33	15	49.98	21	
Myanmar	South-eastern Asia	60.37	60.82	9.96	55.04	45.70	25	49.15	22	
Mongolia	Eastern Asia	44.51	58.70	11.36	72.36	46.46	23	48.81	23	
Tajikistan	Central Asia	36.05	61.23	13.55	68.92	42.98	28	46.54	24	
Sri Lanka	Southern Asia	36.58	64.32	18.75	57.61	41.94	30	46.44	25	
India	Southern Asia	39.42	53.61	26.76	56.72	43.00	27	46.38	26	
Bangladesh	Southern Asia	54.75	55.63	8.86	54.17	45.06	26	45.71	27	
Maldives	Southern Asia	58.00	52.09	4.01	69.52	46.16	24	45.40	28	
Lebanon	Western Asia	44.94	58.79	7.87	60.31	49.33	20	44.70	29	
United Arab Emirates	Western Asia	36.63	49.59	17.42	64.19	39.79	31	44.07	30	
Jordan	Western Asia	34.08	47.29	23.56	61.06	42.04	29	43.16	31	
Qatar	Western Asia	47.31	33.69	14.50	54.62	35.27	35	39.64	32	
Oman	Western Asia	32.66	41.56	21.64	52.14	35.49	34	38.77	33	
Saudi Arabia	Western Asia	30.63	34.93	24.54	60.83	33.13	39	38.28	34	
Iran	Southern Asia	21.51	57.30	16.50	60.20	39.29	32	38.27	35	
Uzbekistan	Central Asia	18.63	55.40	14.99	66.26	33.56	36	36.99	36	
Bahrain	Western Asia	35.90	23.84	23.96	59.76	32.45	41	35.53	37	
Pakistan	Southern Asia	25.59	52.58	14.11	44.65	33.05	40	35.37	38	
Afghanistan	Southern Asia	45.84	44.70	7.28	36.29	31.17	42	35.28	39	
Kuwait	Western Asia	34.57	35.49	13.95	48.76	33.15	38	35.28	40	
Iraq	Western Asia	19.92	36.78	11.74	60.75	35.91	33	31.73	41	
Yemen	Western Asia	22.71	38.51	24.97	26.66	30.84	43	28.19	42	
Syria	Western Asia	10.09	40.23	28.48	41.30	29.43	44	25.87	43	
EUROPE										
Austria	Western Europe	78.97	80.28	38.99	93.45	75.98	1	77.78	1	
Sweden	Northern Europe	77.30	77.99	37.56	94.71	73.38	3	76.64	2	
Denmark	Northern Europe	77.69	71.56	50.53	90.80	72.57	5	76.08	3	
Switzerland	Western Europe	80.89	78.17	31.31	92.42	74.21	2	75.78	4	
Czech Republic	Eastern Europe	74.56	81.67	40.09	85.85	72.82	4	75.13	5	
Germany	Western Europe	64.95	82.65	46.76	92.04	69.41	8	75.01	6	
Slovakia	Eastern Europe	73.67	84.30	38.30	81.43	70.25	6	74.04	7	
Finland	Northern Europe	69.43	73.06	37.00	90.55	69.41	7	71.69	8	
United Kingdom	Northern Europe	66.31	79.07	32.84	90.95	68.16	11	71.64	9	

Legend: 0 Very low 20 Low 40 Moderate 60 High 80 100 Very High — >5% | <=5% & >1 | <=1% & >0 | <=-1% & >-5% | <-5%

Table 3 Country dashboard for dimensions and Green Growth Index performance, by region *(continued)*

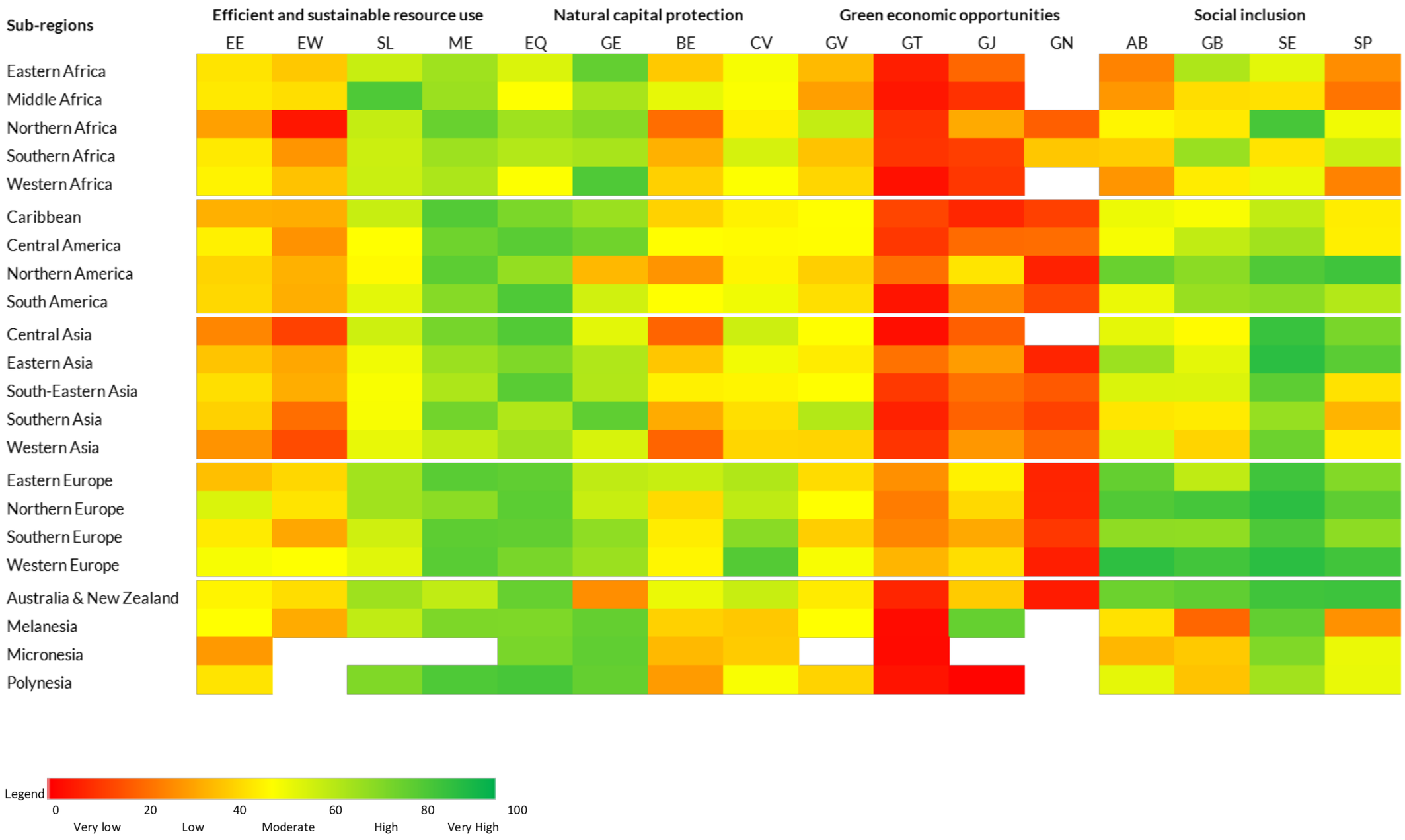
		Dimension scores (2022)				2010		2022		
Country	**Sub-region**	**ESRU**	**NCP**	**GEO**	**SI**	**Index**	**Rank**	**Index**	**Rank**	**Performance**
France	Western Europe	64.98	78.51	31.28	91.91	67.66	12	70.93	10	
Italy	Southern Europe	65.86	80.39	32.61	87.15	68.55	9	70.89	11	
Hungary	Eastern Europe	65.74	81.18	32.67	81.87	68.41	10	69.75	12	
Portugal	Southern Europe	64.81	78.66	28.06	89.27	66.55	15	69.54	13	
Latvia	Northern Europe	71.75	76.38	24.07	84.55	66.39	16	68.85	14	
Lithuania	Northern Europe	68.52	73.33	30.91	83.68	64.60	20	68.57	15	
Spain	Southern Europe	60.83	75.99	29.51	91.29	64.03	22	68.33	16	
Estonia	Northern Europe	62.91	74.24	32.90	86.92	65.71	17	68.27	17	
Belarus	Eastern Europe	60.60	72.95	38.07	86.75	67.01	14	68.10	18	
Croatia	Southern Europe	63.99	83.74	25.48	81.66	61.12	27	68.07	19	
Romania	Eastern Europe	64.88	77.32	32.72	80.02	65.60	19	68.01	20	
Luxembourg	Western Europe	66.38	74.78	25.13	88.23	65.70	18	67.99	21	
Slovenia	Southern Europe	60.05	78.97	31.21	84.64	62.94	24	67.68	22	
Norway	Northern Europe	64.36	68.85	28.21	92.60	67.47	13	67.45	23	
Poland	Eastern Europe	57.30	76.02	32.66	86.27	63.45	23	66.66	24	
Netherlands	Western Europe	56.52	71.23	30.20	92.88	64.20	21	66.04	25	
Macedonia	Southern Europe	60.03	74.85	39.59	71.85	61.60	26	64.93	26	
Greece	Southern Europe	61.25	77.01	19.32	84.85	61.95	25	64.46	27	
Belgium	Western Europe	50.36	77.07	27.96	90.54	57.29	34	64.33	28	
Bulgaria	Eastern Europe	50.84	78.31	32.07	82.58	60.14	30	63.93	29	
Serbia	Southern Europe	60.72	70.27	31.02	76.16	60.57	28	63.49	30	
Bosnia and Herzegovina	Southern Europe	64.64	62.83	27.76	70.83	55.06	36	60.53	31	
Albania	Southern Europe	64.72	82.38	9.63	76.54	60.40	29	60.48	32	
Ireland	Northern Europe	65.43	59.22	15.03	88.17	58.20	33	59.95	33	
Moldova	Eastern Europe	59.58	67.36	20.60	74.83	58.28	32	59.52	34	
Montenegro	Southern Europe	58.91	64.34	21.29	72.47	45.82	39	58.14	35	
Ukraine	Eastern Europe	56.03	65.40	20.75	72.06	58.39	31	57.31	36	
Russia	Eastern Europe	53.86	55.93	19.93	77.26	55.66	35	54.96	37	
Iceland	Northern Europe	56.00	44.60	13.63	87.29	49.07	37	51.88	38	
Malta	Southern Europe	43.13	63.37	9.87	82.37	46.06	38	50.72	39	
OCEANIA										
New Zealand	Australia and New Zealand	59.88	67.84	20.10	87.11	61.46	1	62.37	1	
Fiji	Melanesia	62.23	68.25	33.74	65.01	56.97	2	60.97	2	
Australia	Australia and New Zealand	65.98	53.79	20.11	87.84	56.76	3	60.04	3	
Tonga	Polynesia	61.13	62.24	6.56	56.39	46.75	4	47.99	4	

*Based on the sub-region and intermediate region on UNSTATS (https://unstats.un.org/unsd/methodology/m49/overview/)

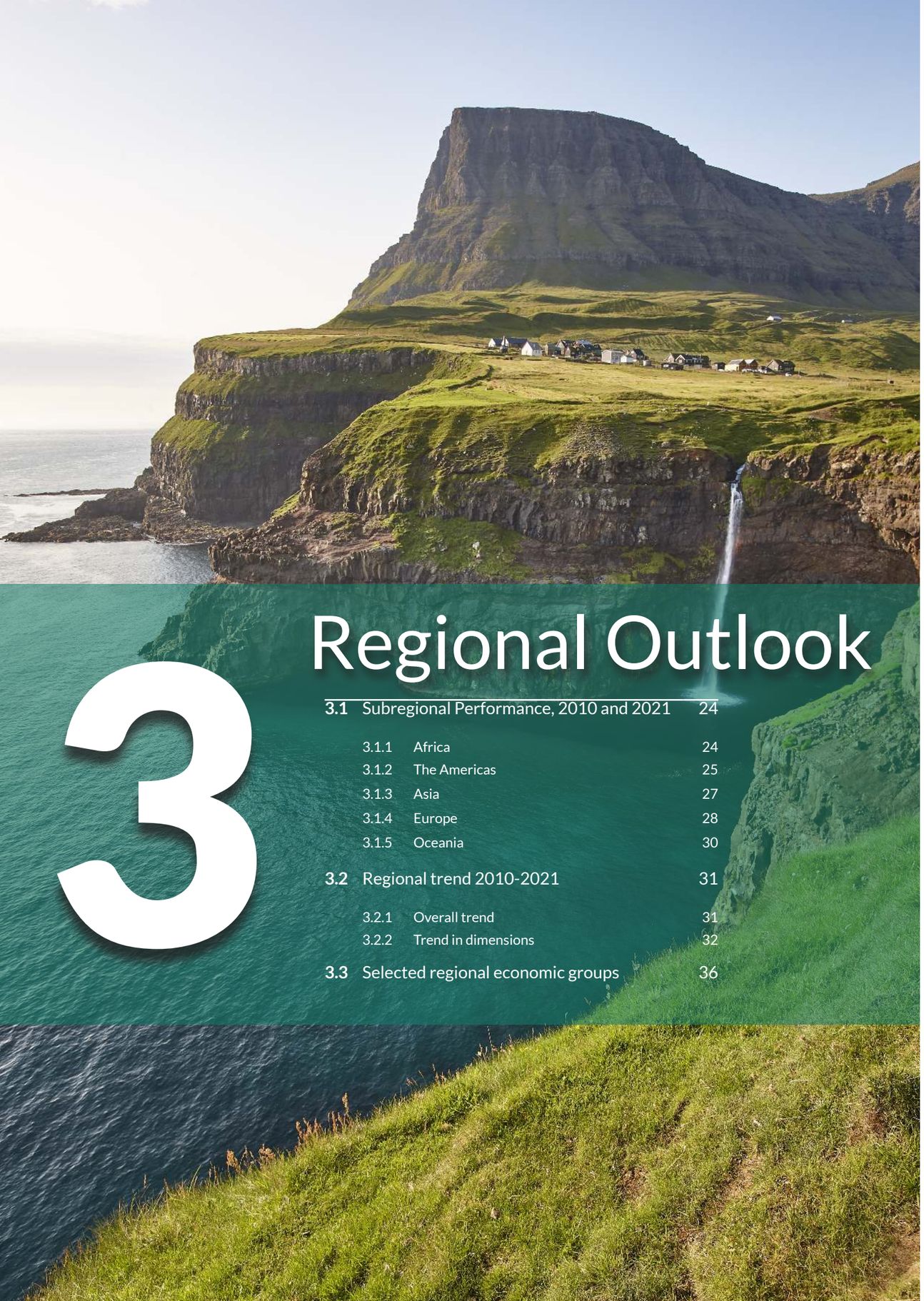
ESRU - Efficient and Sustainable Resource Use, **NCP -** Natural Capital Protection, **GEO -** Green Economic Opportunities, **SI -** Social Inclusion

Legend: 0 Very low 20 Low 40 Moderate 60 High 80 100 Very High — >5% | <=5% & >1 | <=1% & >0 | <=-1% & >-5% | <-5%

Figure 7 Dashboard of pillars in each green growth dimension, by sub-regions in 2021



Definitions: EE – Efficient and sustainable resource use, EW – Efficient and sustainable water use, SL – Sustainable land use, ME – Material use efficiency, EQ – Environmental Quality, GE – GHG emissions reduction, BE – Biodiversity and ecosystem protection, CV – Cultural and social value, GV – Green investment, GT – Green trade, GJ – Green employment, GN – Green innovation, AB – Access to basic services and resources, GB – Gender balance, SE – Social equality, SP – Social protection



3 Regional Outlook

3.1 Subregional Performance, 2010 and 2021

Green Growth Index and dimension scores are provided for countries within five geographic regions – Africa, the Americas, Asia, Europe, and Oceania. To further understand the Green Growth Index results, an in-depth analysis of each region is provided, discussing the scores of efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion at a subregional level. The Green Growth Index is calculated as a geometric mean of the dimensions. To gain a deeper understanding of the region's economic development over time, the changes in the region's Green Growth Index and dimension scores were analyzed between 2010 and 2021.

3.1.1 Africa

The Green Growth Index includes the results for five African subregions: Eastern, Middle, Northern, Southern, and Western. Figures 8a and 8b compare the overall green growth performance in the African subregions between 2010 and 2021. The Green Growth Index scores are similar across all subregions in both years except Northern Africa, where performance is lower. The African subregions' scores on the Green Growth Index in 2010 ranged between 40.89 and 50.75. In 2021 a slight increase can be observed, so the scores ranged between 42.40 and 52.15 (Figure 8a). Among the four green growth dimensions, the best performance was in social inclusion across each subregion, reaching additional 2-7 scores in this dimension between 2010 and 2021, except in Middle Africa, where the scores stagnated. The lowest performance was observed in green economic opportunities. Almost all countries in each subregion performed low on green economic opportunities. For example, Libya and South Africa showed a decreasing trend in these dimensions and the Green Growth Index (Table 3).

In 2021, Middle Africa had the highest score as a result of having the highest performance in efficient and sustainable resource use and natural capital protection. However, Middle Africa's performance on social inclusion was the lowest due to the low performance on access to basic services and social protection. Furthermore, this subregion's score on green economic opportunities had the second lowest value. Middle Africa is thus faced with the challenge of improving performance in several green growth dimensions. Eastern Africa reached second place on the green growth score in the African region. The lower scores were observed in efficient and sustainable resource use and green economic opportunities in this subregion. Green economic opportunities scores were very low in all of the five subregions. Although Northern Africa had the highest performance in social inclusion, the lowest performance in efficient and sustainable resource use, especially on green trade and innovation, negatively affected the subregion's score in the Green Growth Index. Furthermore, Northern Africa performed the worst on sustainable water use. Several countries in this subregion scored very low in sustainable water use due to water scarcity.[7] Performance in efficient and sustainable resource use and social inclusion was the most diverse among the dimensions. Higher performance in efficient and sustainable resource use in Middle Africa can be attributed to very high scores in sustainable land use, while for Eastern and Western Africa, due to either moderate or high performance in efficient and sustainable energy use.

Figure 7 and Figure 8a highlighted the opportunities for improving green growth performance in the African subregions, particularly in the green trade, green jobs, green investment, and green innovation, along with efficient and sustainable energy and water, biodiversity and environmental protection, access to basic services, and social protection.

Figure 8a Green Growth Index and dimension subindices in the African subregions, 2021

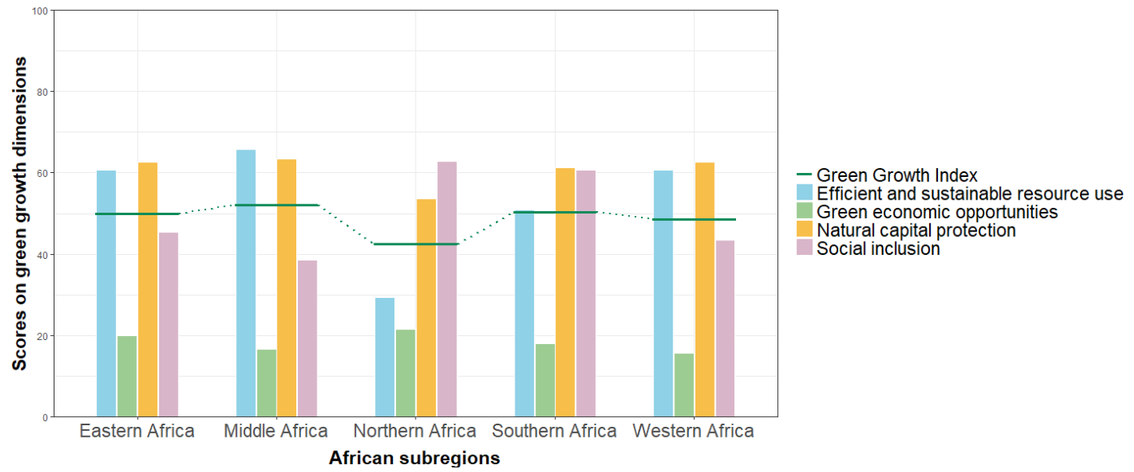
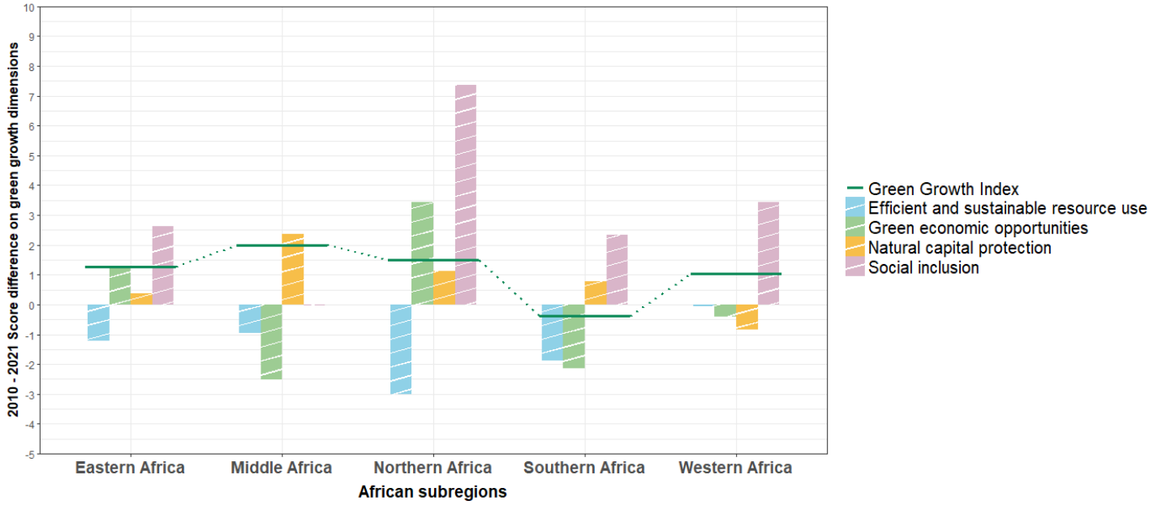


Figure 8b Score difference for the Green Growth Index and dimension subindices in the African subregions, 2010-2021



3.1.2 The Americas

The Americas consists of four subregions – the Caribbean, Central America, Northern America, and South America. The scores for the Green Growth Index and dimensions in these subregions in 2010 and 2021 are presented in Figures 9a and 9b, respectively.

The Green Growth Index scores were similar in both years for all subregions. The Green Growth Index scores in the Americas subregions ranged between 51.98 and 59.56 in 2010 (Figure 9a). A slight increase can be observed in the scores, with the range increasing to 54.37-60.89 in 2021 (Figure 9a). Social inclusion showed the best performance, with scores increasing between 2.89 and 4.43 in the Americas subregions (Figure 9b). The natural capital protection dimension followed it, with scores increasing between 1.38 and 2.29 points. Standing with moderate scores, efficient and sustainable resource use was the weakest performer among all dimensions. Trinidad and Tobago contributed to the weak efficient and sustainable resource use performance. This country showed a slight decline in Green Growth Index scores from 2010 to 2021 (Table 3). Although there was a slight increase in green economic opportunities among the Americas subregions, the scores for this dimension remained at a low level.

In 2021, Northern America performed best due to a very high score in the social inclusion dimension (Figure 9a), particularly concerning social protection and social equity in Canada and the United States. The very high scores in these countries can be attributed to prioritizing social inclusion policies and public spending on social programs. These countries also performed well in green jobs and investment, contributing to a slightly higher score in green economic opportunities. Despite the increase, the overall score for this dimension in Northern America remained low. The other subregions performed better than Northern America in natural capital protection. For example, Latin America and the Caribbean hold most of the global terrestrial biodiversity, placing a high value on natural capital and ecosystem services.[8] This led to high performance in biodiversity and ecosystem protection as well as cultural and social value, resulting in increased natural capital protection scores. Moreover, the performance in reducing GHG emissions (GE) is high in the Caribbean and Central America (Figure 7). Efficient and sustainable resource use had moderate performance and displayed the lowest variability among the subregions (Figure 9b). The good performance in material use efficiency balanced out the poor performance in efficient and sustainable energy and water use.

Figure 7 and Figure 9a show that in addition to green trade, green jobs, green investment, and green innovation, the best opportunities to improve green growth performance in the Americas will be in efficient and sustainable energy and water use, and in biodiversity and ecosystem protection.

Figure 9a Green Growth Index and dimension subindices in the Americas subregions, 2021

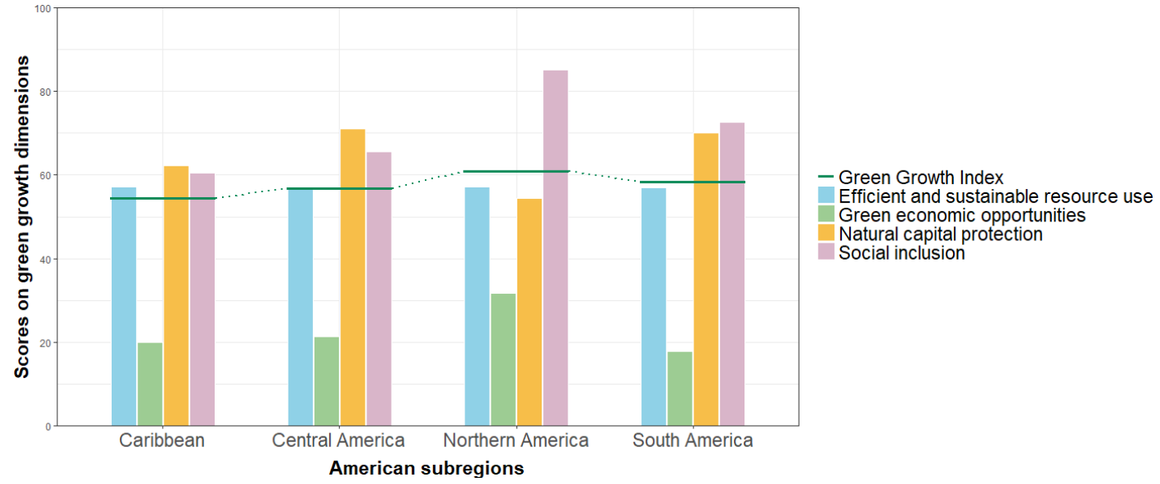
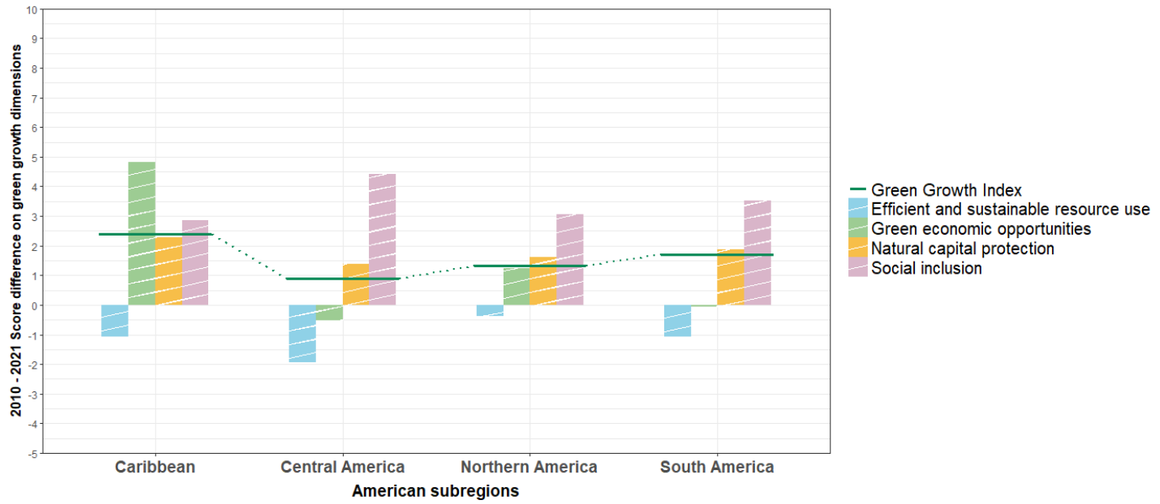


Figure 9b Score difference for the Green Growth Index and dimension subindices in the Americas subregions, 2010-2021



3.1.3 Asia

The subregions of Asia include Central, Eastern, South-eastern, Southern, and Western. Figure 10a and Figure 10b show that the Green Growth Index scores are similar across these subregions in 2010 and 2021. The scores ranged between 41.89 and 54.11 in 2010 and between 42.51 to 57.06, slightly higher, in 2021 (Figure 10a). The dimension showing one of the highest increases in score was social inclusion, with up to 6.70 points (Figure 10b). The increase in green economic opportunities and natural capital protection was even higher, ranging from 0.21 to as high as 9.02. But in the case of green economic opportunities, the scores remain low despite the significant improvement. Efficient and sustainable resource use showed negligible improvement from 2010 to 2021. This can be attributed to the declining performance in this dimension in several countries in Western Asia, including Azerbaijan, Lebanon, Iraq, Yemen, and Syria. These countries also showed an overall decline in the Global Green Growth scores between 2010 and 2021 (Table 3). On the contrary, the highest overall increase during this period was observed in Central Asia because three out of four countries included in this subregion (i.e., Kazakhstan, Tajikistan, and Uzbekistan) showed a 6-10 percent increase in their Green Growth Index scores (Table 3).

In 2021, Eastern Asia had the highest score due to very high performance in social inclusion. Although low, its scores in green economic opportunities are highest at 28.43 in the Asian subregion. Natural capital protection showed moderate to high scores for most subregions, with South-eastern Asia showing the highest score for this dimension. The high performance in natural capital protection in this subregion can be attributed to very high scores in environmental quality. Western Asia had the lowest Green Growth Index score because of very low performance in natural capital protection and efficient and sustainable resource use. For the other subregions, the weakest dimension remained green economic opportunities (Figure 10a), indicating good opportunities for increasing performance in this dimension in the region. The same is the case for the subregions in other regions like Africa and the Americas. The performance in efficient and sustainable resource use was lowest in Central and Western Asia, which can be attributed to the low scores in efficient and sustainable water use. The other subregions had moderate scores in this dimension.

Figure 7 and Figure 10a shows that, like in the Americas, the best opportunities to improve green growth performance in Asia will be in all four pillars of green economic opportunities as well as in efficient and sustainable energy and water use, and in biodiversity and ecosystem protection.

Figure 10a Green Growth Index and dimension subindices in the Asian subregions, 2021

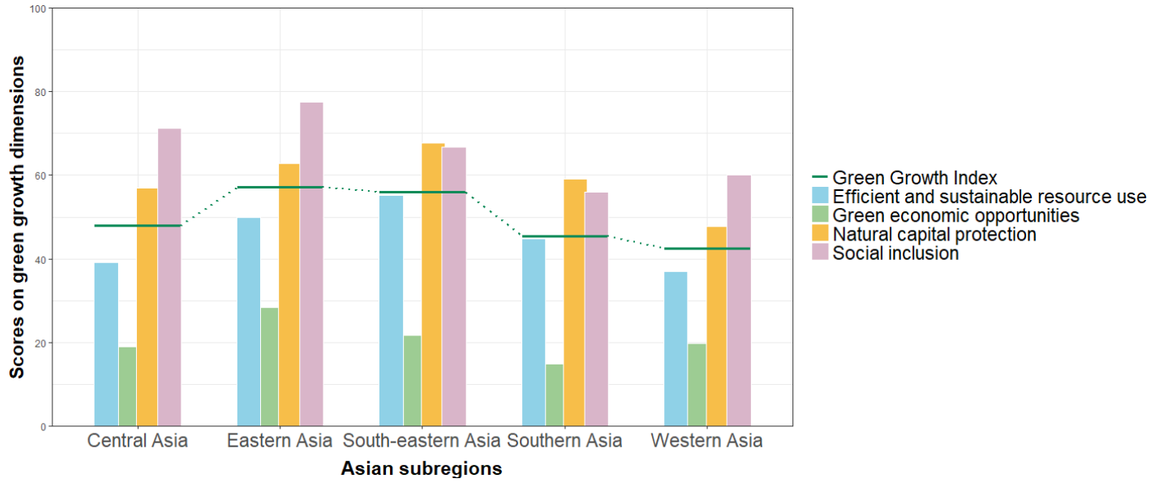
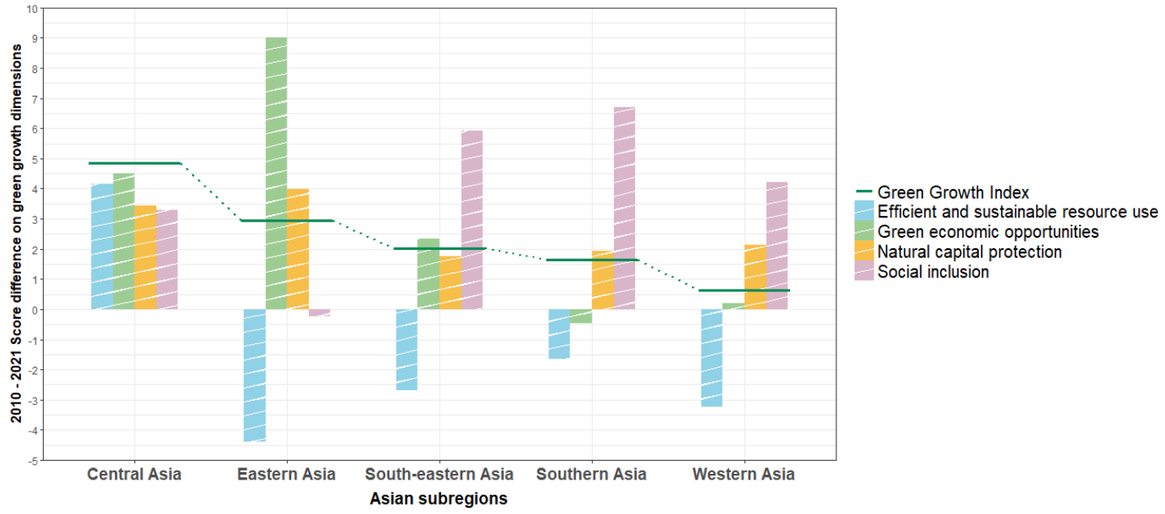


Figure 10b Score difference for the Green Growth Index and dimension subindices in the Asian subregions, 2010-2021



3.1.4 Europe

Europe's Eastern, Northern, Southern, and Western subregions scored the highest on the Green Growth Index in 2021 (Figure 11a). The score ranges increased from 59.55-67.78 in 2010 to 63.93-71.12 in 2021. The dimension scores improved across the subregions during this period. The highest improvements were observed in social inclusion and the natural capital protection dimensions. Western Europe showed the highest increase in natural capital protection scores by 7.78 points (Figure 11b). Moreover, its scores for efficient and sustainable resource use also increased by 5.65 points. The scores for green economic opportunities increase only slightly between 0.67 and 3.55 across European subregions. Montenegro and Belgium recorded the highest improvements in the Green Growth Index dimension, increasing by 12.32 points (or 27 percent) and 7.04 points (or 12 percent), respectively. Despite these increases, green economic opportunities remained to have low scores.

Social inclusion and natural capital protection dimensions contributed to the high scores in Green Growth Index across the European subregions in 2021 (Figure 11a). Like in the other regions, green economic opportunities remained to have low scores in Europe. Western Europe, which had the highest social inclusion and natural capital protection scores, showed the best green growth performance with the highest Green Growth Index score of 71.12. The very high scores in social equity and high in social protection contributed to the very high performance in social inclusion in European subregions (Figure 7). GHG emission reduction and cultural and social values were responsible for the high scores in natural capital protection. In contrast, however, biodiversity and ecosystem protection still require improvement in this dimension, for which performance remained moderate in the subregions, except in Eastern Europe. The green economic opportunities dimension is the lowest across all subregions due to low performance in green innovation and moderate performance in green investment, green trade, and green jobs. Performance in green economic opportunities is best in Western Europe, with a score of 30.78, and worst in Southern Europe, with a score of 25.44. The high performance in efficient and sustainable resource use in all European subregions can be attributed to the high scores in sustainable land and material use efficiency. However, scores in efficient and sustainable energy and water were only moderate.

Figure 7 and Figure 11a highlighted that in European subregions, green innovation, green trade, green jobs, green investment are the green growth pillars that will need policy attention. However, there are also further opportunities to improve green growth performance in efficient and sustainable energy and water, as well as biodiversity and ecosystem protection across the subregions.

Figure 11a Green Growth Index and dimension subindices in the European subregions, 2021

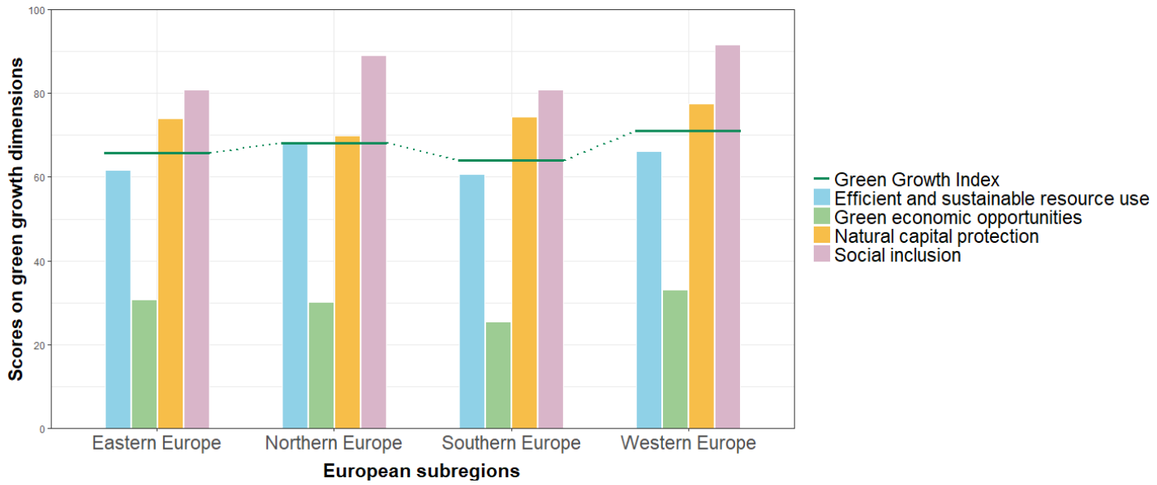
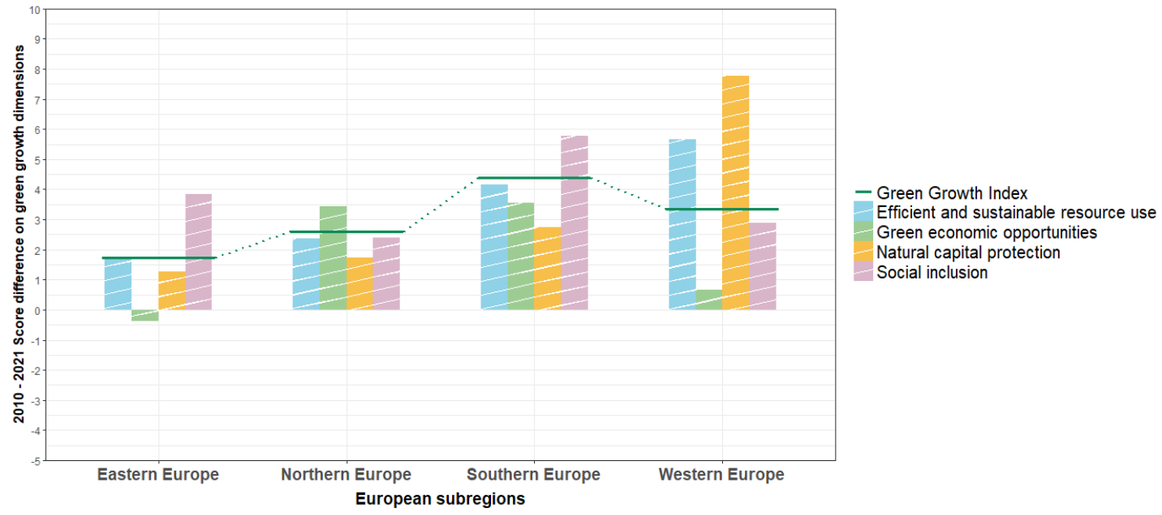


Figure 11b Score difference for the Green Growth Index and dimension subindices in the European subregions, 2010-2021



3.1.5 Oceania

Oceania has four subregions – Australia and New Zealand, Melanesia, Micronesia, and Polynesia. It is important to note that due to the data availability of Oceanian subregions, their comparison is limited in green economic opportunities, especially on green investment, green jobs, and green innovation. Moreover, Micronesia and Polynesia have limited data on efficient and sustainable resource use, particularly efficient water use. Micronesia has a further data limitation on sustainable land use and material use efficiency. Therefore, due to challenges in data availability in many subregions in Oceania, analysis can be conducted only on a country level for Australia, New Zealand, Fiji, and Tonga (Figure 12a and 12b). The Green Growth Index scores for these countries ranged between 46.75 and 61.46 in 2010. In 2021, a slight increase can be observed, with the scores ranging from 47.99 to 62.37 (Figure 12a). From 2010 to 201, Fiji had the most significant overall improvement in Green Growth Index scores due to the increased score in social inclusion by 10.68 points (Figure 12b). Australia followed closely by improving scores in the dimensions between 3.80 and 5.61, except for the green economic opportunities with a 3-point decrease. According to Table 3, each country had improved its performance on the Green Growth Index as follows: Fiji by seven percent, Australia by six percent, Tonga by 3 percent, and New Zealand by one percent. However, the scores in green economic opportunities in each country remained low.

In 2021, Green Growth Index scores for Australia, Fiji, and New Zealand were around 60, and for Tonga, about 50. All countries thus have only moderate green growth performance. Australia and New Zealand perform slightly better in social inclusion. Whereas in Fiji, the social inclusion score was lower due to poorer performance in gender balance compared to the other countries (Figure 7). However, this country performed better in natural capital protection due to very high scores in environmental quality and GHG emission reductions. It also performed relatively better in green jobs, resulting in higher scores in green economic opportunities. Australia had moderate performance in natural capital protection, as the dimension score is affected by low performance in GHG emission reductions. Australia had the highest value for efficient and sustainable resource use, mainly due to very high scores in sustainable land use. This is the opposite for Tonga, which had the lowest score in the efficient and sustainable resource use dimension. Like other subregions, the green economic opportunities dimension had the lowest score, with green jobs and green investment being the major pillar influencing the dimension performance.

Figure 7, Table 3, and Figure 12a highlighted that in Oceanian subregions, one of the significant challenges to tracking green growth performance is data availability across countries and over time. With the available data, the assessment indicates that Oceanian countries had to focus on green economic opportunities and, in Australia, on environmental quality as well as biodiversity and ecosystem protection. Although the four countries with Green Growth Index scores performed well on social inclusion, other Oceania countries with sufficient data on this dimension showed moderate or low performance on access to basic services. Moreover, several countries also showed poor performance in gender balance, including five countries in Melanesia, eight in Micronesia, and ten in Polynesia.

Figure 12a Green Growth Index and dimension subindices in the Oceania subregions, 2021

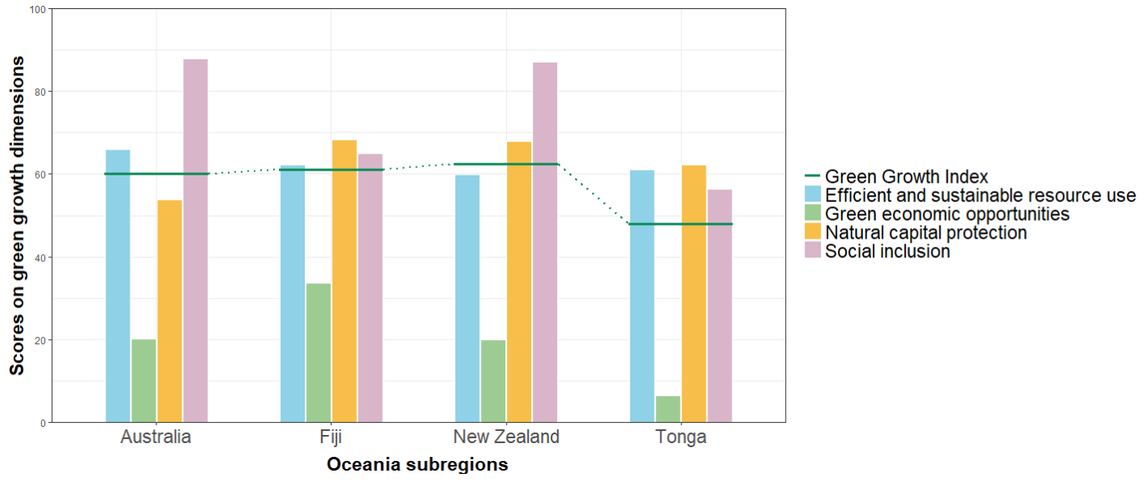
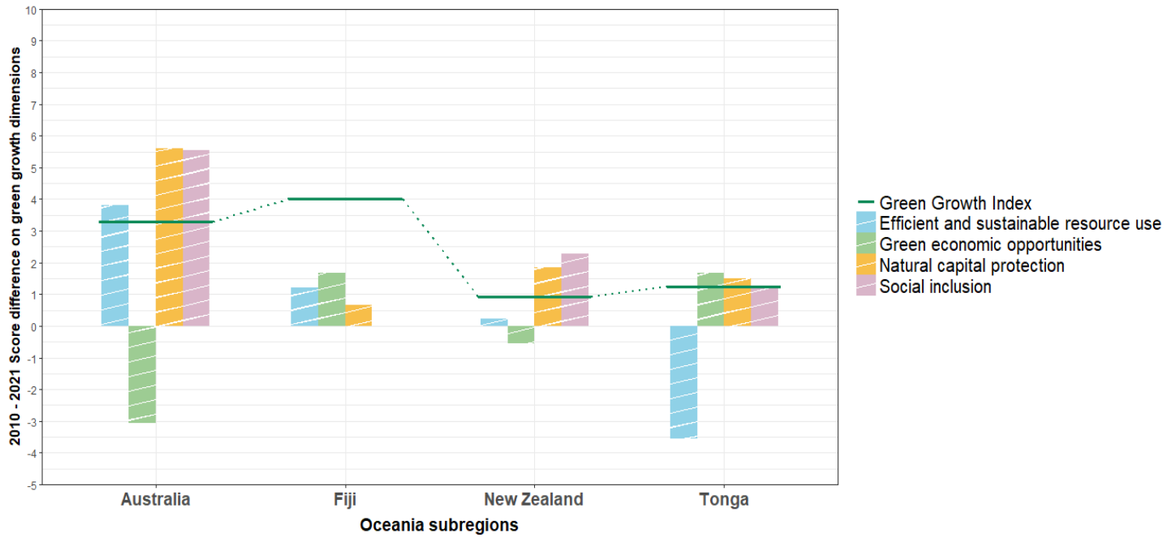


Figure 12b Score difference for the Green Growth Index and dimension subindices in the Oceania subregions, 2010-2021



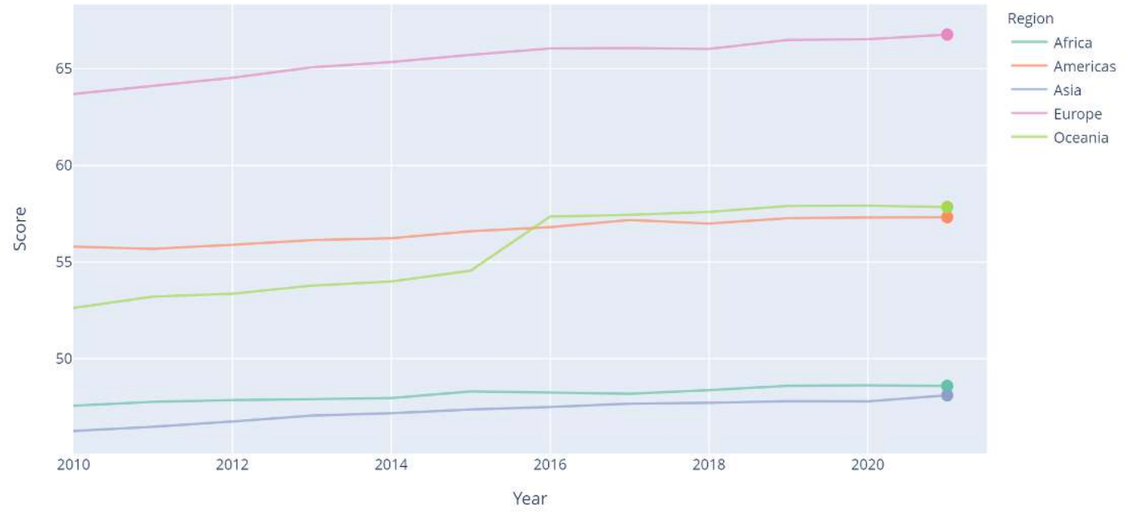
3.2 Regional trend 2010-2021

3.2.1 Overall trend

Trend analysis is crucial for monitoring the countries' performances in the Green Growth Index. This analysis looks for patterns and highlights valuable information on green growth performance. Determining the factors affecting the upward and downward trends in the Index and its dimensions will help the policymakers to determine the areas of green growth that need crucial attention, make important decisions, and plan accordingly. Figure 13 presents the trends in the Green Growth Index scores by region from 2010 to 2021. During this period, Europe consistently showed the global highest score on Green Growth Index, with a score of only 66.76 in 2010 and not reaching a very high level of performance at 68 in 2021. This performance was influenced mainly by the European Union's (EU) efforts to push for a more sustainable future. Moreover, Europe's 6 percent increase in the Green Growth Index scores between 2010 and 2021 was slightly higher than in the Americas.

The Americas had Green Growth Index scores between 55 and 60, which were on the upper end of the moderate green growth performance. This was mainly attributed to their consistent efforts to eradicate poverty and inequality in South and Central America. The scores for the Americas did not adequately reflect the performances of the United States and Canada, which individually scored well above the average, at 62 and 60, respectively. Oceania showed the most significant score change during the period, with a score between 50 and 60, which is also on the upper end of the moderate scores range. On the other hand, Africa and Asia remained the regions with the lowest scores over time. Africa showed the slightest change in the scores during this period, with a score between 47 and 49. The African and Asian countries were both on the lower end of moderate scores (40-50). But there were very slight improvements in performance in the social inclusion dimension for these countries.

Figure 13 Trend in Green Growth Index by region, 2010-2021



3.2.2 Trend in dimensions

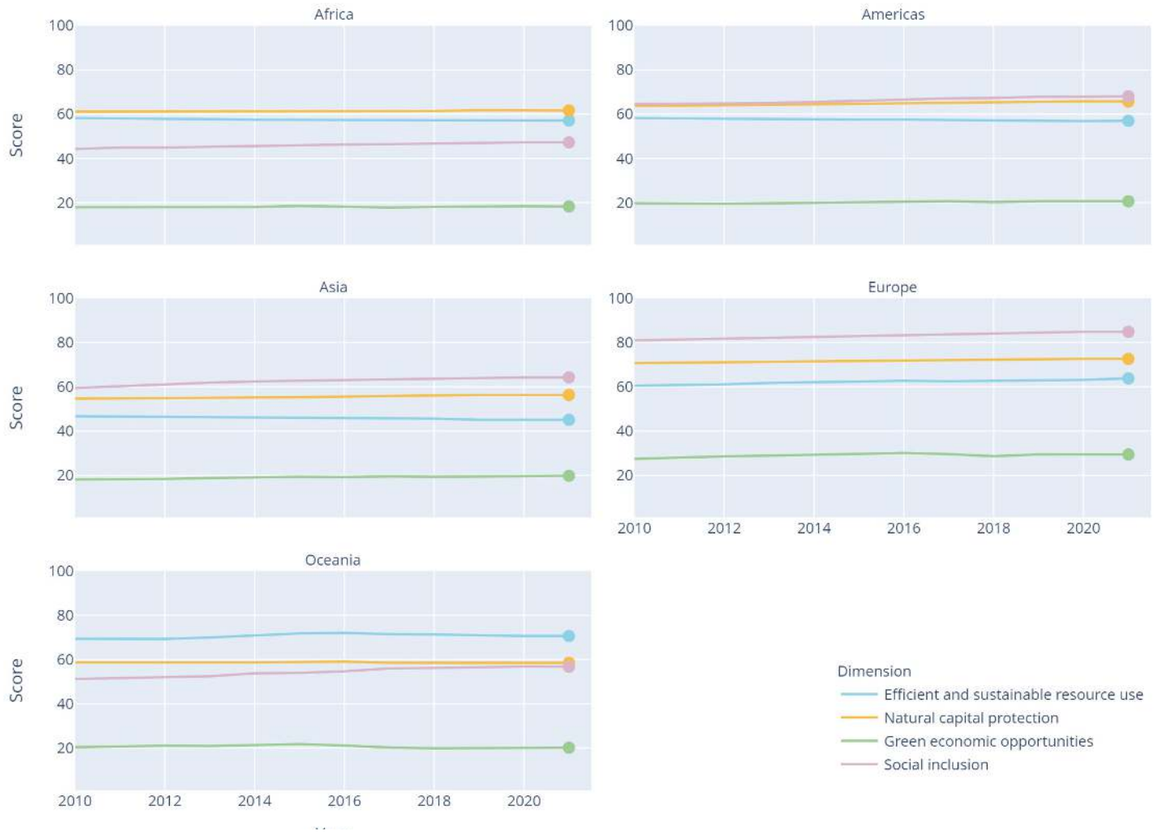
Figure 14 shows the regional trend in the four green growth dimensions, including efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion from 2010 to 2021. Although the trends differ across regions for the four green growth dimensions, the green economic opportunities dimension is consistently below targets and largely stable across time, except in Europe, where the trend is more significant than in other regions. Creating green economic opportunities continued to be a critical bottleneck to the green growth transition in all regions. The trend in this dimension showed the lowest score and almost no improvement from 2010 to 2021, except for Asia.

A positive trend to note is that across all regions, social inclusion scores have risen systematically during the period from 2010 to 2021. This is especially true in areas with many developing countries like Asia and Africa. The increase in social inclusion scores can largely be attributed to the wide-ranging efforts at poverty reduction, including the inflow of foreign aid, government welfare programs, and efforts by international organizations, including the United Nations.[9] Moreover, this dimension dominated the trend in scores in the Americas, Asia, and Europe. Meanwhile, the trends for natural capital protection and efficient and sustainable resource use stood out for Africa and Oceania, respectively. Except for Africa, natural capital protection is the second green growth dimension that dominated the trend in all regions in the last decade. This indicates that the protection of natural capital has been one of the main contributors to enhancing green growth performances across regions.

Comparative trends can also be noted in Figure 14. For instance, the efficient and sustainable resource use dimension had the closest scores in Africa and the Americas. This is partly attributed to the share of renewable to total final energy consumption indicator, where many African countries scored 100, signifying that they have reached or exceeded the sustainability target. The very high scores for this indicator are attributed to the lower total energy consumption in many African countries and the increase in renewable energy investments. Moreover, Africa scored slightly better on the natural capital protection dimension than Asia. This is because Asian developing countries usually prioritized industrialization over conservation, while Africa only produced two percent of energy-related global carbon dioxide.[10]

The following sections of this chapter explain the abovementioned trends in the green growth dimensions.

Figure 14 Trend in green growth dimensions by region, 2010-2021



Africa

Africa's score in the social inclusion dimension consistently increased by seven percent, from 44.28 in 2010 to 47.23 in 2021 (Figure 14). This trend can be attributed to various factors, such as their initiatives to improve their education and healthcare and reduce poverty. Children are crucial to the future of Africa. The region will have a billion children and adolescents under 18 years old by the middle of this century.[11] On the global level, this number will comprise almost 40 percent of all children and adolescents.[12] With this number of young populations, Africa needs to ensure that their growth demographically will not be a problem but an advantage. Thus, Africa recognizes that education is a crucial development priority and, therefore, prioritizes fair and inclusive access to education for all, youth and adult literacies, and education for global citizenship and sustainable development as they aim towards their Education 2030 goals. The African countries aim to ensure that their human capital is developed through continuous investments in science, technology, higher education, research, innovation, and universal access to early childhood development and primary education.[13]

In the case of their healthcare, about 450 million malaria deaths were prevented in sub-Saharan Africa between 2000 and 2015 due to the distribution of nets[14], which contributed to the rise in their healthcare indicator. In terms of poverty reduction, many countries in Sub-Saharan Africa have already developed plans for poverty reduction. For instance, in Kenya, where poverty is prevalent and estimated to surpass 60 percent, the main strategies include facilitating continuous and rapid economic growth, enabling the poor to raise their incomes, advancing the quality of life of the poor and vulnerable, improving equality and the participation of the poor in decision-making, and developing governance and security.[15] In partnership with international development organizations, Kenya and other low- and middle-income countries in Sub-Saharan Africa have implemented cash transfer programs to address extreme poverty and support vulnerable households. Some benefits from the cash transfer program were an increase in their consumption expenses by households, an increase in demand-driven earnings by the local businesses, an increase in food security, women empowerment, an improvement in child growth and school attendance, an improvement in psychological health, and improvement in the overall health of the recipient household.[16]

The efficient and sustainable resource use dimension remained constant in Africa from 2010 to 2021 since the initiatives to introduce clean energy in Africa have been opposed by the efforts for industrialization. Middle Africa had the highest performance in this dimension due to its high scores in sustainable land use. Eastern and Western African countries also had high scores in this dimension due to their moderate to high performance in efficient and sustainable energy use. On the other hand, Northern Africa had the lowest score, particularly in sustainable water, due to water shortage.

The same trend can be observed in Africa's natural capital protection dimension since efforts to conserve biodiversity and forest land have been resisted by politicians and interest groups who wish to use these resources for economic advantage. Africa had a remarkable biodiversity, with numerous endangered and endemic plants and mammals. It is also rich in tropical forests, wetlands, mangroves, montane grasslands, and deserts. Despite the opportunities that their biodiversity provides, the region is experiencing a decline due to illegal trafficking, rapid urbanization, population growth, infrastructure development, and extensive agricultural practices, among others.[17] While most African countries scored highly in specific indicators like forest area to total land area and municipal solid waste generation, other indicators had mixed results.

The Americas

The Americas performed best in social inclusion and natural capital protection dimensions, with scores of 68.07 and 65.68, respectively, in 2021 (Figure 14). The region experienced an increase of five percent in social inclusion and three percent in natural capital protection from 2010. The social inclusion dimension had steadily risen in the Americas during this period. However, developed countries like Canada and the United States significantly outperformed others as they have very high social protection and social equity performances. The very high scores in these countries can be attributed to prioritizing social inclusion policies and spending on social programs. In Canada's case, most Canadians now accept policies such as bilingualism and multiculturalism, which reflect its approach to social inclusion. Canada's journey toward National Reconciliation is one of the indicators of its desire to shift toward a more inclusive society.[18] The increase in the social inclusion dimension can also be attributed to the investment of South and Central America in social welfare, such as the Bolsa Familia program in Brazil and Oportunidades in Mexico.[19] These countries experienced increased access to basic services, social protection, and gender balance indicators.

The relatively slower progress in the natural capital protection dimension was attributed to slow development in efficient and sustainable resource use. In the last decade, there was a decline in GHG emission reduction and efficient and sustainable energy in the Americas. In the case of the United States, its GHG emissions decreased by 20 percent from 2005 to 2020. Notably, it sharply reduced by nine percent from 2019 to 2020 due to COVID-19 impacts on economic and travel activities. The decline also revealed the effects of long-term trends in factors such as economic growth, population, energy markets, carbon intensity, and technological changes.[20] Another factor in the slow progress in this dimension is the challenges in transport logistics in Venezuela which include economic instability because of the short-term policies on the economy, limitations in the infrastructures, and lack of human resources.[21] Bolivia and Guyana also contributed to the slow progress in sustainable transport.[22]

Like the other regions, the trend in the green economic opportunities dimension in the Americas was consistently below targets and largely stable but slightly increased over time. Canada and United States performed moderately well in green jobs and green investment. Canada saw a rise in indicator scores for green employment and the share of patent publications in environmental technology. On the other hand, the indicator of adjusted net savings had a decreasing score for many American countries. The slow improvement in this dimension was attributed to the decrease in green innovation in almost the entire region. But American countries continued to improve in green innovation. For instance, a Brazilian producer and retailer of cosmetics, fragrances, and personal care products adopted eco-packaging. In 2017, Sustainable Public Procurement was launched in Colombia by the Ministry of the Environment and Sustainable Development to influence the purchasing decisions of producers and consumers toward sustainable products and services. This aimed to enable companies and final consumers to include environmental quality criteria within their purchasing decisions. Green innovation is a primary criterion in the actual procurement process when evaluating the bidder's proposals. In Mexico, the Ministry of Energy in Mexico launched different human capital programs in support of the sustainable energy transition. In other South American countries, many Green R&D funds are administered by National Ministries, Councils of Science and Technology, and Innovation Agencies.[23]

On the other hand, there has been a slight decline in the efficient and sustainable resource use dimension, decreasing by two percent from 58.19 in 2010 to 56.98 in 2021. This is attributed to the slow adoption of renewable energy, even in places like the United States and Canada. An indicator of material use efficiency, the Americas perform relatively well. While the score for soil nutrient budget is high for most countries, the indicator on the share of organic agriculture is very low and remains persistent across time.

Asia

Asia showed increasing trends in social inclusion and stable trends in some dimensions. The eight percent rise in the score for the social inclusion dimension allowed Asia to shift from moderate to high performance from 59.46 in 2010 to 64.25 in 2021 (Figure 14). Eastern Asia significantly contributed to this increase because of its very high performance in this dimension. The increasing trend is attributed to increased access to basic services and social protection, as well as modest improvements in gender balance across most countries. Many Asian countries have developed and implemented strategies that significantly contributed to reducing extreme poverty in the region. These strategies include increasing the delivery of social services, developing social protection interventions, accelerating economic growth, redistributing incomes, developing lagging areas, growing investments to generate jobs, promoting small and medium-sized enterprises, and balancing rural–urban growth.[24]

Asia's performance in the natural capital protection dimension showed relatively slower progress. It remained at a moderate level, increasing by three percent from 54.65 in 2010 to 56.34 in 2021. Most subregions show moderate to high performance in this dimension. The high performance in this subregion can be attributed to very high scores in environmental quality. The slow progress was caused by a slight decline in reducing GHG emissions across

almost all subregions in Asia. Moreover, big Asian countries such as India and China failed to reduce air pollution.[25] In other natural capital protection indicators, including the biodiversity indicators, DALY rate due to unsafe water sources, and tourism in marine and coastal areas, there are mixed results, with most countries recording stable trends across time. The region's reefs in the "coral triangle", large river basins, and temperate and tropical forests are among the most unique in the world. However, the countries in the region experienced a fast decline in biodiversity.[26] They are challenged by very high rates of deforestation and mining.[27] To address such issues, Asian countries adopted a framework including a shared vision, a mission, strategic goals, and attainable targets, known as the Aichi Biodiversity Targets.[28]

In the efficient and sustainable resource use dimension, Asia had a declining trend, decreasing by three percent from 46.66 in 2010 to 45.08 in 2021. The region failed to improve significantly despite investments in renewable energy by China and India. Moreover, many Asian countries experienced political unrest and violence and struggled for sustainable transport. The trend in the green economic opportunities dimension in Asia was also consistently below targets and largely stable, slightly increasing by nine percent from 18.17 in 2010 to 19.79 in 2021. The best-performing indicator in this dimension is the indicator of adjusted net savings, representing green investment.

Europe

Europe's trends in all dimensions are rising slightly and more significantly than other regions. The region consistently achieved very high performance in the social inclusion dimension, increasing by five percent from 80.97 in 2010 to 84.86 in 2021 (Figure 14). The increasing trend can be attributed to the improvements across all green growth pillars in many Eastern European nations like Bulgaria, Slovakia, and the Czech Republic. Additionally, gender balance indicators across most countries have been very close to target levels since the enactment of policies for equality, such as mandating equal pay and the treatment of women in the workplace.[29] Over the last decades, Europe has made crucial progress in gender equality. They implement strategies such as increasing female labor market participation and economic independence of women and men, reducing the gender pay, earnings, and pension gaps and thus fighting poverty among women, promoting equality between women and men in decision-making, combating gender-based violence, and protecting and supporting victims, and promoting gender equality and women's rights across the world.[30] The gender pay gap was already one of the lowest in the OECD as early as 2011, and women had good opportunities to work as permanent employees and in professional occupations.[31]

Europe's performance in the natural capital protection dimension had relatively slow progress. But performance is high, increasing by three percent from 70.67 in 2010 to 72.63 in 2021. Almost all countries in the region contributed to the slight growth in the scores for this dimension. Since 1990, GHG emissions have decreased by around one-third, according to early estimations that included reductions in 2020. This is attributed to the increase in the use of renewables, the implementation of their national policies and measures, a shift in the utilization from coal to gas, and structural changes in Europe's economy. Moreover, the region aimed for a 55 percent net reduction in its GHG emissions for 2030. According to initial data, the EU's net emissions in 2020 were 34 percent below their 1990 levels. It was also noted that the emissions have decreased in most sectors, particularly in the residential, industrial, and energy supply sectors. But the emissions from the transport sector have not decreased fast enough despite the implemented climate policies and efforts to improve vehicle efficiency. Despite the progress in GHG emission reduction, extensive efforts across all sectors are needed to achieve a climate-neutral economy by 2050 in the EU.[32]

Europe also recorded progress in the efficient and sustainable resource use dimension, increasing by six percent from 60.48 in 2010 to 63.81 in 2021. Countries such as Germany and the Scandinavian nations of Denmark, Norway, Sweden, and Finland encouraged investments in renewable energy, contributing to the increase in indicators of efficient and sustainable energy. Although many European countries implemented strict air pollution laws using low emissions zones and congestion charging policies, the air pollution indicator (PM2.5) saw a fall from target levels since 2005.[33] In terms of efficient and sustainable water use, water scarcity has been a challenge in Belgium, but efforts have been made to address this problem. As an EU member, it has adopted EU directives that aim to solve issues on water availability. But Belgium has also been implementing solutions at the subnational level, including the mandatory rainwater collection in new-build buildings in Flanders, which saves around ten percent of freshwater consumption.[34] For efficient and sustainable land use, Belgium recorded an increasing trend in two indicators, including the share of organic agriculture in the total agricultural land area and the ruminant livestock population in the agricultural area.[35]

The trend in the green economic opportunities dimension in Europe was consistently below targets and largely stable, slightly increasing by seven percent from 27.43 in 2010 to 29.42 in 2021. But still, the region had the highest score in this dimension, and this trend was sustained in the last decade. The progress was attributed to the consistent attention given to creating green employment and the focus on sustainable innovations.[36]

Oceania

Oceania was the only region with consistently high performance in the efficient and sustainable resource use dimension between 2010 to 2021. It has recorded progress in this dimension, increasing by two percent from 69.37 in 2010 to 70.59 in 2021 (Figure 14). This promising trend was attributed to the increase in scores for efficient and sustainable land use in Australia and New Zealand as well as Melanesian countries. Australia had the best performance due to very high scores in sustainable land use. Half of the 72.3 million hectares of global organic agricultural land is in Oceania, with Australia accounting for 35.7 million hectares.[37] Moreover, Fiji and Vanuatu were the most significant contributors to organic farming in Melanesia. In both countries, youth are widely engaged in promoting organic agriculture.[38] Australia has the second-highest share of organic agriculture in the total agricultural area, followed by Fiji and Vanuatu.[39]

Oceania showed a drop in the natural capital protection dimension, slightly decreasing by 0.3 percent from 58.68 in 2010 to 58.49 in 2021. Generally, the region's performance in this dimension remained unchanged at a moderate level in the last decade.

Oceania owns six of the world's 39 biodiversity hotspots[40] but is considered "the continent of biological extinctions" due to ecosystem degradation, invasive species, overexploitation, pollution, etc.[41] Moreover, a recent report by the Worldwide Fund for Nature identified Australia as among 24 global deforestation fronts (Pacheco et al., 2021). The decrease in the score in this dimension is attributed to the significant reduction in the environmental quality indicators in New Zealand and Australia. Cultural and social value indicators have also dropped for countries like Fiji, the Marshall Islands, and Vanuatu. But Fiji also had a good performance in this dimension due to very high scores in environmental quality and GHG emission reductions. Australia had a moderate performance due to low performance in GHG emission reductions.

The region experienced the most significant improvement in the social inclusion dimension, increasing by 11 percent from 51.21 in 2010 to 56.7 in 2021. The rise in social inclusion can be attributed to an increase in access to basic services and resources across all countries and a moderate increase in scores for the gender balance category. The most significant increases were observed for gender balance in Micronesia and Polynesia, as well as social protection in Melanesia and again Polynesia. Samoa accounted for the most considerable contribution to improving both the gender balance and social protection in Polynesia. In the case of gender balance, equal gender pay garnered the most significant change in Samoa during 2010-2021. Men dominate the labor sector in Samoa, but women receive higher pay.[42] However, progress was very limited in terms of political representation because the parliamentary gender quota continued to be low at ten percent.[43] Similarly, equal gender pay contributed to the progress in gender balance scores in Kiribati in Micronesia, albeit the magnitude of change was not as much as in Samoa.

Like other regions, the trend in the green economic opportunities dimension in Oceania was consistently below targets and largely stable, slightly decreasing by one percent from 20.4 in 2010 to 20.13 in 2021. This dimension had the lowest score, with green jobs and green investment being the major pillars influencing the dimension performance. Moreover, it is noted that based on the available data, both Australia and New Zealand have had declining scores in the share of export of environmental goods to total export and share of green employment in total manufacturing employment.[44]

3.3 Selected regional economic groups

This section analyses the green growth performance in selected economic groups, including the EU, North American Free Trade Agreement (NAFTA), Mercado Común del Sur (MERCOSUR), Common Market for Eastern and Southern Africa (COMESA), Association of Southeast Asian Nations (ASEAN), and South Asian Association for Regional Cooperation (SAARC). One important criterion for their selection is the lack of overlapping country memberships (Box 3), avoiding overestimating performance measurement. In addition, these economic groups are among the most important in terms of regional economic integration. The EU has the largest number of member countries but with the least land area (Table 4). After the EU, SAARC has the smallest land area but the largest population, with 1.9 billion people. NAFTA has the largest land area with 20 million km^2 and a GDP of 27 trillion USD in 2021. Moreover, it also has the largest per capita GDP of about 54 thousand USD. COMESA, although having the third largest land area and population, has the lowest GDP of about 910 million USD and per capita GDP of 1.53 thousand USD. ASEAN has the third largest number of member countries with the third lowest GDP.

Figure 15 shows that the EU's green growth performance was better than NAFTA from 2010 to 2021. Moreover, the rate of increase in the Green Growth Index scores was higher for the EU than NAFTA during this period. Although NAFTA had a slightly higher score than the EU in green economic opportunities, the latter economic group had much higher scores for social inclusion, natural capital protection, and efficient and sustainable resource use than the latter in 2021 (Figure 16). This difference can be explained when looking at the pillar scores by country. On the one hand, NAFTA's better performance in green economic opportunities was due to higher scores for green employment in the United States of America and Canada, 76.55 and 69.67, respectively, which are higher than the EU average. On the other hand, the EU's better performance in the other three dimensions was due to the contributions of different countries. For example, Austria, Denmark, and Sweden, with scores above 75, were the countries contributing to the overall high performance in efficient and sustainable resource use in the EU. The pillars that mainly accounted for this performance were efficient and sustainable water use and sustainable land use. Slovakia, Croatia, and Germany, with scores above 80, contributed to the high performance in natural capital protection, particularly in GHG emissions reduction, and biodiversity and ecosystem protection. Sweden, Austria, and the Netherlands were the top performers in the EU for social inclusion, scoring above 90. The pillars contributing to high performance in social inclusion include access to basic resources and services and social equity.

The Green Growth Index scores in NAFTA were only a bit higher than those in MERCOSUR, which green growth performance was in the middle range. Specifically, NAFTA had a clear edge across all pillars in social inclusion and green employment and trade in the green economic opportunities dimension. In the case of the latter dimension, Brazil, the top performer of MERCOSUR in the green trade, had a score of only 15.95. In contrast, Mexico and the United States of America, NAFTA's member countries, had a score of around 40 for green trade. Moreover, Paraguay, the highest performer in MERCOSUR in green employment, scored 46.10. But as mentioned earlier, scores for green employment in NAFTA's United States of America and Canada were at least 70. However, MERCOSUR still had a higher score in efficient and sustainable resource use in 2021, with efficient and sustainable energy, water, and land use having a higher average score than NAFTA countries.

MERCOSUR's green growth performance remained moderate from 2010 to 2021. Similarly, ASEAN remained to have moderate scores during this period. It performed best in natural capital protection and social inclusion in 2021. ASEAN's scores in social inclusion continued to lag behind those in MERCOSUR. This can be explained by the difference in social protection scores between the two groups, where MERCOSUR had an average score of 78.38 compared to 52.88 in ASEAN. Countries that are lagging in ASEAN are Myanmar and Cambodia.

COMESA and SAARC were the least-performing economic groups with low scores from 2010 to 2021. Both economic groups have the same level of performance in natural capital protection. However, COMESA performed better than SAARC in efficient and sustainable

resource use and vice versa in social inclusion. At the indicator level, COMESA had higher average scores on efficient and sustainable water and land use, with scores of 38.95 and 68.68, respectively. In contrast, SAARC's scores for these indicators were 29.55 and 54.21. Conversely, SAARC performed better in social inclusion as compared to COMESA. The former had high performance in access to basic services and resources and social equity, scoring 53.17 and 77.55, respectively. Although COMESA had high performance in access to basic resources and services, the lowest score for SAARC was only 41.08 compared to multiple countries with scores below 20 in COMESA, including Madagascar, Zambia, Eritrea, and Dem. Rep. of Congo, and Burundi.

Table 4 Characteristics of selected economic groups, 2021

Economic blocks*	Number of countries	Year of founding	Total land area (million km²)	Total population (million people)	Total GDP (trillion current USD)	GDP per capita (thousand current USD)
EU	27	1993	4.00	447.20	17.18	38.41
NAFTA	3	1994	20.06	496.84	26.58	53.49
MERCOSUR	4	1991	11.67	270.27	2.20	8.12
COMESA	19	1994	10.81	595.08	0.91	1.53
ASEAN	10	1967	4.39	673.99	3.35	4.97
SAARC	8	1985	4.77	1,901.91	4.09	2.15

**European Union (EU), North American Free Trade Agreement (NAFTA), Mercado Común del Sur (MERCOSUR), Common Market for Eastern and Southern Africa (COMESA), Association of Southeast Asian Nations (ASEAN), and South Asian Association for Regional Cooperation (SAARC)*

Figure 15 Trend in Green Growth Index scores in selected economic groups, 2010-2021

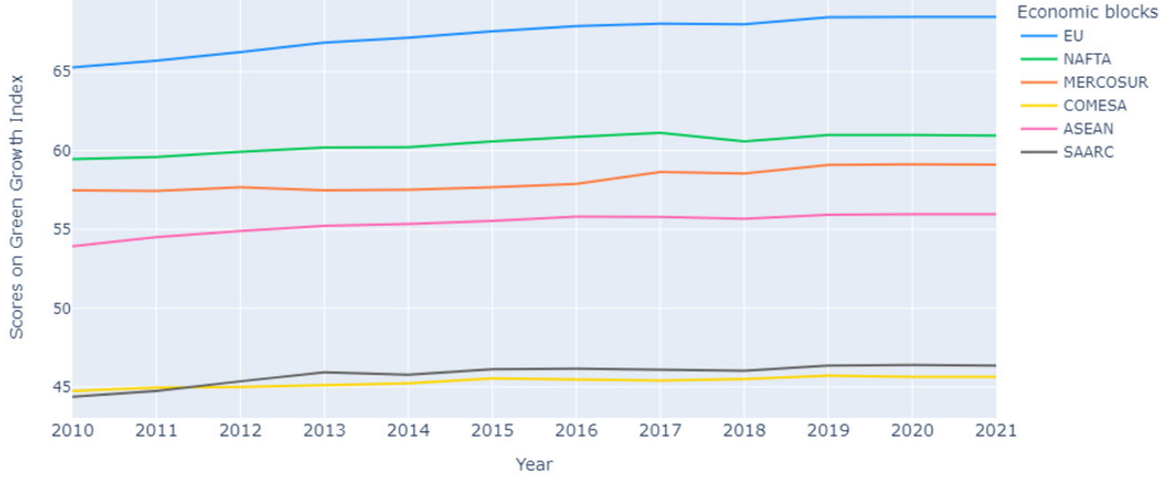
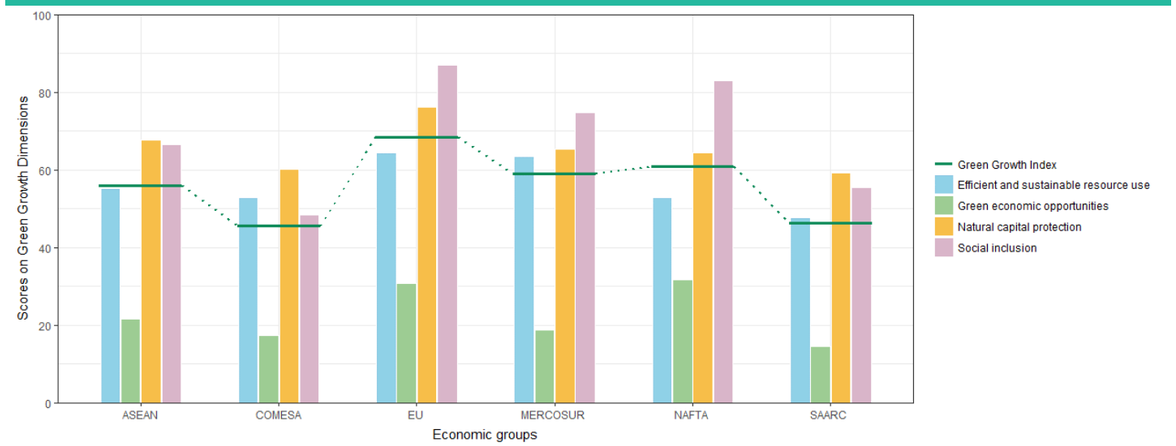


Figure 16 Green Growth Index and dimension subindices in the economic groups, 2021



Box 3 Selected economic groups

European Union (EU): Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, and Sweden

North American Free Trade Agreement (NAFTA): Mexico, Canada, and United States

Mercado Común del Sur (MERCOSUR): Argentina, Brazil, Paraguay, and Uruguay

Common Market for Eastern and Southern Africa (COMESA): Burundi, Comoros, Dem. Rep. of Congo, Djibouti, Arab Rep. of Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Eswatini, Uganda, Zambia, and Zimbabwe

Association of Southeast Asian Nations (ASEAN): Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

South Asian Association for Regional Cooperation (SAARC): Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka

4 Country Performance

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4.1 Country distribution

The Green Growth Index scores of the countries by region are presented in the scatter diagram in Figure 17. The scores for most European countries gather around the high range of scores, between 60 and 80, in 2021. This contrasts with the African and Asian countries, whose scores gather around the moderate range, between 40 and 60. There were three African countries with scores below 40, including Niger, Sudan, and Libya. Compared with Africa, more countries in Asia had scores below 40. These Asian countries include Syria, Yemen, Iraq, Kuwait, Afghanistan, Pakistan, Bahrain, Uzbekistan, Iran, Saudi Arabia, Oman, and Qatar. Gabon was the only African country with a score above 60, showing a high green growth performance. In Asia, Japan and Thailand were the countries reaching high scores. The scores for the Americas and Oceania countries tended to split above and below 60, corresponding to high and moderate performance, respectively. In Oceania, Tonga's score was located farther away from the other scores in the scatter diagram. Trinidad and Tobago and Guatemala were farthest from the other countries in the Americas. Nonetheless, these countries in Oceania and the Americas performed moderately, unlike many countries in Africa and Asia, which showed low performance.

Figure 18 presents the distribution of country scores for the four green growth dimensions and reveals more information on the green growth performance of other countries in Oceania. While country performance in Oceania for social inclusion and natural capital protection dimensions approaches those in other regions, it tends to follow the distribution of European countries as far as efficient and sustainable resource use is concerned. Unfortunately, Oceania countries continue to lack data in green economic opportunities. Generally, the countries in Europe performed better in natural capital protection than other countries, albeit there is one outlier, Monaco, with a very low score of only 16.29. This is almost as low as the lowest value of 16.04 for Guam in Oceania. It is noteworthy that while many European countries have better scores on green economic opportunities, they also have low scores, like most countries in other regions. The European countries excelled in social inclusion, with high and very high scores, without any country outliers. This region is approaching the sustainability goal of leaving no one behind. On the other hand, this remained a significant challenge in many countries in Africa as many of them remain to have low and few others even very low performance in social inclusion. The three African countries with very low scores for social inclusion include the Central African Republic, Guinea-Bissau, and Chad. An outlier in the Americas region in social inclusion is Haiti. The distribution of scores was promising for natural capital protection, where countries across regions, including Africa, tended to gather at the upper end of the scatter diagram, closer to the sustainability targets.

Figure 17 Distribution pattern of country scores for the Green Growth Index by region, 2021

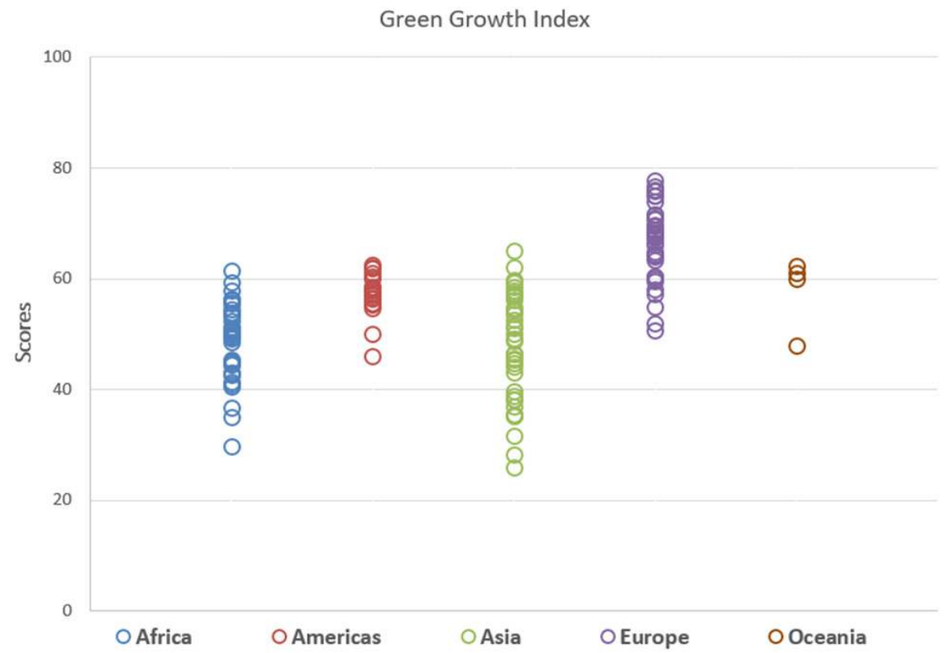
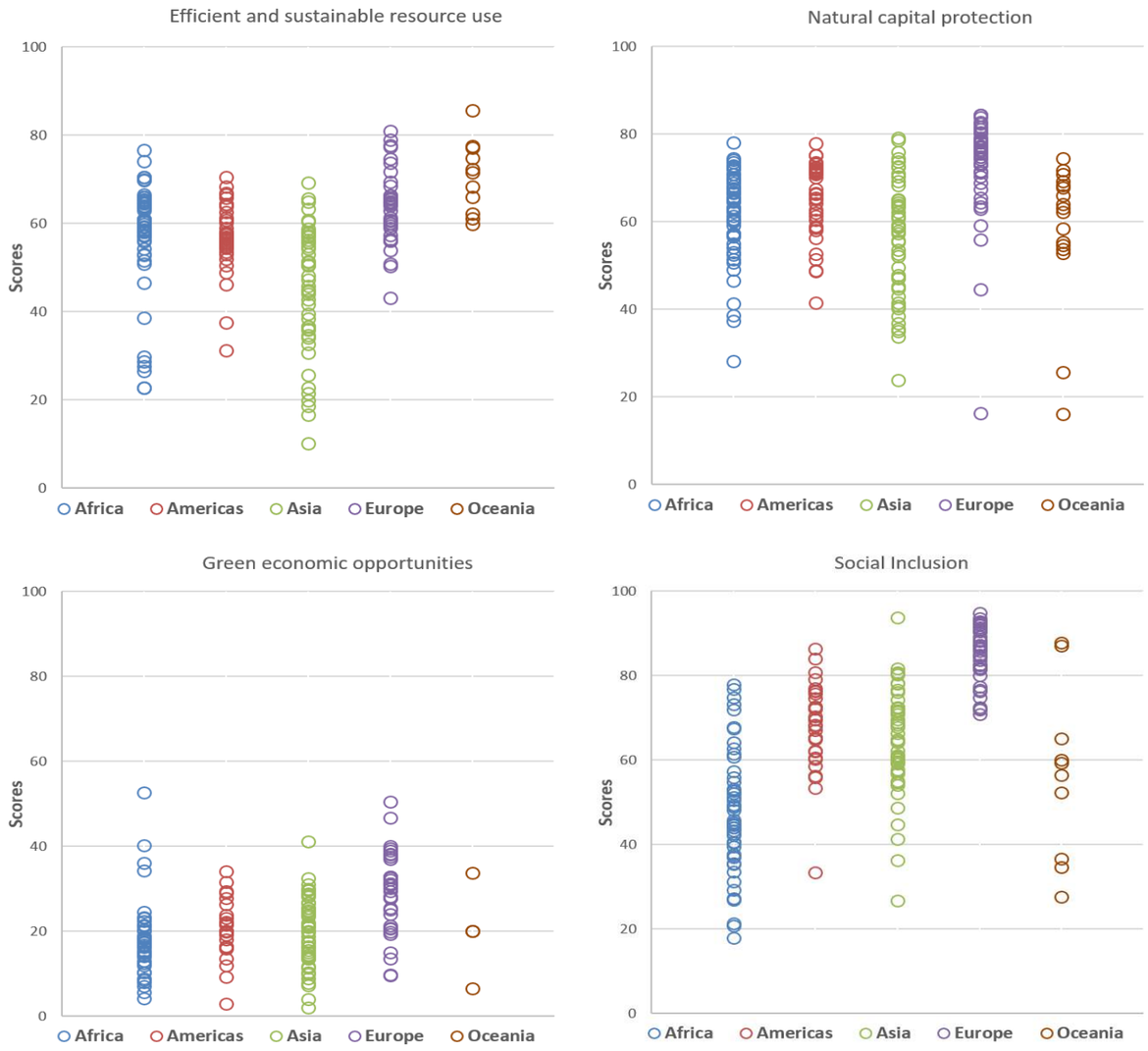


Figure 18 Distribution pattern of country scores for the green growth dimensions by region, 2021



4.2 Best performers by region in 2021

In the 2021 Green Growth Index, the top-ranking countries by region were Austria in Europe with a score of 77.78, Japan in Asia with a score of 65.03, Paraguay in the Americas with a score of 62.47, New Zealand in Oceania with a score of 62.37, and Gabon in Africa with a score of 61.56. Figure 19 shows the scores of these countries for the different green growth pillars, which contributed to their overall top performance in their respective regions. The indicators were benchmarked against the sustainability targets. The circular diagrams in Figure 19 thus show the distance to targets in each pillar, where a score of 100 indicates that a target was reached.

Austria had a very high green growth performance as it progressed closer to achieving all its targets in social inclusion (Figure 19), reflected by a dimension score of 93.45 (Table 3). But Austria occupied only second rank in social inclusion, with Sweden occupying the first rank with a score of 94.71. Nonetheless, Austria overtook Sweden's very high performance in the other three green growth dimensions. Austria's performances in efficient and sustainable resource use and natural capital protection dimensions were at 78.97 and 80.28, respectively, in 2021. Although Austria has the second-highest European score for efficient and sustainable resource use, it only ranked 9th in natural capital protection. Austria's opportunities to further improve its performance in natural capital protection would be in biodiversity and ecosystem protection (BE), where the score is currently only at 69.6. The specific indicators to create these opportunities in this dimension would be the

proportion of terrestrial, freshwater, marine, and mountain KBAs in protected areas (BE1) and above-ground biomass stock in the forest (BE3). Austria had a low score of 38.99 in green economic opportunities in 2021, although it ranked 5th in the region. Its lowest-performing indicator is in green innovation (GN), with a very low score of 9.91.

Like Austria, Japan performed best in social inclusion, almost reaching the social equity (SE) target with a score of 95.69 in 2021 (Figure 19). Although the scores in access to basic services and resources (AB) and social protection (SP) were also very high, Japan had only a moderate score in gender balance (GB). Japan's overall performance in social inclusion resulted in a score of 80.48, corresponding to the 6th rank in Asia (Table 3). The environmental quality (EQ) score was close to reaching the sustainability target of 91.3. But opportunities are available to improve the performance in natural capital protection by increasing the scores for cultural and social value (CV) and biodiversity and ecosystem protection (BE), which are currently at 53.42 and 64.1, respectively. Japan occupies the 8th rank in natural capital protection in Asia. For green economic opportunities, it ranked 2nd behind South Korea with a score of 32.41. At the indicator level, Japan scored the lowest in green innovation (GN), scoring only very low at 8.77. The country's efficient and sustainable resource use performance is 60.68, corresponding to the fifth highest in Asia. In this dimension, Japan can improve performance in efficient and sustainable energy and water use, with moderate scores of 55.17 and 49.85, respectively.

Paraguay performs well in natural capital protection and social inclusion dimensions. It occupied the top ranks for cultural and social value (CV) and environmental quality (EQ) in the Americas, with scores of 96.12 and 91.06, respectively, in 2021 (Figure 19). However, the country can still improve its performance in GHG emissions reduction (GE) and biodiversity and ecosystem protection (BE), where it ranked 32nd and 27th in the region. For social inclusion, access to basic services and resources (AB) remained challenging for Paraguay, with a score of 57.52. Opportunities for improvement are the greatest in efficient and sustainable resource use and green economic opportunities. Paraguay scored 63.81 in efficient and sustainable resource use, corresponding to 8th rank in the region. Specifically, the country can also improve its performance in efficient and sustainable water use (EW) and sustainable land use (SL scores), with moderate scores of 53.09 and 56.45, respectively. For green economic opportunities, it scored 29.12, which was the 4th highest in the region in 2021. Its lowest scoring indicator was on green trade (GT), with a very low score of 3.72.

New Zealand scored 87.11 for social inclusion in 2021 (Figure 19), with very high scores for all pillars in this dimension. However, it only occupied the second rank after Australia in social inclusion. The country also had a high performance in natural capital protection, occupying the 1st and 2nd ranks in cultural and social value (CV) and biodiversity and ecosystems protection (BE), respectively, in Oceania. Green growth performance can be improved in GHG emissions reduction (GE), scoring low at 46.74 and corresponding to 13th rank in the region. However, opportunities lie in improving scores for efficient and sustainable resource use and green economic opportunities. New Zealand can still improve its scores for efficient and sustainable water use (EW) score of 40.57. This is particularly the case for the indicators on water use efficiency (EW1) and sustainable fisheries (EW3), scoring very low. In the case of green economic opportunities, New Zealand ranked third in the region. However, it has very low performance in green innovation (GN) and green trade (GT), with scores of 6.5 and 8.96, respectively.

Gabon had an overall Index score that was only a few points away from New Zealand's due to its relatively high scores in several dimensions, except for green economic opportunities. Specifically, it ranked second in efficient and sustainable resource use and 4th in natural capital protection in Africa (Figure 19). Regarding social inclusion, it had moderate performance in social protection (SP) and gender balance (GB), with scores of 42.09 and 51.93, respectively. Specific indicators relating to universal health coverage (SP2) and equal gender pay (GB2) pushed the scores down for the country. Creating green economic opportunities will help further improve the country's green growth performance. Green trade and green innovation had very low scores of 7.46 and 19.74, respectively. Unfortunately, Gabon lacks green employment (GJ) data, which hinders a more accurate comparison of its performance vis-à-vis top-performing countries in the other regions.

Figure 19 Distance to targets of green growth indicators in top-performing countries by region, 2021

5 Featured Country: Zambia

© GGGI Burkina Faso

5.1 Green growth contexts

Zambia aspires to become a middle-income country by 2030, requiring a transition that respects environmental sustainability and human well-being while increasing the production and consumption of goods and services (Box 4). The green growth framework aligns well with Zambian's green growth contexts. Zambia defines green growth as an "inclusive development that makes sustainable and equitable use of Zambia's natural resources within ecological limits".[45] Green growth indicators will provide policymakers with the necessary tool to measure and monitor the impacts of policies on Zambian's green growth transition.

The GGGI supports the Government of Zambia through a collaborative project to benchmark the country's green growth performance and establishes its readiness to transition to a green economy growth model using GGGI's Green Growth Performance Measurement (GGPM) framework and tools, including the Green Growth Index. The green growth indicators and their composite index will provide the baseline data to benchmark green growth performance and information for greening national development frameworks, particularly the 8th National Development Plan (8NDP). They will help to highlight potential green interventions and support the green growth diagnosis and assessment process in the development of Zambia's National Green Growth Strategy.

5.2 Green growth indicators

Table 5 presents the 80 indicators for the Zambia Green Growth Index, which are aligned with the green growth framework (Figure 1). Two approaches were applied to validate the policy relevance of these indicators: First, GGGI conducted a comprehensive review of the national policies, sectoral programs, and development priorities in Zambia to generate a list of policy-relevant indicators using a checklist approach.[46] Second, 45 experts from more than 20 government, non-government, and academic institutions participated in the validation of the GGGI-generated list of green growth indicators through a series of webinars, participatory workshops, and online surveys (see chapter 6.1.1). While the number of indicators for the global Green Growth Index is limited to 40, more indicators were used for the Zambia Green Growth Index to include all relevant indicators to measure the country's performance in transitioning to green growth. Each pillar has five green growth indicators, giving equal weight to each of the total 80 indicators. However, 28 indicators have insufficient data and were replaced with proxy variables. The experts also validated the policy relevance of these proxy variables. The green economic opportunities have the highest number of proxy variables (8), followed by efficient and sustainable resource use (7) and natural capital protection (7). Social inclusion has the lowest number of proxy variables (6).
The national policies that were considered in assessing the policy relevance of the indicators include Zambia's Vision 2030, the 8NDP, the National Policy on Climate Change (NPCC), the updated Nationally Determined Contribution (NDC), the National Adaptation Plan (NAP), and the Second National Biodiversity Strategy and Action Plan (NBSAP-2). Several sectoral policies that are relevant to the green growth indicators were considered, including the National Policy on Environment (2007), Technology Needs Assessment (2013), National Forestry Policy (2014), National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+, 2015), Second National Agriculture Policy (2016), Health National Adaptation Plan (2017), Climate Change Gender Action Plan (2018), National Energy Policy (2019), and Transport Policy (2019). The development priorities identified as relevant to the green growth indicators include economic transformation, human skills and development, environmental sustainability, and the water-land-food nexus. Detailed discussion on the relevance of the 80 green growth indicators to the national policies, sectoral policies, and development priorities are available in the Zambia Green Growth Index Report.

Forty-five of the 80 indicators are SDG indicators, with 8 in efficient and sustainable resource use, 13 in natural capital protection, 8 in green economic opportunities, and 16 in social inclusion (Table 5). And 34 indicators are part of the global Green Growth Index (i.e., this report), including 11 in efficient and sustainable resource use, 10 in natural capital protection, 3 in green economic opportunities, and 10 in social inclusion. Figure 20 summarizes the data availability and gaps for each pillar's different green growth indicators. The indicators for social equity (SE) had complete data for 2010-2021. Indicators for GHG emissions reduction (GE), green trade (GT), green investment (GV), efficient and sustainable water use (EW), and gender balance (GB) also had relatively complete databases. The indicators with the most significant data gaps are those in social protection (SP). To allow computation of the Green Growth Index, simple imputations were done to fill in the data gaps. The imputation methods are discussed in Annex 1.

Through normalization, the different units of the green growth indicators, as shown in Table 5, have been rescaled to a uniform unit with a scale of 1 to 100 to allow their aggregations (see Annex 1). In addition, like for the global Green Growth Index (i.e., this report), the green growth indicators were benchmarked against sustainability targets so that the normalized scores measure how far the indicators are from the sustainability targets (i.e., distance to targets). For example, a score of 100 would mean that the sustainability target for an indicator was achieved. Annex 3 shows the different sustainability targets used to benchmark the 80 green growth indicators. However, unlike the global Green Growth Index, for indicators without sustainability targets, the average values for the top 5 performing developing countries were used for the Zambia Green Growth Index. The experts agreed to use the top five performers among developing countries, instead of global, to benchmark Zambia's green growth performance.

Table 5 Green growth indicators selected by the experts for the Zambia Green Growth Index, by dimensions and pillars

Code	Indicator name [Unit]	Publisher*	Green Growth Index	SDG indicators
	EFFICIENT AND SUSTAINABLE RESOURCE USE			
EE1	Energy intensity level of primary energy [MJ per constant 2017 PPP GDP]	8	✓	✓
EE2	Renewable energy share in the total final energy consumption [Percent]	8,11	✓	✓
EE3	Efficiency in sustainable transport [Score]	24	✓	
EE4	Share of low-carbon electricity generation [Percent]	2,31		
EE5	Electricity consumption per capita [kWh per capita]	2,31		
EW1	Water use efficiency, total all sectors [USD per m^3]	5	✓	✓
EW2	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources [Percent]	5	✓	✓
EW3	Capture fisheries as a proportion of GDP [Tons per GDP]	5		
EW4	Irrigated agriculture water use efficiency [USD per m^3]	5		✓
EW5	Total renewable water resources per capita [m^3/inhabitant/year]	5		
SL1	Nutrient balance per unit area [Tons per hectare]	5	✓	
SL2	Share of organic agriculture to total agriculture land area [Percent]	5	✓	
SL3	Cereal yield [Kg per hectare]	5		
SL4	Agricultural production divided by total area of arable land under crops and pasture [USD per hectare]	5		
SL5	Natural capital productive capacity index [Score]	17		
ME1	Total domestic material consumption (DMC) per unit of GDP [Kg per GDP]	15	✓	✓
ME2	Total material footprint (MF) per capita [Tons per capita]	15	✓	✓
ME3	Average of food loss to production and food waste to consumption [Percent]	5	✓	✓
ME4	Sanitation coverage [Percent]	13		
ME5	Trends in sewer, septic tank, and latrine coverage [Percent]	21,26		
	NATURAL CAPITAL PROTECTION			
EQ1	PM2.5 air pollution, mean annual exposure [Micrograms per m^3]	26	✓	✓
EQ2	Age-standardized Disability-Adjusted Life Years (DALY) rate due to unsafe water sources [DALY lost per 100,000 persons]	7	✓	✓
EQ3	Municipal solid waste (MSW) generation per capita tons per capita [Tons per capita]	24	✓	✓
EQ4	Share of urban population practicing open defecation [Percent of urban population]	21,26		
EQ5	People with basic handwashing facilities including soap and water [Percent of population]	21,26		✓
GE1	Ratio of CO_2 emissions to population, including AFOLU [Tons per capita]	4,24	✓	✓
GE2	Ratio of non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population [Tons CO_{2eq} per capita]	3,24	✓	✓
GE3	CO_2 emissions growth rate [Percent growth rate]	2	✓	
GE4	Carbon intensity of energy production [Kg per kilowatt-hour]	2		
GE5	Carbon intensity of electricity [gCO_2 per kWh]	1,12,16		
BE1	Average proportion of (freshwater, terrestrial and mountain) Key Biodiversity Areas covered by protected areas [Percent]	5		
BE2	Share of forest area to total land area [Percent]	5	✓	✓
BE3	Proportion of forest area with a long-term management plan [Percent]	5		✓

Table 5 Green growth indicators selected by the experts for the Zambia Green Growth Index, by dimensions and pillars *(continued)*

Code	Indicator name [Unit]	Publisher*	Green Growth Index	SDG indicators
BE4	Annual forest area change rate [Percent]	5	✓	✓
BE5	Change in the extent of water related ecosystems over time: Lakes and rivers permanent water area [Percent of total land area]	15		✓
CV1	Red List Index [Score]	1, 12	✓	✓
CV2	Share of protected areas in total territorial area [Percent]	1, 12, 16	✓	✓
CV3	International tourism arrivals as proportion of total population [Ratio]	27		
CV4	Share of employment in services to total employment [Percent]	9		
CV5	Share of exports of cultural goods to exports of total goods [Percent]	18		
	GREEN ECONOMIC OPPORTUNITIES			
GV1	Adjusted net savings, including particulate emission damage [Percent of GNI]	24	✓	
GV2	Installed renewable electricity-generating capacity [Watts per capita]	11		✓
GV3	Revenue generated and finance mobilized from biodiversity-relevant economic instruments [Millions of constant 2020 USD]	14		✓
GV4	Agriculture orientation index for government expenditures [Score]	5		✓
GV5	Transport productive capacity index [Score]	17		
GT1	Share of export of environmental goods (OECD and APEC classifications) to total export [Percent]	14	✓	
GT2	Share of ores and metals exports to merchandise exports [Percent]	24		
GT3	Share of medium and high-tech exports to manufactured exports [Percent]	24		
GT4	Doing business: New business density (new registrations per 1,000 people ages 15-64) [Number per 1,000 people]	24		
GT5	Share of manufactures exports to total merchandise exports [Percent]	24		
GJ1	Renewable energy employment by technology [Number]	11		
GJ2	Employed population below international poverty line [Percent]	9		✓
GJ3	Share of vulnerable employment total employment [Percent]	9		
GJ4	Share of youth not in education, employment, or training to total youth population [Percent]	9	✓	✓
GJ5	Volume of official development assistance flows for scholarships by sector and type of study [Millions of constant 2020 USD]	14		✓
GN1	7 years rolling average of share of environment related technologies to all technologies [Percent]	14		
GN2	University-industry collaboration in Research & Development [Rank]	25		
GN3	Allocation to Education as percentage of Budget expenditure [Percent]	30		✓
GN4	Proportion of medium and high-tech manufacturing value added in total value added [Percent]	20		✓
GN5	Charges for the use of intellectual property, Balance of Payments (BoP) [USD]	10		

Table 5 Green growth indicators selected by the experts for the Zambia Green Growth Index, by dimensions and pillars *(continued)*

Code	Indicator name [Unit]	Publisher*	Green Growth Index	SDG indicators
	SOCIAL INCLUSION			
AB1	Share of population with access to safely managed water and sanitation [Percent]	21, 26	✓	✓
AB2	Share of population with access to electricity and clean fuels [Percent]	24, 26		
AB3	Prevalence of stunting, height for age [Percent of children under 5]	21, 24, 26		✓
AB4	Mobile Broadband penetration per 100 users [Number per 100 users]	29		✓
AB5	Property rights [Score]	6		
GB1	Proportion of seats held by women in national parliaments [Percent]	32	✓	✓
GB2	Gender ratio of account at a financial institution or mobile-money-service provider [Ratio]	24	✓	✓
GB3	Getting paid, laws and regulations for equal gender pay score [Score]	24	✓	
GB4	Maternal mortality ratio per 100,000 live births [Number per 100,000 live births]	26		✓
GB5	School enrollment, primary (gross), gender parity index (GPI) [Score]	18		
SE1	Inequality in income based on Palma ratio [Ratio]	24	✓	
SE2	Population with access to basic services by urban/rural, i.e., electricity [Ratio]	24, 26	✓	✓
SE3	Disparity of unemployment: Ratio of Youth (15-24 years old) and above 25 years old unemployment [Ratio]	9		✓
SE4	Unemployment rate, age 25+ [Percent]	9		✓
SE5	Unemployment rate, by disability, ratio of persons with disability to persons without disability [Ratio]	9		✓
SP1	Proportion of population above statutory pensionable age receiving a pension [Percent]	9	✓	✓
SP2	Universal health coverage (UHC) service coverage index [Score]	26	✓	✓
SP3	Proportion of urban population living in slums [Percent]	19	✓	✓
SP4	Number of victims of intentional homicide per 100,000 population [Number per 100,000 population]	23		✓
SP5	Internally displaced persons, new displacement associated with disasters [Number of cases]	22		✓

**Data Publisher: [1]Bird Life International (BLI), [2]British Petroleum Company plc (BP), [3]Climate Analysis Indicators Tool (CAIT), [4]Climate Watch (CW), [5]Food and Agriculture Organization (FAO), [6]Heritage Foundation (HF), Inter-Parliamentary Union (IPU), [7]Institute for Health Metrics and Evaluation (IHME), [8]International Energy Agency (IEA), [9]International Labour Organization (ILO), [10]International Monetary Fund (IMF), [11]International Renewable Energy Agency (IRENA), [12]International Union for Conservation of Nature (IUCN), [13]National Water Supply and Sanitation Council (NWASCO), [14]The Organization for Economic Cooperation and Development (OECD), [15]United Nations Environment Programme (UNEP), [16]UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), [17]United Nations Conference on Trade and Development (UNCTAD), [18]United Nations Educational, Scientific and Cultural Organization (UNESCO), [19]United Nations Human Settlements Programme (UN-Habitat), [20]United Nations Industrial Development Organization (UNIDO), [21]United Nations International Children's Emergency Fund (UNICEF), [22]United Nations International Strategy for Disaster Reduction Secretariat (UNISDR), [23]United Nations Office on Drugs and Crime (UNODC), [24]World Bank (WB), [25]World Economic Forum (WEF), [26]World Health Organization (WHO), [27]World Trade Organization (WTO), [29]Zambia Information and Communications Technology Authority (ZICTA), [30]Zambia Ministry of Finance (MoF), [31]Ember Climate Organization (EMBER), and [32]Inter-Parliamentary Union (IPU)*

Box 4 Zambia's economic, social, and environmental contexts[47]

Zambia's economic growth is based on the mining, agriculture, and tourism sectors. The mining sector attracts investments, while agriculture and tourism contribute to employment. The agriculture sector provides livelihood to more than 70 percent of Zambia's population and employs 67 percent of the labor force.[48] In rural areas, it remains the primary source of income and employment for both women and men. The sector also contributes 16 percent percent of the country's GDP.[49] Tourism, including Arts and Culture, is one of the priority sectors for development in Zambia. The tourism sector grew by an average of 3.1 percent, and its share of GDP was 1.5 percent from 2011 to 2020. Tourism has become a significant source of employment, accounting for 15.7 percent of employment in 2019.[50] From 2006 to 2010, Zambia's annual real Gross Domestic Product (GDP) growth rate was favorable, averaging 8.7 percent, with the highest annual growth rate at 10.3 percent in 2010.[51] Increased investments in the mining sector spurred growth. It was also driven by the Information and Communications Technology (ICT), trading, construction, and transportation sectors. The ICT sector experienced significant structural growth due to the progressive migration from 2G to 4G technologies, resulting in increased adoption rates, data usage, and wider signal penetration rates, especially in rural areas. The increase in consumption, growth in import and export of locally manufactured food products, and investment in retail outlets had driven the growth in the trading sector. The increase in infrastructure investments mainly drove the growth of the construction sector. However, their economic growth rate slowed between 2011 and 2016, averaging 4.9 percent. During this period, the price of copper, Zambia's main export product, fell from over $4 per pound to just around $2 per pound.[52] Additionally, adverse climate change effects led to a drought in 2015, causing lower water levels and affecting Zambia's hydropower generation. Their GDP rate declined from 2017 to 2021, averaging 1.4 percent. The decline was mainly due to unfavorable weather conditions, which impacted the agricultural and energy sectors in the earlier years of the period. The most significant reduction was experienced in 2020, when economic growth contracted by 2.8 percent, registering the first recession since 1998. Like other countries around the world, the COVID-19 pandemic caused disruptions in Zambia's supply chains, and the containment measures affected their industries, including tourism, construction, wholesale and retail trade, and manufacturing. But in 2021, the real GDP growth recovered to 3.6 percent, with the agriculture, manufacturing, energy, wholesale and retail trade, and ICT sectors driving growth.[53] But their mining output still declined despite a pick-up in global economic activity and commodity prices.

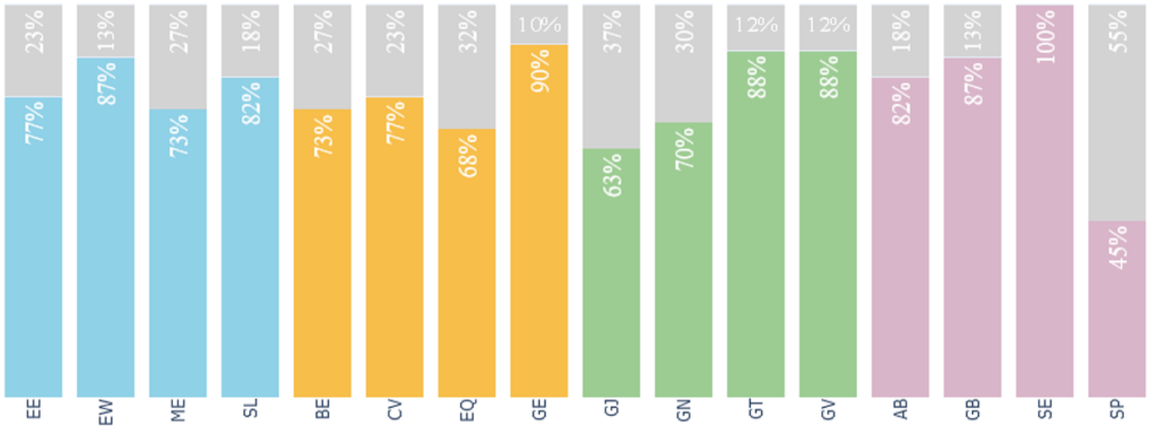
In the case of social aspects, between 2005 and 2021, Zambia recorded improvements in social development measured by life expectancy, access to learning and knowledge, and standard of living. Zambia's Human Development Index (HDI) improved from 0.471 in 2005 to 0.584 in 2019.[54] This primarily reflected the increase in life expectancy at birth from 48.5 years to 63.9 years.[55] The country has continued to register progress in service delivery for human development. Regarding education, the government has made strides in achieving universal primary education and gender parity. In 2011, Zambia incorporated Early Childhood Education into its education system and introduced its centers in primary schools to accommodate early learners and recruit teachers. This resulted in an increase in enrollments from 47,317 pupils in 2011 to 258,616 pupils in 2020. Between 2007 and 2018, the population with access to an improved water source increased from 41.1 percent to 72.3 percent, and improved sanitation facilities increased from 35.5 percent to 54.4 percent.[56] The improvement was attributed to consistent public sector investments in water and sanitation and support from cooperating and development partners. But access to both services remained lower in rural areas, with only 37.2 percent compared to 77.7 percent in urban areas in 2018.[57] Despite the progress in education and skills development, health, water and sanitation, job creation, and empowerment of citizens, Zambia still ranks among the countries with high poverty and inequality in Africa and globally. A reduction of 8.4 percent in poverty was recorded between 2006 and 2015, from 62.8 percent to 54.4 percent.[58] However, extreme poverty, or individuals whose consumption was less than the cost of the food basket, only marginally improved from 43 percent to 41 percent of the total population.[59] Inequality in income distribution, as measured by the Gini coefficient, worsened because Zambia's growth was driven by industries that were not labor-intensive. At the national level, the Gini coefficient declined from 0.60 in 2006 to 0.69 in 2015.[60] This relegated most of the labor to low-paying informal jobs. Moreover, productivity in the agricultural sector, which was the mainstay of the rural population, did not improve, resulting in stagnation of incomes. But income inequality is higher in urban than in rural areas. Access to social protection services such as food security packs, social cash transfers, and public welfare assistance for the poor and vulnerable increased between 2006 and 2021. However, their effective implementation of the social cash transfer interventions, especially targeting the extremely poor and vulnerable faced several challenges. Moreover, challenges remained in delivering quality health services regarding the need to ensure a consistent supply of essential medical supplies, recruitment and placement of health personnel, and effective management of non-communicable diseases. Rural communities continued to face challenges in accessing health services.

In the case of the environment, forests cover approximately 66 percent of the land in Zambia.[61] This represents about 49.97 million hectares, an estimated 9.6 percent of which is covered by gazette forest reserves.[62] Forests are essential in promoting carbon absorption from the atmosphere and providing critical services such as watershed protection. For example, most of the water resources in Zambia originate in forested watersheds, which makes forestry very important in regulating water quality and quantity for livelihoods. Wildlife resources are also crucial to Zambia's national economy due to their role in tourism, which is considered a major potential growth engine in the coming years. The open and closed grasslands and forests constitute the natural habitats of endemic species and other large wild animals, including lions, buffaloes, and elephants. Water animals like hippos and crocodiles and a variety of bird species also inhabit the rivers, lakes, and other wetland ecosystems. Regarding the impacts of climate change, drought conditions reduce soil moisture and give

Box 4 Zambia's economic, social, and environmental contexts *(continued)*

rise to poor-quality fodder, stress, uncontrolled migration, and wildlife-human conflicts. Under excessive rainfall, wetland animals like the Lechwe and Puku would be adversely affected. The water resources in Zambia represent about 40 percent of the water resources in the Southern African region.[63] The country has major rivers such as the Zambezi, the fourth largest in Africa, its tributaries (Luangwa and Kafue), and lakes such as Tanganyika, Mweru, Bangweulu, and Kariba. In as much as Zambia has abundant water resources, the country has isolated semi-arid areas in the southern and western parts. These regions have experienced devastating floods and droughts with changes in rainfall variability. Furthermore, both flood and drought conditions have worsened household access to safe and clean drinking water. This situation has increased the prevalence of waterborne diseases and labor burden on women and girls who are the main drawers of water for their households in the peri-urban and rural areas. Other impacts of climate change on ecosystems include reduced flows and drying up of water bodies leading to possible degradation of aquatic habitats and disruption of aquatic ecosystem functions and services. Agricultural expansion is a widespread phenomenon in Zambia and has a cyclical link to soil degradation. Soil degradation compels farmers to expand into natural habitats for fertile soils; however, these soon degrade into poor soils. According to Mweemba & Wu,[64] deforestation in Zambia is related positively to population pressure on cultivated land (the smaller the cultivated area per person, the higher the rate of deforestation), the rate of population growth (the higher the population growth rate, the higher the rate of deforestation due to land clearance and fuel wood provision), and policies favorable to agriculture (the more profitable the agricultural policy, the lower the rate of deforestation). Deforestation is negatively related to using modern farm inputs such as fertilizer (the greater the use of modern inputs, the lower the need to clear more land for farming).

Figure 20 Data gaps for the indicators per pillar in the Zambia Green Growth Index, 2010-2021



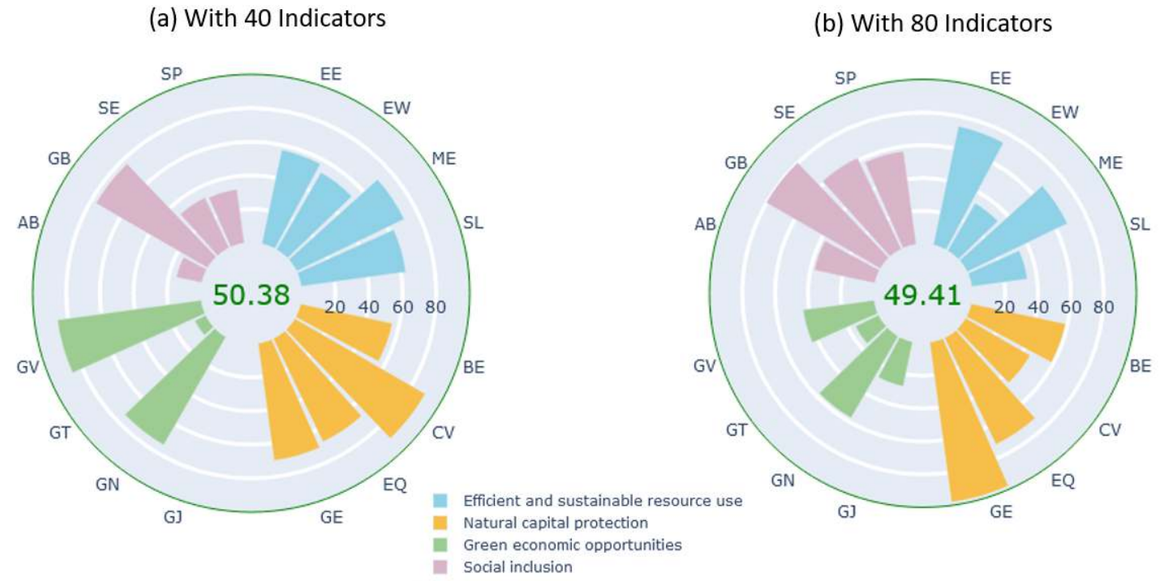
5.3 Green growth performance

5.3.1 Distance to targets

Figures 21a and 21b compares Zambia's scores generated from the global (40 indicators) and national (80 indicators) Green Growth Index. While the overall scores for the Index are close to each other, 50.38 and 49.41 for the global and national Green Growth Index, respectively, the scores for the pillars diverge for two reasons. First, only 42 percent of the global Green Growth Index indicators are included in Zambia's national Green Growth Index. Second, the targets for non-SDG indicators are based on the top five performers in developing countries. In contrast to the global Green Growth Index, the indicators in the national Green Growth Index emphasize Zambia's poor performance in green economic opportunities and good performance in social inclusion. Zambia performs best in natural capital protection in the national and global Green Growth Index. However, the score for cultural and social value (CV) is the lowest in the former and the highest in the latter Green Growth Index.

In the national Green Growth Index (80 indicators), Zambia's moderate score in 2021 was contributed by the very high score in GHG emissions reduction (GE) and high scores in gender balance (GB), environmental quality (EQ), efficient and sustainable energy (EE), and waste and material use efficiency (ME). With a score of 98.11 for GHG emissions reduction, Zambia had almost reached the target for the indicators in this pillar (Figure 21b). GE's good performance and four other pillars compensated for the very low score in green trade (GT) and low scores in green employment (GJ), efficient and sustainable water use (EW), and sustainable land use (SL). With a score of only 15.7, Zambia performed the weakest in green trade in 2021. Green trade performance was measured by the share of export of environmental goods to total export, the share of ores and metals exports to total merchandise exports, the share of manufactured exports to total merchandise exports, the share of medium and high-tech exports to total manufactured exports, and capacity in doing business as represented by new business density. Putting a priority on overcoming the constraints to economic transformation, one of the key priorities in Zambia's 8NDP, such as low diversification and industrialization, would help to improve performance in green trade.

Figure 21 Zambia's distance to sustainability targets by green growth pillars, 2021



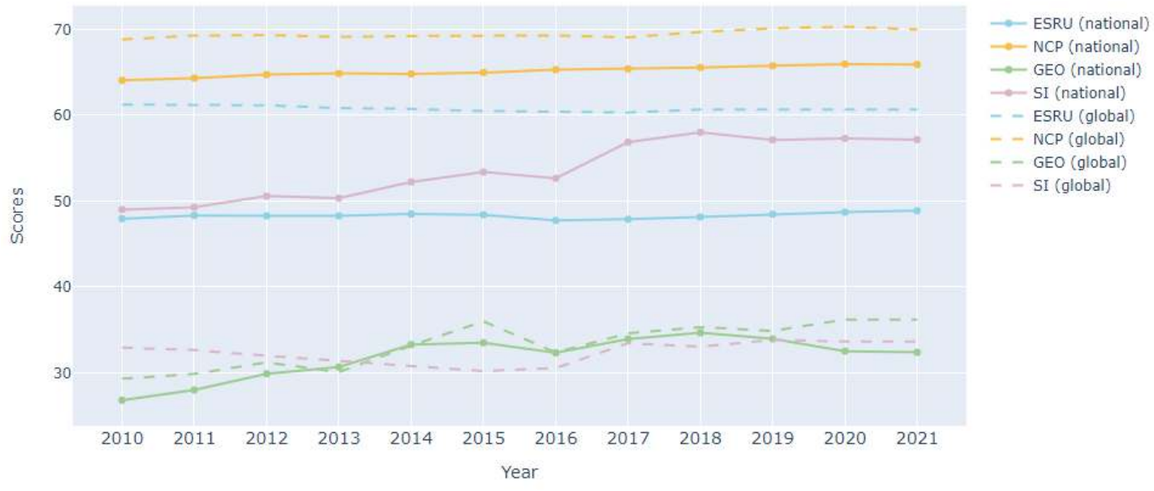
5.3.2 Green growth trends

The trend in Zambia's national and global Green Growth Index scores is presented in Figure 22, both showing an increasing trend from 2010 to 2021. The rate of increase in the national Green Growth Index has been steeper than in the global from 2010 until 2015. This indicates Zambia's improving performance in many green growth indicators during this earlier period. Figure 22 shows the increasing trend in Zambia's national Green Growth Index scores, from 44.78 in 2010 to 49.37 in 2021. These Index scores were from the geometric average of the scores for the four green growth dimensions, which are presented in Figure 23. The figure shows that the trend in green economic opportunities, which remained in the low range of 20-40, is relatively the same for the national and global Green Growth Index. The variance between the national and global Green Growth Index is most evident in social inclusion, with the scores in the former showing a steeper increasing trend in the moderate range of 40-60. In contrast, the social inclusion scores in the global Green Growth Index remained relatively stable in the lower range. The scores in natural capital protection contributed most to both the national and global Green Growth Index.

During 2010-2021, the trend in the national Green Growth Index scores was mainly driven by the changes in green economic opportunities and social inclusion (Figure 23). The trends in scores for these dimensions showed big jumps over time as compared to those for efficient and sustainable resource use and natural capital protection, which remained relatively stable. Green investment and access to basic services and resources were the main drivers for the increasing trend in green economic opportunities and social inclusion, respectively. Despite the remarkable improvement in performance in social inclusion from 2016 to 2018, increasing from 52.46 to 57.82, natural capital protection remained the highest contributor to Zambia's moderate Index score. The performance in social inclusion and green economic opportunities showed a declining trend from 2018, with the latter showing a more significant drop in scores than the former. In contrast, while the trends in natural capital protection and efficient and sustainable resource use were relatively flat and stable, they did not show a decline from 2018. This contributed to the steady increase in the Index score, albeit minimal, until 2021. Reversing the declining trends in social inclusion and green economic opportunities, as they did in 2016, would contribute to a more significant improvement in the Green Growth Index of Zambia.

Figure 22 Trend in the Green Growth Index in Zambia, 2010-2021

Figure 23 Trend in the green growth dimensions in Zambia, 2010-2021



Definitions:
ESRU – Efficient and sustainable resource use, NCP – Natural capital protection, GEO- Green economic opportunities, SI – Social inclusion

5.3.3 Green growth scores

Efficient and sustainable resource use

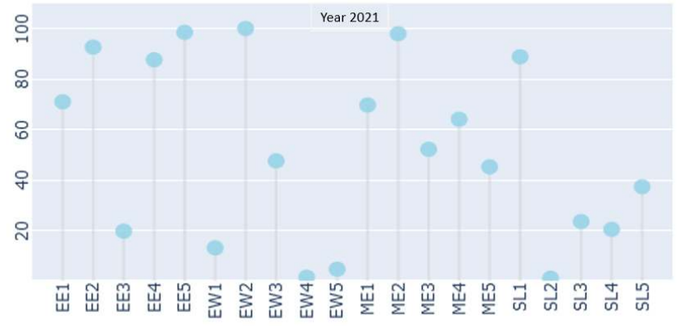
Figure 24 presents the scores for the 20 green growth indicators in the efficient and sustainable resource use dimension. The country's high performance on efficient and sustainable energy (EE) was due to very high score in reducing per capita electricity consumption (EE5) and high scores in increasing the share of renewables in energy consumption (EE2) and share of low-carbon electricity generation (EE4). Around 84.5 percent of Zambia's energy consumption came from renewable sources in 2019, mainly hydropower. The per capita electricity consumption scores were consistently very high at about 98 from 2010 to 2021. Performance in efficiency in sustainable transport (EE3) had been the weakest in Zambia, with a score of only 19.68 in 2021. There has been a steady decline in performance in this indicator since 2010 when the score stood at 26.49. The Zambian experts recognized that there would be a significant opportunity to improve green growth by improving efficiency in sustainable transport in Zambia.

In 2021, the low score of 33.33 for efficient and sustainable water use (EW) can be traced from the very low scores for three green growth indicators (Figures 21b) – water use efficiency (EW1), irrigated agriculture water use efficiency (EW4), and renewable water resources per capita (EW5) (Figure 24). With its large river (Zambezi), tributaries (Luangwa and Kafue), and lakes (Tanganyika, Mweru, Bangweulu, and Kariba), Zambia is rich in water resources. But available water resources per capita had been steadily declining, from 32,140 to 5,867 m3 per inhabitant per year from 1962 to 2019. Population growth and climate change are contributing to this declining trend. With the government's plan to gradually expand irrigated areas throughout the country to boost agricultural production and productivity, water use efficiency in the agriculture sector will be critical to improving performance in the green growth indicators with very low scores. The Zambian experts highlighted that these scores could be enhanced by introducing affordable water-saving technologies and infrastructures, e.g., harvest rainfall.

Zambia also had a low performance in efficient and sustainable land use (SL), with a score of only 34.2 in 2021 (Figures 21b). Like in efficient and sustainable water use, the country is challenged to improve performance in all green growth indicators except for the nutrient balance per unit area (SL1). The score for the share of organic agriculture to total agriculture land area (SL2) is very low, at only 1.05 in 2021 (Figure 24). The other three remaining green growth indicators, including cereal yield (SL3), agricultural productivity (SL4), and natural capital productive capacity (SL5) showed low levels of performance. The Zambian experts suggested that cereal yield could be improved with greater resource efficiency in production. According to them, while productivity is essential, it is also crucial to consider adopting new practices such as climate-smart and organic agriculture, which need proper education and training as well as change in farmers' lifestyles.

The waste and material use efficiency (ME) performance was moderate at 67.72 in 2021 (Figures 21b). Unlike the other pillars in efficient and sustainable resource use, there is no green growth indicator with a very low score. The lowest score was for the sewer, septic tank, and latrine coverage (ME5) which stood at 45.18 (Figure 24). The Zambian experts agreed that to improve performance in this indicator, the construction sector needs to implement more rules and regulations to manage the problem better. The indicator on sewer, septic tank, and latrine coverage is a proxy variable for the proportion of wastewater treated, including reuse/recycling, which is a more relevant indicator for waste and material use efficiency but for which data is unavailable for Zambia. The average food loss to production and food waste to consumption (ME3) had moderate scores, with the experts noting that food loss occurs across harvesting, processing, and distribution. Two indicators in the waste and material use efficiency measure the extent of extraction of natural resources, including total domestic material consumption per unit of GDP (ME1) and total material footprint per capita (ME2). The score for ME1 was high at 79.26 and for ME2 was very high at 97.95 in 2021. While both are SDG indicators, these were not mentioned in the national and sectoral policies.

Figure 24 Scores for indicators in the efficient and sustainable resource use dimension in Zambia, 2021



Efficient and sustainable energy (EE)
EE1 – energy intensity, EE2 – renewable energy share, EE3 – efficient transport, EE4 – low-carbon electricity, EE5 – per capita electricity consumption
Efficient and sustainable energy (EW)
EW1 – water use efficiency, EW2 – level of water stress, EW3 – capture fisheries, EW4 – agriculture water use efficiency, EW5 – renewable water resources per capita
Sustainable land use (SL)
SL1 – nutrient balance, SL2 – organic agriculture area, SL3 – cereal yield, SL4 – agricultural productivity, SL5 – natural capital productivity
Waste and material use efficiency (ME)
ME1 – domestic material consumption, ME2 – material footprint, ME3 – food loss and food waste, ME4 – sanitation coverage, ME5 – sewer, septic and latrine coverage

Natural capital protection

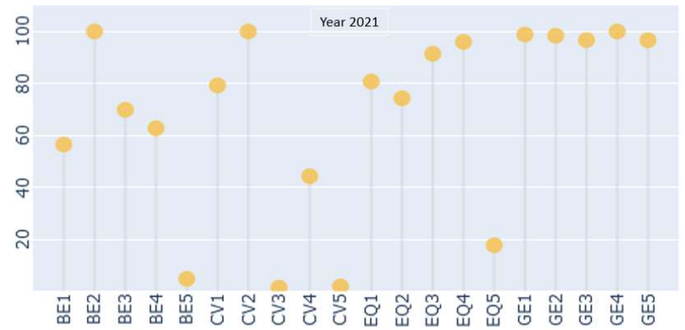
GHG emissions reduction (GE), with a score of 98.11 is the best-performing pillar for natural capital protection (Figures 21b). Multiple indicators for this pillar have almost reached the sustainability targets, and Zambia has a high potential to maintain its very high performance. Figure 25 shows that the ratio of CO_2 emissions to population, including AFOLU (GE1), ratio of non-CO_2 emissions (CH_4, N_2O, and F-gas) excluding AFOLU to population (GE2), CO_2 emissions growth rate (GE3), the carbon intensity of energy production (GE4), and carbon intensity of electricity (GE5) have scores above 96 in 2021. The trend for all these five indicators for GHG emissions reduction has been consistently very high since 2010. This can be attributed to Zambia's declining trend in total emissions per capita (1990-2018) and only a 0.19 percent share of the global GHG emissions . Around 84.5 percent of renewable energy came from renewable sources in 2019, mainly hydropower. The participants noted that the opportunities to improve green growth performance in natural capital protection lie in the other pillars in this dimension. Nonetheless, they see the importance of monitoring the scores as some challenges may come in the future, which will affect the ability of the government to achieve its own NDC targets.

After GHG emissions reduction, Zambia performed best in environmental quality (EQ), with a high score of 72.06 in 2021 (Figures 21b). The performance in PM2.5 air pollution, mean annual exposure (EQ1), municipal solid waste generation per capita tons per capita (EQ3), and urban people practicing open defecation urban (EQ4) were very high, with scores of at least 90 (Figure 25). But indicator for the people with basic handwashing facilities (EQ5) was very low, with a score of 17.78. The experts recognized the importance of indicators for Water, Sanitation, and Hygiene (WASH) in Zambia. According to them, basic hand washing facilities, including soap and water can reduce cholera and improve sanitation. Moreover, improved water and sanitation infrastructure can help prevent epidemics. Approximately 68 percent of households in Zambia have access to improved water supply , but only 40 percent have improved sanitation. Zambia needs help in attaining universal access to safe and clean drinking water and adequate sanitation, especially in densely populated and unplanned settlements in urban settings. These conditions, coupled with poor hygiene practices among citizens, have caused recurrent outbreaks of WASH-related diseases.

With a score of 58.81, Zambia had only a moderate score for biodiversity and ecosystem protection in 2021 (Figures 21b). It achieved the SDG target of 17 percent in the share of forest area to total land area (BE2), hence the score of 100 (Figure 25). High scores were also achieved in the proportion of forest area with a long-term management plan (BE3) and annual forest area change rate (BE4). Nonetheless, the Zambian experts highlighted the need to closely monitor these indicators to overcome the further deterioration of forests in the last decades. The share of forest area to the total land area followed a slow but steady declining trend since 1991, and a sharper decline was even observed from 2010. The performance in the share of key biodiversity areas in freshwater, terrestrial, and mountain covered by protected areas (BE1) had been moderate. In biodiversity and ecosystem protection, Zambia had the lowest score of 4.88 in the extent of water-related ecosystems over time, including lakes and rivers' permanent water areas (BE5) in 2021. And here, the trend was also only going down since 2004. Climate change impacts are reducing flows and increasing the drying-up of water ecosystems. But the experts also mentioned the problems of "Kafue weeds". The sustainable use of Kafue River is challenged by aquatic weed , a free-floating perennial aquatic plant that has spread from South America to Zambia and countries worldwide .

Social and cultural value (CV) had only a moderate score of 45.41, representing the lowest score in the natural capital protection dimension in 2021 (Figures 21b). The very low scores of less than two in international tourist arrivals (CV3) and cultural goods exports (CV5) contributed to the relatively weak cultural and social value performance (Figure 25). The experts mentioned that tourism and cultural goods export pose challenges and opportunities because the products would require grading and standardization to meet international standards and attract investments. They suggested that a careful assessment of the current trends on the supply and demand side of the tourism sector would help drive sustainable economic opportunities and employment for local communities. Zambia's best performance in promoting natural capital's social and cultural value was in the share of protected areas to total terrestrial area (CV2), for which it scored 100 for achieving the SDG target of 17 percent. About 38 percent of its terrestrial area was covered by protected areas from 2000 to 2018 and increased to 41 percent from 2019 to 2021. However, the experts noted that the performance in protected areas should not be isolated from the performance in the share of key biodiversity areas covered by protected areas (BE1). For the latter, as mentioned above, it had only a moderate score. This is because while Zambia has protected 38 percent of its terrestrial area, only 56 percent is rich in biodiversity. Nonetheless, diverse species are maintained in the country, as shown by the high score of 79.26 on the Red List Index (CV1). Except for the share of employment in services to total employment (CV4), other indicators showed relatively the same scores from 2010 to 2021.

Figure 25 Scores for indicators in the natural capital protection dimension in Zambia, 2021



Environmental quality (EQ)
EQ1 – PM2.5 air pollution, EQ2 – DALY rate from unsafe water, EQ3 – solid waste generation, EQ4 – urban people with open defecation, EQ5 – people with basic handwashing facilities
GHG emissions reduction (GE)
GE1 – CO_2 emissions per capita, GE2 – Non- CO_2 per capita, GE3 – CO_2 emissions growth rate, GE4 – carbon intensity of energy production, GE – carbon intensity of electricity
Biodiversity and ecosystem protection (BE)
BE1 – protected key biodiversity areas, BE2 – share of forest areas, BE3 – forest area with management plan, BE4 – annual forest area change, BE5 – change in extent of water ecosystems
Cultural and social value (CV)
CV1 – red list index, CV2 – terrestrial protected area, CV3 – international tourism arrivals, CV4 – share of employment in services, CV5 – share of exports of cultural goods

Green economic opportunities

Zambia had a moderate score of 43.72 for green investment (GV) in 2021 (Figures 21b). Adjusted net savings, including particulate emission damage (GV1) and agriculture orientation index for government expenditures (GV4), both with very high scores, were the green growth indicators that mainly contributed to this performance (Figure 26). Both indicators also followed an increasing trend since 2010. For the other three indicators, Zambia had very low values. While the country's performance in the share of low-carbon electricity generation is very high, the installed renewable electricity-generating capacity (GV2) remained with a very low score of 16.9. Moreover, this latter indicator showed a declining trend from 2015. Renewable electricity is mainly supported by hydropower, so investment in other renewable sources, such as solar, will help improve the capacity for renewable electricity. Zambia has supported solar energy through the Scaling Solar program and the Zambian REFiT Strategy and installed 96 MW of solar power from 2019 to 2021. [72] The score for revenue generated and finance mobilized from biodiversity-relevant economic instruments (GV3) was also very low at 8.22. Eco-tourism is one of those instruments, but Zambia is yet to fully utilize this sector to generate revenue, particularly from "higher spending and more sustainability-aware European tourists". [73] In addition, the participants of the second participatory workshop recognized the significant role of green bonds in attracting private green investments.

Zambia had a very low performance on green trade (GT), with a score of 15.7 (Figures 21b). This is the lowest score among the pillars in green economic opportunities and across all dimensions in 2021. None of the indicators for green trade had reached a moderate score, i.e., four indicators had very low scores, and one indicator had a low score (Figure 26). Ores and metals exports represent the majority of Zambia's merchandise exports (GT2), causing the score for this indicator to become as low as 1 in 2021. The country relies on copper exports, with traditional exports largely dependent on copper, which accounts for more than 70 percent of total exports.[74] The Zambian experts emphasized diversifying their export base because extracting and exporting copper is not sustainable. Moreover, they considered it essential to evaluate trade barriers, improve exports' added value, and impose product standards. Improving the added value of products could improve performance in the share of manufacturing exports to total merchandise exports (GT5), which had a very low score of 12.93 in 2021.

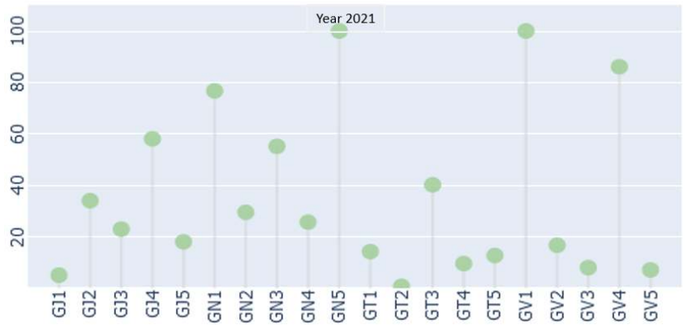
Meanwhile, imposing product standards, particularly regarding their environmental impacts, could contribute to improving performance in the share of export of environmental goods to total exports (GT1), which score was also very low at 14.43. Zambia performed relatively better in the share of medium and high-tech exports to manufactured exports (GT3), with a score of 40.35. The scores for this indicator showed an increasing trend, which was not observed in the other green trade indicators.

Zambia's green employment (GJ) performance was slightly better than in green trade. With a score of 27.81, the performance in creating employment from green economic opportunities is very low (Figures 21b). A moderate score was achieved in reducing the share of youth not in education, employment, or training to the total youth population (GJ4). While the score was only 44.23 in 2010, it increased to 58.17 in 2021 (Figure 26). According to Zambian experts, local skills development in light manufacturing presents an opportunity for jobs. Youth unemployment is very high, so local innovation technologies will need to be exploited to create jobs for them. The renewable energy sector could provide employment opportunities. The score for employment in the renewable energy sector (GJ1) was still very low at 5.3. But with further initiatives and programs to develop this sector, performance in creating green employment for the youth could be improved. For example, the government-owned utility firm, Zambia Electricity Supply Corp. (ZESCO), has planned to develop and construct 50 MW of PV plants in the Southern, Western, and Luapula provinces this year. [75] Another source of green employment for the youth will be eco-tourism, which remains underdeveloped in Zambia. The youth will also need opportunities to develop their innovative skills to participate in developing green sectors (i.e., renewable, eco-tourism, etc.). The volume of official development assistance flows for scholarships by sector and type of study (GJ5), one of the sources of skills development support for developing countries, had been low at 18.23 in 2021.

For green economic opportunities, green innovation (GN) was the best-performing pillar, with a moderate score of 57.52 in 2021 (Figures 21b). The score for the share of patents on environmental technologies (GN1) was 76.78 in 2021 (Figure 26). According to the OECD's database on green growth indicators, Zambia's share of environment-related technologies to all technologies was 75.19 in 2015, 33.33 in 2017, and 100 in 2018. The score for 2021 was based on the most recent available data in 2018. The experts

emphasized that improving the scores on this indicator would encourage the uptake of more projects that provide innovative solutions. However, these innovations are costly and, thus, would require heavy support from the financial sector to succeed. The indicators on university-industry collaboration in R&D (GN2) and allocation to education as a percentage of budget expenditure (GN3) are both critical in creating enabling environment for innovation. Both indicators have experienced a decline in scores in the last decade. The score for the university-industry collaboration in R&D declined from 37.69 to 29.68, and that for the share in budget expenditure for education from a very high level of 92.63 to moderate 55.26. The score for the proportion of medium and high-tech manufacturing value added in total value added (GN4) was the lowest in green innovation. It was only 25.87 in 2021, albeit slightly higher than the score of 16.28 in 2010. The score for the charges for the use of intellectual property (GN5) was very high in 2021 and has stayed stable at this level since 2010. A very high score for this indicator is linked to the development of patents in the country and the promotion and protection of intellectual property.

Figure 26 Scores for indicators in the green economic opportunities dimension in Zambia, 2021



Green investment (GV)
GV1 – adjusted net savings, GV2 – renewable electricity capacity, GV3 – revenue from biodiversity economic instruments, GV4 – agriculture orientation index, GV5 – transport productive capacity
Green trade (GT)
GT1 – exports of environmental goods, GT2 – ores and metals exports, GT3 – medium and high-tech exports, GT4 – new business density, GT5 – exports of manufactured goods
Green employment (GJ)
GJ1 – renewable energy employment, GJ2 – employed below poverty line, GJ3 – vulnerable employment, GJ4 – youth not in education, employment, training, GJ5 – ODA flows for scholarships
Green innovation (GN)
GN1 – environmental technologies, GN2 – collaboration in R&D, GN3 – share education expenditure, GN4 – medium/high-tech manufacturing value added, GN5 – intellectual property charges

Social inclusion

Access to basic services and resources (AB) remained low in Zambia. Although there was an increasing trend in the performance in access to basic services and resources from 2010, the score remained low at 37.75 in 2021 (Figures 21b). Access to electricity and clean fuels (AB2), which had the lowest score of 22.57, contributed to this low performance (Figure 27). The Zambian experts noted that the Government set a goal for universal electricity access for all Zambians by 2030. They suggested that access to electricity in rural areas is crucial because it helps replace the consumption of kerosene, diesel, dry cell batteries, and alternative fuels such as firewood that contribute to deforestation. Because more than 90 percent of household fuels come from wood, reducing firewood collection from "woodland areas in forest reserves and open lands" is critical for biodiversity and ecosystem protection. [76] Like in access to electricity and clean fuels, access to safely managed water and sanitation (AB1) had been low, albeit with a slightly higher score of 31.46 in 2021. The participants highlighted that about 55 percent of urban dwellers live in slums with inadequate access to water and sanitation facilities. Regarding food nutrition and security, as represented by the prevalence of stunting among children under five years of age (AB3), the score had been low at 37.66 in 2021, only showing some improvement in performance in 2010 when the score was at 31.24. Despite this progress, which could be attributed to the launch of Zambia's Scaling Up Nutrition (SUN) movement in 2010, Zambia continues to be one of the Sub-Saharan countries with the highest malnutrition and stunting rates.[77] The country was relatively more successful in improving its performance in the mobile broadband penetration per 100 users (AB4) and property rights score (AB5), raising scores to moderate in 2021 from very low for AB4 and low for AB5 in 2010. The experts agreed that harmonizing laws related to land could improve the score in property rights, which would give people greater opportunities to succeed and be secured economically.

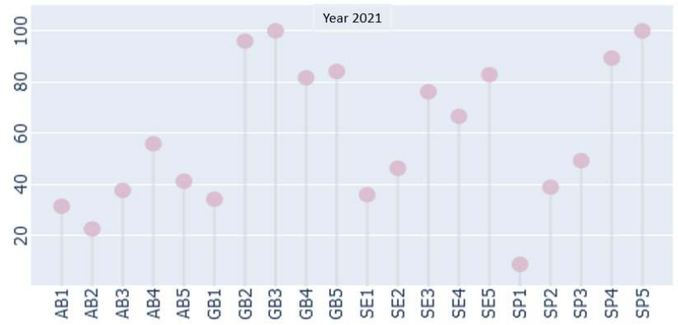
In 2021, Zambia achieved the second-highest performance in gender balance (GB) across all indicator categories after GHG emissions reduction. The score for gender balance was 79.2 in 2021 (Figures 21b), gaining about 5 points relative to the score of 73.9 in 2010. Zambia's goal to ensure gender equality is evident not only in its National Gender Policy (2014) but also in its first Climate Change Gender Action Plan (2018). Other efforts to reduce the gender gap include integrating gender issues into Zambia's first national financial inclusion strategy, aiming to "increase women's financial inclusion to 70 percent in 2022 from 30 percent in 2015". [78] The green growth indicators that contributed to the high performance in gender balance were laws and regulations for equal gender pay score (GB3) and gender ratio of account at a financial institution or mobile-money-service provider (GB2). In equal gender pay (GB3), Zambia significantly improved scores from 75.25 in 2010 to 100 in 2021 (Figure 27). And in an account at a financial institution, the participants emphasized that, currently, women have more financial accounts in the mobile market, which empower them economically. The performance in maternal mortality ratio (GB4) and primary school enrollment, gender parity index (GB5) had also been very high, with scores above 80. The experts explained that the maternal mortality ratio in Zambia is affected by many issues, not only health and nutrition. Zambia has made significant strides in the past two decades to improve maternal and newborn health outcomes. According to them, what has been critical in this achievement is the greater availability of skilled midwifery personnel. They further explained that more women in decision-making positions could improve the maternal mortality ratio performance, although it does

not always guarantee change. In 2021, the performance in the proportion of seats held by women in national parliaments (GB1) was low, with a score of 34.2.

Although the score in social equity was high at 61.58 in 2021 (Figures 21b), there was a decline in performance by about four score points from 2010. The indicators that contributed to the decrease in social equity were the inequality in income based on the Palma ratio (SE1), the unemployment rate among older people (SE4), and the disparity in unemployment among persons with disability (SE5). The decline in income inequality caused the scores for this indicator to shift from a moderate score of 48.53 to a low score of 35.95 from 2010 to 2021 (Figure 27). The experts referred to the International Growth Centre report [79] indicating that wage income is the most significant contributor to income inequality. This year's USAID report for Zambia pointed out that after a decade of high economic growth, a large part of the population, particularly in rural areas, continues to live below the poverty line due to high-income inequality. [80] In Zambia, older persons and persons with disabilities are challenged by social inequality in different ways, including employment. Due to discrimination, older people have limited opportunities to find employment. [81] However, the disparity in unemployment among the youth (SE3) is even slightly higher than among persons with disabilities. As discussed above, developing green sectors could offer youth new opportunities for employment. Although the scores for access to electricity in urban and rural areas (SE2) improved from 2010 to 2020, increasing from a low level (27.96) to a moderate level (46.32), the disparity remains high between urban and rural areas. Using off-grid solar to generate electricity could improve access to electricity in rural areas.

The performance in social protection stood at a moderate level, with a score of 57.24 in 2021 (Figures 21b). The proportion of the population above statutory pensionable age receiving a pension (SP1) had the lowest score and slightly declined from 9.71 in 2010 to 8.72 in 2021 (Figure 27). The 8NDP recognizes the need to support old people after retirement by reforming the pension system, which will "increase coverage, enhance its effectiveness as a social safety net and make it financially sustainable". Health support and services could overcome health-related issues among old people and in all parts of society. The performance of universal health coverage service (SP2) in Zambia had also been low, with a score of 38.9 in 2021. There had been only a slight increase in the score, which stood at 31.86 in 2010. Nonetheless, Zambia has made significant strides to improve maternal and newborn health outcomes in the past two decades. The increased availability of skilled midwifery personnel resulted in a better quality of care because they averted about two-thirds of preventable maternal and newborn deaths. The performance in reducing the proportion of the urban population living in slums (SP3) had been at a moderate level, with a score of 49.28 in 2021. The experts suggested that there would be a need for social welfare net expansion because slums service delivery faces supply-side issues. There is a severe shortage of affordable housing in Zambia. Consequently, informal settlements are sprawling in urban areas. About 55 percent of urban dwellers live in slums with inadequate access to water and sanitation facilities. Zambia performed relatively well for the two remaining green growth indicators, which refer to social protection against crime and disasters.

Figure 27 Scores for indicators in the social inclusion dimension in Zambia, 2021



Access to basic services and resources (AB)
AB1 – access to safe water and sanitation, AB2 – access to electricity and clean fuels, AB3 – prevalence of children stunting, AB4 – mobile broadband penetration, AB5 – property rights
Gender balance (GB)
GB1 – women in national parliaments, GB2 – gender account in financial institution, GB3 – equal gender pay, GB4 – maternal mortality ratio, GB5 – school enrollment gender parity
Social equity (SE)
SE1 – inequality in income, SE2 – rural/urban access to electricity, SE3 – youth unemployment disparity, SE4 – old people unemployment disparity, SE5 – unemployment disabled disparity
Social protection (SP)
SP1 – share old people receiving pension , SP2 – universal health coverage, SP3 – population living in slums, SP4 – victims of intentional homicides, SP5 – displacement ralated to disasters

6 Expert Consultations

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The first part of this chapter discusses the consultations with the Zambian and international experts in the design process of the national Green Growth Index for Zambia. Although no new indicators were added in this year's version of the global Green Growth Index, the second chapter discusses the consultations planned with international experts in the following years.

6.1 National Green Growth Index for Zambia

6.1.1 Participatory activities with the Zambian experts

Developing the Zambia Green Growth Index followed systematic and participatory approaches. It is systematic because the output from each activity feeds in as input into the following activity, and it is participatory because the Zambian experts, who were identified before the process, were not only recipients but also sources of knowledge for developing the Index. Throughout the consultation process, the experts discussed, suggested, and selected the indicators that are policy relevant – with GGGI providing the needed technical support and expertise. The process combined different forms and mediums to allow interactive participation with and among the experts, including seminars/webinars, participatory workshops, online surveys, and dissemination (e.g., global conference). Figure 28 shows the chronological occurrence of the nine activities conducted in developing the Index. Details on each activity are discussed in a separate report for the Zambia Global Green Growth Index,[82] and a summary is provided in Table 6. These activities were supported by analytical methods conducted by GGGI's Green Growth Performance Measurement (GGPM) team and are discussed in Annex 1. Figure 29 shows selected photos of the Zambian experts during the two participatory workshops.

Figure 28 Design process for the Zambia Green Growth Index

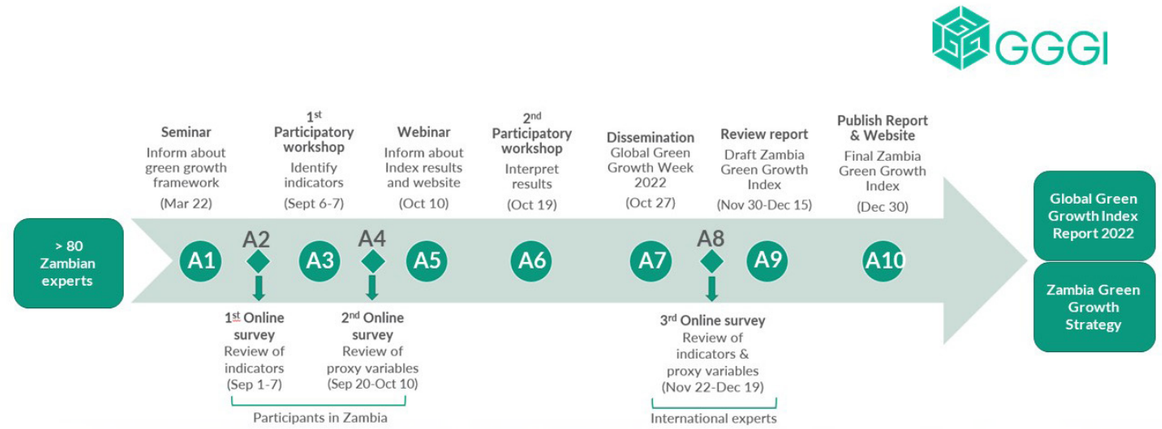

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Figure 29 Selected photos of the Zambian experts during the first (top) and second (bottom) participatory workshops

Table 6 Summary of the activities for the design process of the Zambia Green Growth Index

Activities	Schedule and venue	Objectives	Outputs
A1: Seminar on green growth framework	22 March 2022 Lusaka, Zambia	Inform the Zambian experts about the concepts and applications of the Green Growth Index	Created knowledge among experts on the different green growth dimensions and the indicators that represent each dimension, which corresponds to the questions in the 1st online survey
A2: 1st Online survey	1-6 September 2022 Virtual	(i) Familiarize the experts on the potential indicators for the different green growth dimensions, (ii) Build the capacity of experts to assess the policy relevance of the green growth indicators to Zambia's economic, social, and environmental contexts; and (iii) Train experts on how to use the online survey form which will be used during 1st participatory workshop	Created knowledge among experts on the policy relevance of the green growth indicators, which was necessary for the discussion during the 1st participatory workshop and selection of indicators for the Zambia Green Growth Index
A3: 1st Participatory workshop	6-7 October 2022 Lusaka, Zambia	(i) Allow experts to discuss with each other the policy relevance of the green growth indicators and (ii) Allow experts to rate and vote on the green growth indicators with the highest policy relevance to Zambia's economic, social, and environmental contexts	Selected 80 green growth indicators to be included in the Zambia Green Growth Index

Table 6 Summary of the activities for the design process of the Zambia Green Growth Index *(continued)*

Activities	Schedule and venue	Objectives	Outputs
A4: 2nd Online survey	20 September to 10 October 2022 Virtual	(i) Inform the experts on the green growth indicators with insufficient data and (ii) Collect feedback on the policy relevance of the proxy variables that can be used to replace these indicators	Ratings of experts on the proxy variables for the green growth indicators with insufficient data
A5: Webinar	10 October 2022 Virtual	(i) Share with the experts the link to the website of the preliminary Zambia Green Growth Index; (ii) Explain to the experts how to navigate the website and how the results were computed in the Zambia Green Growth Index; and (iii) Collect feedback on the sustainability targets that will be used to benchmark indicators which do not have SDG targets	(i) Access to the website to prepare experts for the discussion of the Index scores during the 2nd participatory workshop, and (ii) Experts' preference on sustainability targets for indicators with no SDG and national targets
A6: 2nd Participatory workshop	19 October 2022 Lusaka, Zambia	(i) Share with the experts the link to the website of the revised Zambia Green Growth Index; (ii) Allow the experts to discuss with each other the challenges and opportunities for green growth transition based on the Index scores; and (iii) Build capacity of the experts to interpret the scores of the Zambia Green Growth Index	(i) Access to the website on the final scores of the Zambia Green Growth Index and (ii) Experts' contribution to the analysis of scores in the Index report
A7: Dissemination	27 October 2022 Seoul, Korea, and virtual	(i) Create awareness of the collaborative project between GGGI and MoGEE to develop the Zambia Green Growth Index; (ii) Train government officers who are participating in the development of the Index to disseminate it to the experts globally; and (iii) Inform international organizations on the application of the Global Green Growth Index at the national level	Dissemination of the Zambia Green Growth Index at a global conference
A8: 3rd Online survey	22 November to 9 December 2022 Virtual	(i) Inform the international experts on the first application of the Green Growth Index at the national level and (ii) Collect feedback on the policy relevance of the indicators selected by the Zambian experts for the Zambia Green Growth Index (see chapter 6.1.2)	International experts' ratings on the relevance of the indicators to policy decision-making and development contexts in Zambia or, in general, African countries
A9: Review of the report	Virtual	(i) Inform the Zambian experts on the contents of the Zambia Green Growth Index and (ii) Allow the experts to review the 2022 Zambia Green Growth Index report before the publication	List of suggestions to be considered in finalizing the 2022 Zambia Green Growth Index report
A10: Publish report and website	-	(i) Widely disseminate the 2022 Zambia Green Growth Index report and website and (ii) Provide reference to the green growth indicators and scores for Zambia in the 2022 global Green Growth Index report and national Green Growth Strategy	The first version of the 2022 Zambia Green Growth Index report

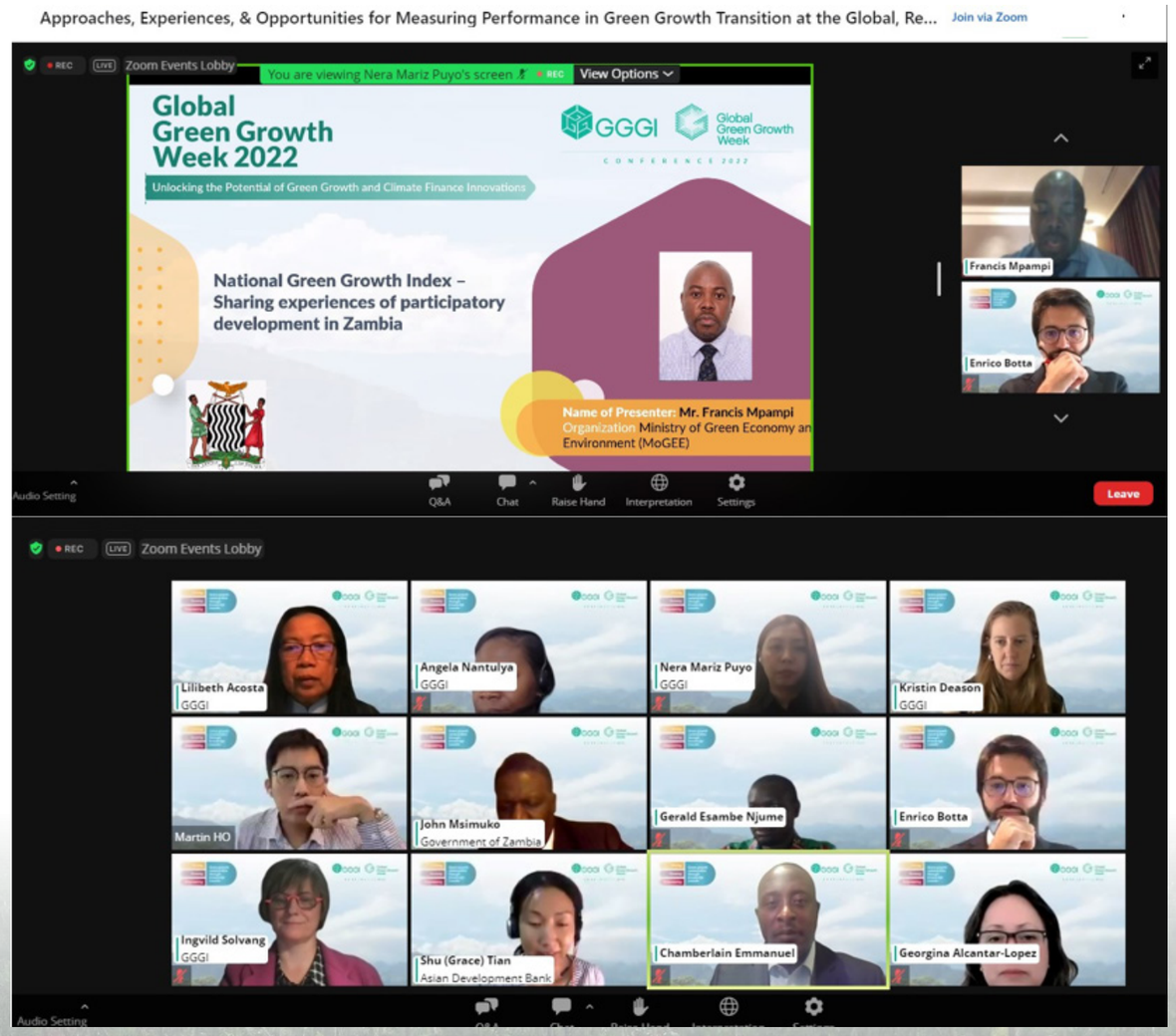
The participatory workshops, activities A3 and A6 in Table 6, applied well-structured activities to allow the experts to rate and vote on the green growth indicators (A3) and scores (A6) before and after the breakout sessions, during which they discussed with each other the policy relevance of the indicators in each dimension. The first activity was the GGPM team's presentation of the five indicators for each pillar; the second activity was the initial individual voting on the indicators and scores for each pillar using Mentimeter software; the third activity allowed the experts to join one of the three breakout groups to discuss the relevance of the indicators and scores, and to provide common ratings using the online survey form; the fourth activity was a reporting from each breakout group on the reasons for the votes given to the indicators and scores; and the fifth activity was final voting on the indicators and scores for each pillar using Mentimeter software.

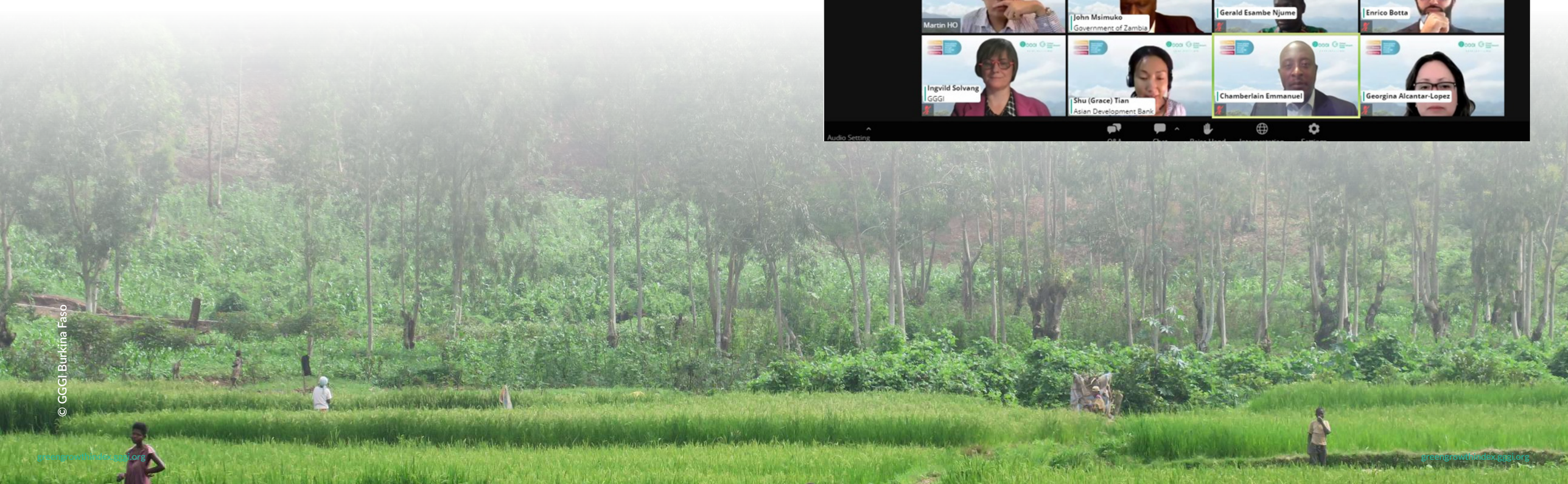
The dissemination of the Zambia Green Growth Index (activity A7) dealt with the presentation of the results in the session on Approaches, Experiences, & Opportunities for Measuring Performance in Green Growth Transition at the Global, Regional & National Levels during the Global Green Growth Week 2022, which was held virtually on 24-28 October 2022 (Figure 30). Mr. John Msimuko, MoGEE's Permanent Secretary, provided the opening remarks for this session on 27 October. Dr. Lilibeth Acosta, GGPM's Program Manager, introduced the concepts and applications of GGGI's Green Growth Index and its tools. Mr. Francis Mpampi, the National Coordinator for the Green Climate Fund's National Designated Authority, shared his experiences in participating in the development of the Zambia Green Growth Index. Ms. Angela Nantulya, GGGI's Country Lead and Project Lead for Zambia Green Climate Fund readiness, informed about GGGI's work in Zambia and the importance of the Zambia Green Growth Index for the development of the national Green Growth Strategy. The session was participated by experts from international organizations, allowing dissemination of information on the first national application of the Green Growth Index. Many international experts participated in the annual review of the Global Green Growth Index and, for this year, in the review of the indicators for the Zambia Green Growth Index.

Other speakers and panelists in the session included the following (Figure 30):

- Ms. Nera Mariz Puyo, Associate Officer, Climate Action and Inclusive Development Global Practice, GGGI, South Korea
- Mr. Chamberlain Emmanuel, Head of Environmental Sustainability Division, Organisation of Eastern Caribbean States (OECS) Commission, Saint Lucia
- Ms. Georgina Alcantar-Lopez, Chief Environment and Climate Change Statistics Unit/Statistic Division, Economic Commission for Latin America and the Caribbean (UN-ECLAC), Mexico
- Dr. Kristin Deason, Caribbean Representative, GGGI, St. Lucia
- Mr. Gerald Esambe Njume, Senior Climate Change, and Green Growth Officer, African Development Bank Group (AfDB), Côte d'Ivoire
- Dr. Shu Tian, Senior Economist, Economic Research and Regional Cooperation Department, Asian Development Bank (ADB), Philippines
- Mr. Enrico Botta, Policy Analyst, Green Growth & Global Relations Division, Environment Directorate, Organisation for Economic Co-operation and Development (OECD), France
- Ms. Ingvild Solvang, Deputy Director, Head of Climate Action and Inclusive Development Global Practice, GGGI, Luxembourg

Figure 30 Selected photos of the speakers and panelists during the presentation of the Zambia Green Growth Index on Global Green Growth Week 2022





6.1.2 Consultation with the international experts

The third online survey on the Zambia Green Growth Index focused on assessing the relevance of the 80 green growth indicators with the participation of 30 international experts (activity A8 in Table 6) Almost half of the 30 experts were from academic institutions. There is nearly equal participation by females and males. The majority's work is related to indicators and green growth. The online survey has two objectives: First, to inform international experts on the first application of the Green Growth Index at the national level, and second, to collect feedback on the policy relevance of the indicators selected by the Zambian experts for the Zambia Green Growth Index. Figures 32-35 present the international experts' ratings on the relevance of the indicators to policy decision-making and development contexts in Zambia or, in general, African countries. The experts were requested to rate the indicators' policy relevance according to five levels – very high, high, moderate, low, and very low. Overall, most experts gave high ratings to the indicators across dimensions.

The policy-relevance ratings on the green growth indicators for efficient and sustainable resource use are generally high (Figures 32). Almost all indicators also received very high ratings; the highest percentages are for renewable energy share (EE2) in efficient and sustainable energy, water use efficiency (EW1) and level of water stress (EW2) in efficient and sustainable water use, and nutrient balance (SL1) in sustainable land use. All these green growth indicators are included in the global Green Growth Index. The level of water stress (EW2) in efficient and sustainable water use (EW2) are both SDG indicators. Food loss and food waste (ME3) and sanitation coverage (ME4) received high ratings from more than 60 percent of the experts. Some experts rated the indicators' policy relevance as moderate, except for renewable energy share (EE2), level of water stress (EW2), and agricultural productivity (SL4). There were a few experts who gave low ratings for the following indicators. For example, about 15 percent and 25 percent of the experts gave low ratings to efficient transport (EE3) and sewer, septic, and latrine coverage (ME5), respectively. Agricultural productivity (SL4) and natural capital productivity (SL5) were the two indicators that received very low ratings from 10 percent of the experts.

Three indicators for natural capital protection received very high policy-relevance ratings from at least 50 percent of the experts (Figure 33). These include the DALY rate from unsafe water (EQ2) in environmental quality, CO2 emissions per capita (GE1) in GHG emissions reduction, and terrestrial protected areas (CV2) in biodiversity and ecosystem protection. About half of the 20 indicators for natural capital protection received high ratings from at least 50 percent of the experts. The indicators receiving high ratings from most experts include changes in the extent of water ecosystems (BE5) from 80 percent of the experts, while solid waste generation (EQ3), the share of employment in services (CV4), and the share of exports of cultural goods (CV5) from at least 65 percent of the experts. The only indicator receiving moderate ratings from more than 65 percent of the experts was international tourism arrivals (CV3). Other indicators also received moderate ratings from less than half of the experts. The indicators for GHG emissions reduction and biodiversity and ecosystem protection did not have low or very low ratings. The red list index (CV1), terrestrial protected area (CV2), and share of employment in services (CV4), all in the cultural and social value pillar, had low ratings. Moreover, this is the only pillar with indicators not receiving very high ratings, including international tourism arrivals (CV3), the share of employment in services (CV4), and the share of exports of cultural goods (CV5). The only indicator receiving a very low rating from the experts was people with basic handwashing facilities (EQ5) in environmental quality.

Among the four dimensions, the policy-relevance ratings are most diverse for green economic opportunities, with many indicators receiving low ratings from few experts (Figure 34). Only one indicator, medium/high-tech manufacturing value added (GN4), received very high ratings from 50 percent of the experts. Other indicators were rated high by 40 percent or less of the experts. The ores and metals exports (GT2) and vulnerable employment (GJ3) were the indicators receiving high ratings from more than 70 percent and 60 percent of the experts. Many indicators were rated moderate by at least 30 percent of the experts. The agriculture orientation index (GV4) received moderate ratings from 40 percent, and intellectual property charges (GN5) received moderate ratings from 50 percent of the experts. Only environmental technologies (GN1) did not have low and very ratings. Over 20 percent of the experts rated ODA flows for scholarships (GJ5), share education expenditure (GN3), and intellectual property charges (GN5) low. More than 10 percent also rated share education expenditure (GN3) very low. It is the only indicator of green economic opportunities with a very low rating.

More than half of the experts rated only two indicators very high, including women in national parliaments (GB1) and the population living in slums (SP3) (Figure 35). However, more than half of them rated 20 social inclusion indicators as high. The most significant percentage of high ratings were given to mobile broadband penetration (AB4) and old people unemployment disparity (SE4), with at least 70 percent, followed by youth unemployment disparity (SE3) and unemployment disabled disparity (SE5), with at least 60 percent of the experts. There were also several experts providing moderate ratings on many indicators. The displacement related to disasters (SP5) and property rights (AB5) were rated moderate by at least 40 percent of the experts. Five indicators received low ratings from a few experts. These include the prevalence of children stunting (AB3), gender account in financial institutions (GB2), equal gender pay (GB3), share old people receiving a pension (SP1), and displacement related to disasters (SP5). None of the experts rated the social inclusion indicators very low.

Figure 31 Characteristics of the international experts who participated in the review of the 80 indicators for the Zambia Green Growth Index

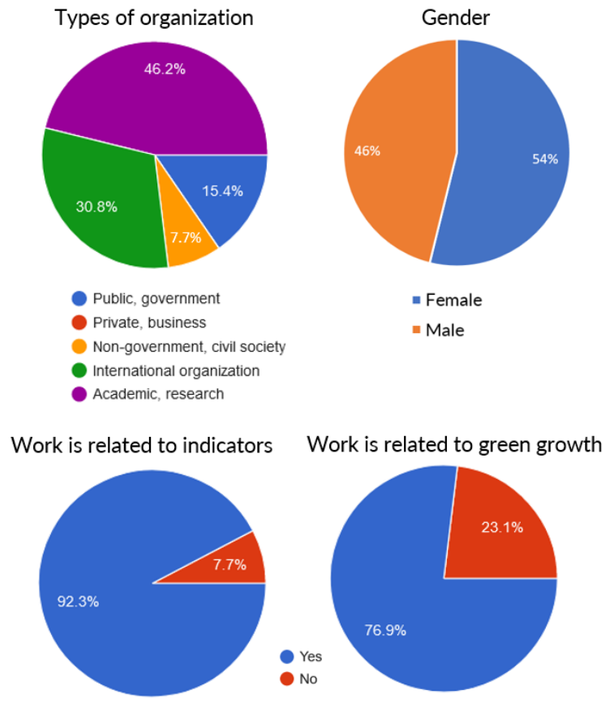
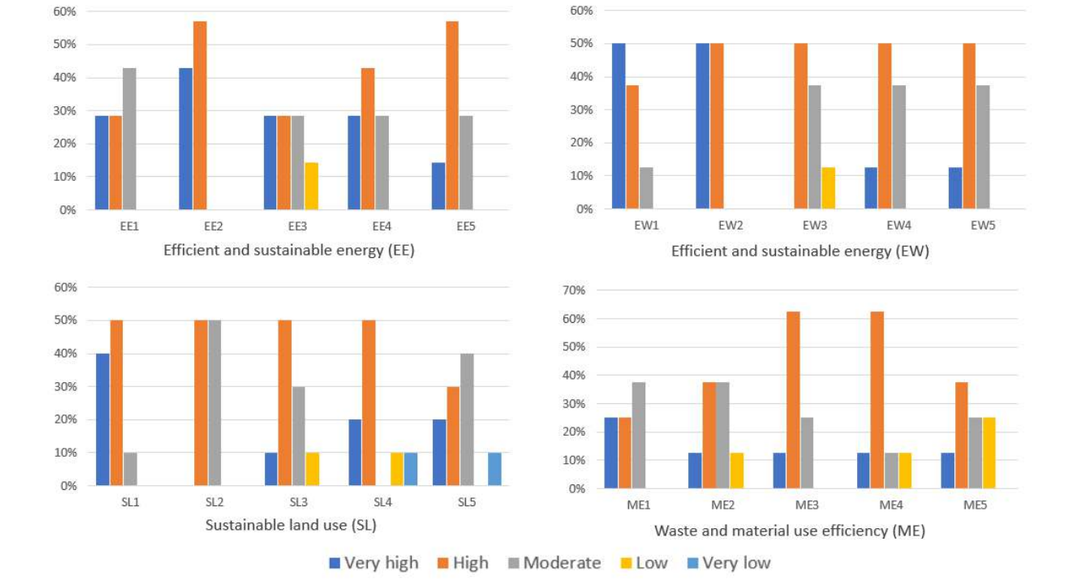
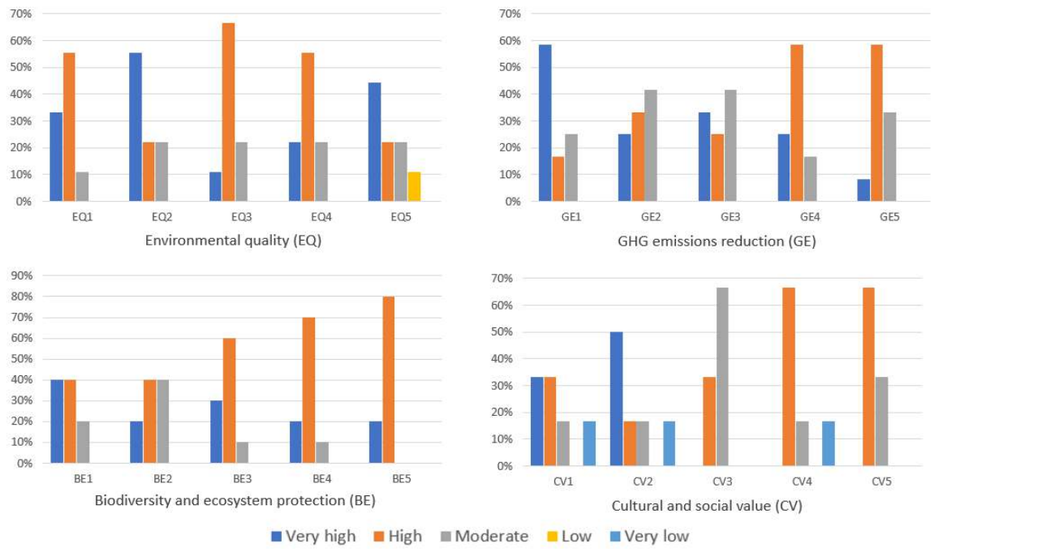


Figure 32 Ratings given by international experts on the 20 indicators for efficient and sustainable resource use



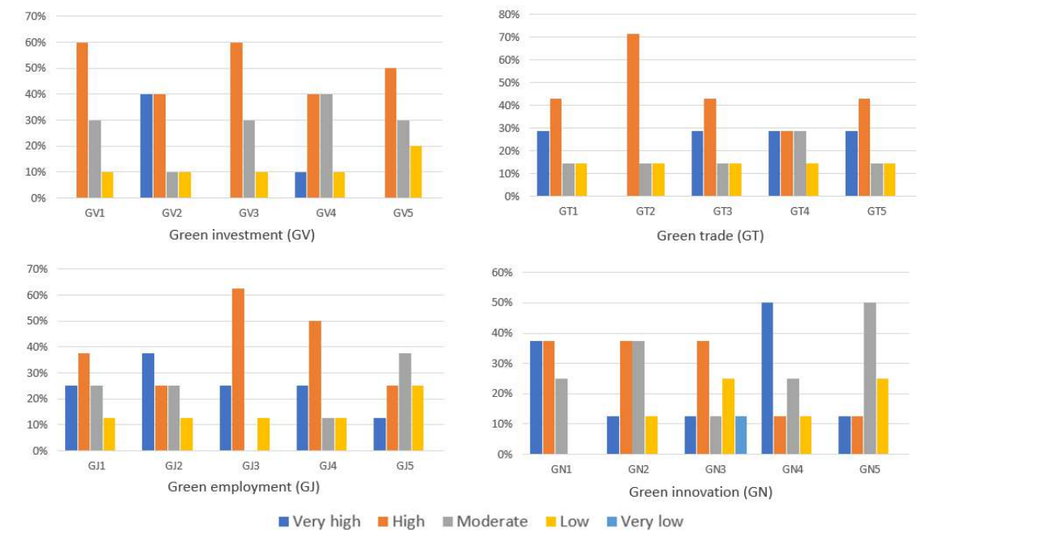
EE1 – energy intensity, EE2 – renewable energy share, EE3 – efficient transport, EE4 – low-carbon electricity, EE5 – per capita electricity consumption
EW1 – water use efficiency, EW2 – level of water stress, EW3 – capture fisheries, EW4 – agriculture water use efficiency, EW5 – renewable water resources per capita
SL1 – nutrient balance, SL2 – organic agriculture area, SL3 – cereal yield, SL4 – agricultural productivity, SL5 – natural capital productivity
ME1 – domestic material consumption, ME2 – material footprint, ME3 – food loss and food waste, ME4 – sanitation coverage, ME5 – sewer, septic and latrine coverage

Figure 33 Ratings given by international experts on the 20 indicators for natural capital protection



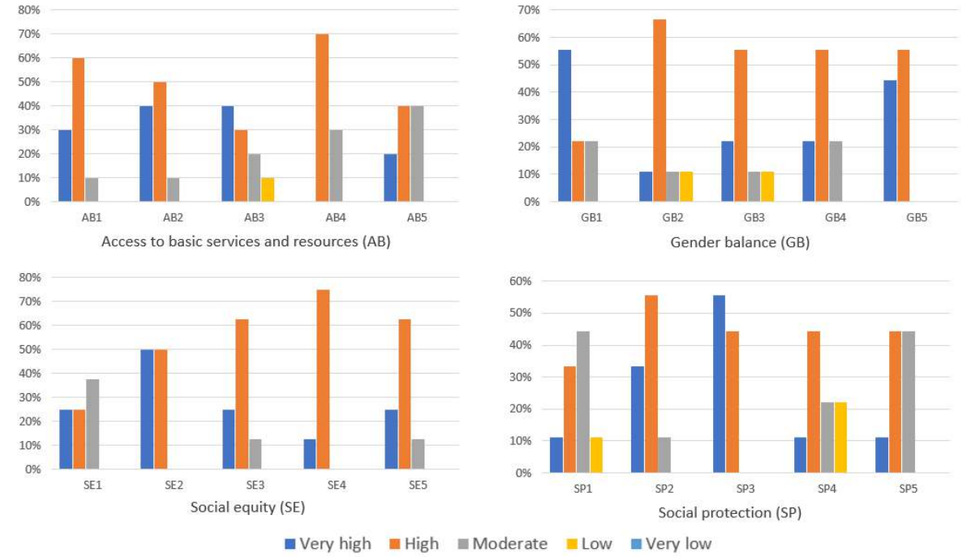
EQ1 – PM2.5 air pollution, EQ2 – DALY rate from unsafe water, EQ3 – solid waste generation, EQ4 – urban people with open defecation, EQ5 – people with basic handwashing facilities
GE1 – CO2 emissions per capita, GE2 – Non- CO2 per capita, GE3 – CO2 emissions growth rate, GE4 – carbon intensity of energy production, GE – carbon intensity of electricity
BE1 – protected key biodiversity areas, BE2 – share of forest areas, BE3 – forest area with management plan, BE4 – annual forest area change, BE5 – change in extent of water ecosystems
CV1 – red list index, CV2 – terrestrial protected area, CV3 – international tourism arrivals, CV4 – share of employment in services, CV5 – share of exports of cultural goods

Figure 34 Ratings given by international experts on the 20 indicators for green economic opportunities



GV1 – adjusted net savings, GV2 – renewable electricity capacity, GV3 – revenue from biodiversity economic instruments, GV4 – agriculture orientation index, GV5 – transport productive capacity
GT1 – exports of environmental goods, GT2 – ores and metals exports, GT3 – medium and high-tech exports, GT4 – new business density, GT5 – exports of manufactured goods
GJ1 – renewable energy employment, GJ2 – employed below poverty line, GJ3 – vulnerable employment, GJ4 – youth not in education, employment, training, GJ5 – ODA flows for scholarships
GN1 – environmental technologies, GN2 – collaboration in R&D, GN3 – share education expenditure, GN4 – medium/high-tech manufacturing value added, GN5 – intellectual property charges

Figure 35 Ratings given by international experts on the 20 indicators for social inclusion



AB1 – access to safe water and sanitation, AB2 – access to electricity and clean fuels, AB3 – prevalence of children stunting, AB4 – mobile broadband penetration, AB5 – property rights
GB1 – women in national parliaments, GB2 – gender account in financial institution, GB3 – equal gender pay, GB4 – maternal mortality ratio, GB5 – school enrollment gender parity
SE1 – inequality in income, SE2 – rural/urban access to electricity, SE3 – youth unemployment disparity, SE4 – old people unemployment disparity, SE5 – unemployment disabled disparity
SP1 – share old people receiving pension , SP2 – universal health coverage, SP3 – population living in slums, SP4 – victims of intentional homicides, SP5 – displacement related to disasters

6.2 Next steps for the global Green Growth Index

6.2.1 Indicators and proxy variables

One improvement to be made in the following years is the addition of relevant indicators to the green economic opportunities, which is the only dimension that needs to meet the target number of indicators. While the other dimensions include 12 indicators each, the green economic opportunities have only four (Table 7). Less than half of its indicators have a high level of relevance to green growth. Moreover, several indicators still need more data for many countries and years, affecting the number of countries with Index scores and the confidence level for the Index trend. The indicators with limited time-series data include the share of freshwater withdrawal to available freshwater resources (EW2), the share of organic agriculture to total agricultural land area (SL2), municipal solid waste (MSW) generation per capita (EQ3), the share of youth (aged 15–24 years) not in education, employment, or training (SE3), and proportion of population above statutory pensionable age receiving a pension (SP1). Thus, GGGI will continue collaborating with experts to review the indicators for all dimensions in the following years.

6.2.2 Data availability and confidence level

Two indicators continue to have only one data point, including municipal solid waste (MSW) generation per capita (EQ3) and universal access to sustainable transport (AB3) (Table 8). These indicators were assumed to have a constant trend over time. The indicators with only a few data points needing data imputations for several years include efficiency in sustainable transport (EE3), sustainable fisheries as a proportion of GDP (EW3), the share of food loss to production and food waste to food consumption (ME3), and share of terrestrial and marine protected areas to total territorial areas (CV3). Data for all the indicators included in the Green Growth Index are publicly available online, except for the share of green employment in total manufacturing employment (GJ1). The data were mainly collected from international organizations, which offers important advantages for measuring performance across countries. For example, collecting data from national agencies for more than 100 countries will take time and effort. In contrast, the data from international organizations were already collected from national agencies and had already undergone consistency checks.

Data availability is a significant challenge that affects the interpretability of any global index and thus needs transparency. In the case of the 2022 Green Growth Index, there are three issues to consider.

First, some indicators have data only for a limited number of countries. The completeness of indicators or lack of data for indicators influences the scores for the Green Growth Index. For example, a country with complete data for all indicators for green economic opportunities will have lower scores if one of the four indicators has zero value, thus pulling down the values of other indicators. In contrast, another country with incomplete data will have a higher score because the fourth indicator, which may also have a value of zero but missing and unknown, will be excluded by default. Thus, the lack of data causes some uncertainty in the Green Growth Index results. Allowing missing values is, however,

necessary to enable the substitutability of indicators that represent the same concept as defined by the pillar and maintain a larger number of countries until the last level of aggregation. Not allowing substitutability at the first and second levels of aggregation will exclude countries with missing values. As a rule, 25 percent of the missing data were allowed for the aggregation of indicators (see Annex 1, Acosta, 2019a). If there were no missing values, the index could be computed for about 243 countries globally. Due to data gaps, however, the current index was calculated only for 147 countries.

Second, the most recent available data vary across indicators (Table 8). To enable computation of the Green Growth Index for 2021, the most recent data were used as a baseline, and values were assumed to hold until 2021. For example, five of the 40 green growth indicators used 2018 data for the years 2020-2021, and a few others used 2019 for 2020 and 2021. This approach is commonly used in other global indices.

Third, for the missing data between the time series from 2010, the adjacent data were used to represent data for the missing years (i.e., imputed data). Imputation is essential to avoid a drastic drop or discontinuity in the Index trend from 2010 and 2020 due to missing data, which could be misinterpreted as a decline in performance. The confidence level is attached to the Index trend to highlight the uncertainty that the missing data can cause. The level of confidence is based on data availability. Figure 36 presents the distribution of 147 countries with Index scores based on their data availability. Generally, data availability is around 75 percent because 25 percent was the missing data allowed in the aggregation rule. The mean for the data availability is 70 percent. Based on these statistics, the confidence levels were assigned as follows: Data availability of 70 percent and above has a high confidence level, between 60 and 70 percent has a moderate confidence level, and below 60 percent has a low confidence level. Figure 37 presents the confidence level for the Index trend by region and globally. The Index trend in at least 75 percent of the ranked countries in the Americas and Europe can be interpreted with a high level of confidence. In Asia and Oceania, about half of the countries have a high confidence level. But these two regions also have the largest share of countries with a low confidence level in the Index trend. In Africa, the Index trend is dominated by a moderate level of confidence.

Table 7 Relevance of indicators for the Green Growth Index and desired improvements for proxy variables

Codes	Baseline indicators	Relevance	Desired improvement and remarks
EE1	Ratio of total primary energy supply to GDP (MJ per $2017 PPP GDP)	High	
EE2	Share of renewable to total final energy consumption (Percent)	High	
EE3	Efficiency in sustainable transport (Index)	Proxy	Can be replaced with indicator from SDG database when it becomes available.
EW1	Water use efficiency (USD per m^3)	High	
EW2	Share of freshwater withdrawal to available freshwater resources (Percent)	Moderate	Improvement of time series data
EW3	Sustainable fisheries as a proportion of GDP (Percent)	High	
SL1	Soil nutrient budget (Kilogram nitrogen per hectare)	High	
SL2	Share of organic agriculture to total agricultural land area (Percent)	Moderate	Improvement of time series data
SL3	Livestock per agricultural area (include only ruminant livestock)	Moderate	Can be replaced with indicator with ratio to total livestock area.
ME1	Total domestic material consumption (DMC) per unit of GDP (Kilogram per GDP)	High	
ME2	Total material footprint (MF) per capita (Tons per capita)	High	
ME3	Share of food loss to production and food waste to food consumption (Percent)	High	
EQ1	PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m^3)	Moderate	To be combined with PM10 as data availability improves.
EQ2	DALY rate due to unsafe water sources (DALY lost per 100,000 persons)	Proxy	Can be replaced with water pollution; no identified sources yet
EQ3	Municipal solid waste (MSW) generation per capita (Tons per year per capita)	Moderate	Improvement of time series data
GE1	Ratio of CO_2 emissions to population, including AFOLU (Tons per capita)	High	
GE2	Ratio of non-CO_2 emissions to population, excluding AFOLU (CO_2eq tons per capita)	High	
GE3	Ratio of non-CO_2 emissions in agriculture to population (CO_2eq tons per capita)	High	
BE1	Average proportion of key biodiversity areas covered by protected areas (Percent)	High	
BE2	Share of forest area to total land area (Percent)	Proxy	Can be replaced with indicator on SDG indicator 15.2.1 Forest area annual net change rate when time-series data and country coverage improve
BE3	Above-ground biomass stock in forest (Tons per hectare)	High	
CV1	Red list index (Index)	Proxy	Can be replaced by species of relevance to tourism, local, and indigenous communities

Table 7 Relevance of indicators for the Green Growth Index and desired improvements for proxy variables *(continued)*

Codes	Baseline indicators	Relevance	Desired improvement and remarks
CV2	Tourism and recreation in coastal and marine areas (Score)	Proxy	Can be replaced by sustainable eco-tourism in different ecosystems; no identified sources yet
CV3	Share of terrestrial and marine protected areas to total territorial areas (Percent)	Proxy	Can be replaced by protected areas managed by indigenous and local communities
GV1	Ratio of adjusted net savings to GNI, including particulate emission damage (5 yrs moving ave.)	Proxy	Can be replaced by investment in renewable energy or green technology
GV2	-	-	Additional indicator to measure investment in Key Biodiversity Areas or protected areas; no identified sources yet
GV1	Ratio of adjusted net savings to GNI, including particulate emission damage (5 yrs moving ave.)	Proxy	Can be replaced by investment in renewable energy or green technology
GV2	-	-	Additional indicator to measure investment in Key Biodiversity Areas or protected areas; no identified sources yet
GV3	-	-	Additional indicator to measure investment in human skills in green jobs; no identified sources yet
GT1	Share of export of environmental goods (OECD and APEC class.) to total export (Percent)	Moderate	Improvement in the classification of environmental goods
GT2	-	-	Additional indicator to measure sustainable trade in certified products, to be made available by certification organization; data currently scanty
GT3	-	-	Additional indicator to measure trade in waste materials; no identified sources yet
GJ1	Share of green employment in total manufacturing employment (Percent)	Moderate	Improvement in the indicator to measure green employment in a different economic sector
GJ2	-	-	Additional indicator to measure skills generated in green employment; no identified sources yet
GJ3	-	-	Additional indicator to measure wage gap in green and standard employment; no identified sources yet
GN1	Share of patent publications in environmental technology to total patents (7 yrs moving ave.)	Moderate	Improvement in data availability for more countries
GN2	-	-	Additional indicator to measure green innovation in entrepreneurships; no identified sources yet.
GN3	-	-	Additional indicator to measure green innovation
AB1	Population with access to basic services, i.e., Water, sanitation, electricity, and clean fuels (Percent)	High	
AB2	Prevalence of undernourishment (Percent)	High	
AB3	Universal access to sustainable transport (Index)	Moderate	Can be replaced with indicator from SDG database when it becomes available.
GB1	Proportion of seats held by women in national parliaments (Percent)	Moderate	Can be combined with an indicator on positions held by women in managerial positions; data currently scanty
GB2	Ratio female to male with an account at a financial institution or mobile-money-service provider, age 15+ (Ratio)	High	
GB3	Getting paid, covering laws and regulations for equal gender pay (Score)	Proxy	Can be replaced by an indicator measuring gender parity in salary and benefits
SE1	Inequality in income based on Palma ratio (Ratio)	High	
SE2	Population with access to basic services by urban/rural, i.e., electricity (Ratio)	Moderate	Improvement of the indicator to measure renewable electricity; to add safely managed drinking water and sanitation, which have scanty time-series data
SE3	Share of youth (aged 15–24 years) not in education, employment, or training (Percent)	Moderate	Improvement in time series data
SP1	Proportion of population above statutory pensionable age receiving a pension (Percent)	Moderate	Improvement in time series data
SP2	Universal health coverage (UHC) service coverage index (Index)	High	
SP3	Proportion of urban population living in slums (Percent)	Proxy	Can be replaced by indicator on inadequate housing, including homelessness; to be made available by UN-Habitat

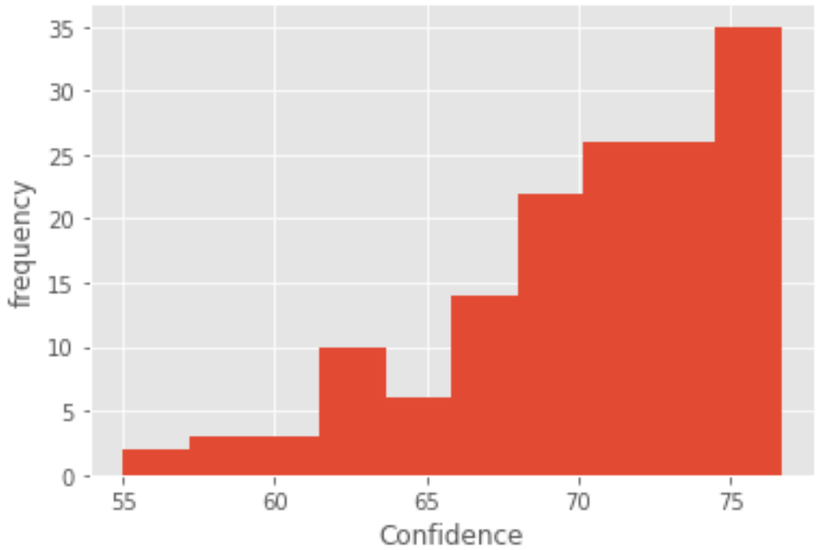
Table 8 Characteristics of the indicators in terms of data availability and required imputation

Codes	Available Data	Baseline Data	Data Downloaded Source	Website	Year(s) imputed for 2022 Index (only consider years between 2010 and 2021)
EE1	2000 - 2019	2019	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2020, 2021
EE2	2000 - 2019	2019	UNSTATS	-Same-	2020, 2021
EE3	2010 - 2018 2years interval	2018	WB data	https://lpi.worldbank.org/	2011, 2013, 2015, 2017, 2019, 2020, 2021
EW1	2000 - 2019	2019	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2020, 2021
EW2	2000 - 2019	2019	UNSTATS	-Same-	2020, 201
EW3	2011 - 2019 2years interval	2019	UNSTATS	-Same-	2010, 2012, 2014, 2016, 2020, 2021
SL1	1961 - 2018	2018	FAO	http://fenix.fao.org/faostat/internal/en/#data/ESB	2019, 2020, 2021
SL2	2004- 2020	2020	FAOSTAT	http://www.fao.org/faostat/en/#data/EL	2021
SL3	1961 - 2019	2019	FAO	https://www.fao.org/faostat/en/?fbclid=IwAR0dE JjoD4nMZkIqQehBd #home	2020, 2021
ME1	2000-2019	2019	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2020, 2021
ME2	1970-2019	2019	UNEP-IRP	https://www.resourcepanel.org/global-material-flows-database	2020, 2021
ME3	2014 - 2018	2018	FAOSTAT	http://www.fao.org/faostat/en/#data/SCL	2010, 2011, 2012, 2013, 2019, 2020,2021
EQ1	1990 - 2017 5years interval till 2010	2017	WB data	https://data.worldbank.org/indicator	2018, 2019, 2020, 2021
EQ2	1990 - 2019	2019	GHDx	http://ghdx.healthdata.org/gbd-results-tool?params=gbd-api-2017-permalink/b6989accc192c6a5f121a8204b88f819	2020, 2021
EQ3	2018	2018	WB Waste	https://datacatalog.worldbank.org/dataset/what-waste-global-database	Constant
GE1	1990 - 2021	2021	ClimateWatch and WB data	https://www.climatewatchdata.org/ghg-emissions AND https://data.worldbank.org/indicator	–
GE2	1990 - 2021	2021	ClimateWatch and WB data	-Same-	–
GE3	1990 - 2021	2021	ClimateWatch and WB data	-Same-	–
BE1	2000 - 2021	2021	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	–
BE2	1990 - 2020	2020	WB data	https://data.worldbank.org/indicator	2021
BE3	2000-2020 5years interval till 2015	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2021
CV1	1993 - 2021	2021	UNSTATS	-Same-	_
CV2	2012- 2020	2020	OHI	http://ohi-science.org/ohi-global/download	2010, 2011,2021
CV3	2016-2021	2021	WB data	https://data.worldbank.org/indicator	2010, 2011,2012, 2013, 2014,2015

Table 8 Characteristics of the indicators in terms of data availability and required imputation *(continued)*

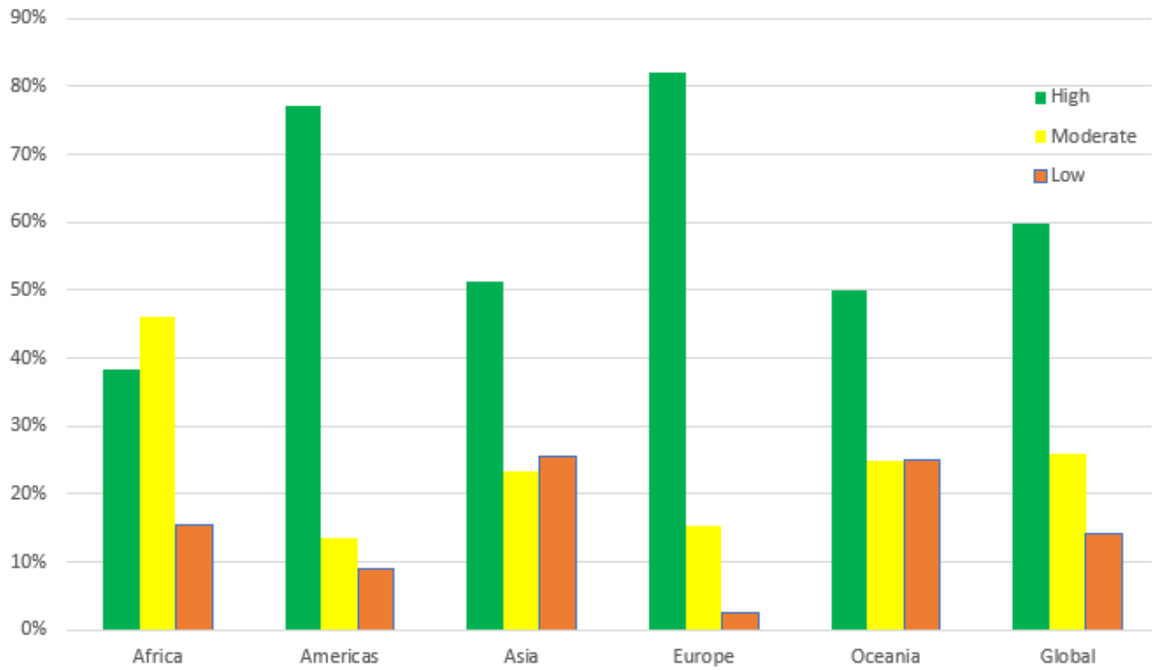
Codes	Available Data	Baseline Data	Data Downloaded Source	Website	Year(s) imputed for 2022 Index (only consider years between 2010 and 2021)
GJ1	2010-2018	2018	UNIDO	Not Available online,data computed and shared by the author	2019, 2020, 2021
GN1	1960-2019	2019	OECD	https://data.oecd.org/envpolicy/patents-on-environment-technologies.htm	2020, 2021
GT1	2000 - 2019	2019	UNCOMTRADE data	https://comtrade.un.org/data/	2020, 2021
GV1	1990 - 2020	2020	WB data	https://data.worldbank.org/indicator	2021
AB1	2000 - 2021	2021	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	–
AB2	2021-2020	2020	UNSTATS	-Same-	2021
AB3	2020	2020	Sum4all	https://www.sum4all.org/gra-tool/country-performance/global	constant
GB1	2000 - 2021	2021	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	–
GB2	2004 - 2021	2021	UNSTATS	-Same-	_
GB3	1971 - 2021	2021	WB WBL	http://wbl.worldbank.org/en/reports	_
SE1	1967 - 2021	2021	WB data	https://data.worldbank.org/indicator	_
SE2	2000 - 2021	2021	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	–
SE3	2000-2021	2021	UNSTATS	-Same-	_
SP1	1996 - 2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2021
SP2	2000 - 2019 5years interval till 2017	2019	UNSTATS	-Same-	2020, 2021
SP3	2000-2020 2years interval(from 2010-2020)	2020	UNSTATS	-Same-	2021

Figure 36 Confidence level based on data availability for 147 countries, 2010-2021



	Confidence
count	147.000000
mean	70.279195
std	4.645470
min	55.000000
25%	67.916667
50%	71.250000
75%	74.270833
max	76.666667

Figure 37 Distribution of confidence levels based on data availability per region, 2010-2021



6.2.3 Sustainability targets

The sustainability targets were essential inputs to the computation of the Green Growth Index (Annex 1). They were used to benchmark the green growth indicators to allow the Index scores to measure their distance to targets, i.e., a score of 100 implies that the sustainability targets were achieved. The targets were grouped into three types (Table 9), including (i) SDG targets, (ii) other targets whose sources are not from the SDG indicators, and (iii) the mean of the top five performers. If the targets are unavailable from the SDG indicators and other reliable literature, they were computed based on the average values of the top five performing countries (bottom five performing countries for the negative relationship to green growth). The targets in the Green Growth Index were aligned as much as possible with the SDG targets, using the information on sustainability targets applied in relevant global indices such as the SDSN's SDG Index and OECD's SDG Indicators. The SDG targets are either explicit or implicit, with the latter leaving room for interpretation. For the Green Growth Index, the GGPM team did not attempt to interpret the SDG targets but used the available interpretation, such as that suggested by OECD[83] and SDSN[84] . Whenever the suggestions on the targets diverged, the SDSN targets were adopted because, as with the Green Growth Index, the SDSN methodology was developed based on the global context. The alignment with the SDG targets will continue to be essential to provide consistent policy recommendations to the countries. A vital step to improve the Green Growth Index is to have a valid and sufficient basis for the targets of the indicators, which are currently not considered in any internationally agreed goals such as SDGs, Climate Paris Agreement, and Aichi Biodiversity Target.

Thirteen of the targets for the 40 green growth indicators remained based on the mean values of the top five performing countries (Table 9), allowing countries to reach the targets regardless of their performance on a given indicator. But Table 5 shows that the mean values were high enough that only a few countries, up to six, could reach the targets. Over 90 percent of the 147 countries reached the target for the share of forest area to total land area (BE2). The target of 17 percent was based on the Aichi biodiversity target for 2030 and was also adopted by the OECD and SDSN.[85] The other indicator with the many countries reaching the target, over 80 percent, was the share of freshwater withdrawal to available freshwater resources (EW2). The FAO suggested a target between 25 and 75 percent for this indicator. [86] The targets not achieved by any countries include efficiency in sustainable transport (EE3) with five as the target score, DALY rate due to unsafe water sources (EQ2) with zero as target DALY lost per 100,000 persons, municipal solid waste (MSW) generation per capita (EQ3) with 0.001752675 ton as target per capita per year, the average proportion of Key Biodiversity Areas covered by protected areas with a target of 100 percent, Red list index (CV1) with one as target score, universal access to sustainable transport (AB3) with 100 as the target score, share of youth (aged 15-24 years) not in education, employment, or training (SE3) with zero percent as the target, universal health coverage (UHC) service coverage index (SP2) with 100 as the target score, and proportion of the urban population living in slums (SP3) with zero percent as the target.

Table 9 Details on the sustainability targets used to benchmark the indicators

Codes	Indicators	Unstat SDG Indicator	Targets	Counties Reaching Targets	Types of Targets	Source of data	Source of targets
EE1	Energy intensity level of primary energy (MJ per $2011 PPP GDP)	Yes	1.008 MJ per GDP	2	Mean top 5 performers	SE4ALL	Method based on Sachs et al. (2019)
EE2	Share renewable to total final energy consumption (Percent)	Yes	51.4 Percent	46	Other targets	SE4ALL	Sachs et al. (2019)
EE3	Efficiency insustainable transport (Index)	No	5 Index score	0	Other targets	Sum4all	Sum4all
EW1	Water use efficiency (USD per m^3)	Yes	265.7579346 USD per m^3	4	Other targets	FAO	OECD (2019)
EW2	Share freshwater withdrawal to available freshwater resources (Percent)	Yes	25 and 75 Percent	120	Other targets	FAO	FAO 2017

Table 9 Details on the sustainability targets used to benchmark the indicators *(continued)*

Codes	Indicators	Unstat SDG Indicator	Targets	Counties Reaching Targets	Types of Targets	Source of data	Source of targets
EW3	Sustainable fisheries as a proportion of GDP (Percent)	Yes	9.781601 Percent	3	Mean top 5 performers	FAO	Method based on Sachs et al. (2019)
SL1	Soil nutrient budget (Nitrogen kilogram per hectare)	No	5 Kg per hectare	19	Other targets	FAO	FAO
SL2	Share agriculture organic to total agriculture land area (Percent)	No	11.90 Percent	11	Other targets	FAO	OECD 2017b
SL3	Share of ruminant livestock population to agricultural area (Percent)	No	0.028 Livestock units per hectare	2	Mean top 5 performers	FAO	Method based on Sachs et al. (2019)
ME1	Domestic material consumption per unit of GDP, by type of raw material	Yes	0.002952 Kg per GDP	1	Other targets	WESR / Global Material Flows Database.	OECD (2019)
ME2	Total material footprint (MF) per capita population (Tons per capita)	Yes	5 MF tons per capita	2	Other targets	IRP	Stefan Bringezu (2015)
ME3	Share of food loss to production and food waste to food consumption (Percent)	Yes	6.31267 Percent	3	Mean top 5 performers	FAO (food loss) and UNEP (food waste)	Method based on Sachs et al. (2019)
EQ1	PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m^3)	Yes	10 Micrograms per m^3	17	Other targets	Brauer et al. 2016	WHO 2005; OECD (2019)
EQ2	DALY rate due to unsafe water sources (DALY lost per 100,000 persons)	Yes	0 in every 100,000 population	0	SDG Target (implicit)	IHME	OECD (2019)
EQ3	Municipal solid waste (MSW) generation per capita (Tons per year per capita)	Yes	0.001752675 Ton per year per capita	0	Other targets	WB	Sachs et al. (2019)
GE1	Ratio of CO_2 emissions to population, including AFOLU (Tons per capita)	Yes	0.052253 Ton per capita	3	Mean top 5 performers	CAIT	Method based on Sachs et al. (2019)
GE2	Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population (CO_{2eq} tons per capita)	Yes	0.060997 Ton per capita	3	Mean top 5 performers	CAIT	Method based on Sachs et al. (2019)

Table 9 Details on the sustainability targets used to benchmark the indicators *(continued)*

Codes	Indicators	Unstat SDG Indicator	Targets	Counties Reaching Targets	Types of Targets	Source of data	Source of targets
GE3	Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population (CO_{2eq} tons per capita)	Yes	0 Ton per capita	6	Mean top 5 performers	CAIT	Method based on Sachs et al. (2019)
BE1	Average proportion of Key Biodiversity Areas covered by protected areas (Percent)	Yes	100 Percent	0	SDG Target (explicit)	IUCN, UNEPWCMC	Sachs et al. (2019)
BE2	Share forest area to total land area (Percent)	Yes	17 Percent	138	Other targets	FAO	OECD (2019); Sachs et al. (2019)
BE3	Above-ground biomass stock in forest (Tons per hectare)	Yes	428.688 Tons per hectare	2	Mean top 5 performers	FAO	Method based on Sachs et al. (2019)
CV1	Red list index (Index)	Yes	1 Index score	0	Other targets	BirdLife International and IUCN	OECD (2019); Sachs et al. (2019)
CV2	Tourism and recreation in coastal and marine areas (Score)	No	100 Index score	20	Other targets	Ocean Health Index	Sachs et al. (2019)
CV3	Share of terrestrial and marine protected areas to total territorial areas (Percent)	Yes	13.5 Percent for both terrestrial and marine	78	SDG Target (explicit) for marine; Other targets for terrestrial	UNEPWCMC	(Leadly et. al., 2014)
GV1	Ratio of adjusted net savings to GNI, including particulate emission damange (5 yrs moving ave.)	No	33.150529 Percent GNI	2	Mean top 5 performers	WB	Method based on Sachs et al. (2019)
GT1	Share export of environmental goods (OECD and APEC class.) to total export (Percent)	No	16.587856 Percent	1	Mean top 5 performers	UNCOMTRADE	Method based on Sachs et al. (2019)
GJ1	Share of green employment in total manufacturing employment (Percent)	Yes	14.7267 Percent	1	Mean top 5 performers	Moll de Alba and Todorov 2018, 2019	Method based on Sachs et al. (2019)
GN1	7 Years rolling average Patents on environment technologies	No	100 Percent	7	Mean top 5 performers	OECD	Method based on Sachs et al. (2019)
AB1	Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels (Percent)	Yes	100 Percent for both water and sanitation	13	SDG Target (implicit)	WHO/ UNICEF	OECD (2019); Sachs et al. (2019)

Table 9 Details on the sustainability targets used to benchmark the indicators *(continued)*

Codes	Indicators	Unstat SDG Indicator	Targets	Counties Reaching Targets	Types of Targets	Source of data	Source of targets
AB2	Prevalence of undernourishment (Percent)	Yes	0 Percent	48	SDG Target (explicit)	FAO	Normative
AB3	Universal access to sustainable transport (Index)	Yes	100 Index score	0	Other targets	Sum4all	Normative
GB1	Proportion of seats held by women in national parliaments (Percent)	Yes	50 Percent	3	SDG Target (explicit)	IPU	OECD (2019); Sachs et al. (2019)
GB2	Share of adults (15 years and older) with an account at a financial institution or mobile-money-service provider (Percent)	Yes	1 Equality ratio	1	Other targets	WB	Normative
GB3	Getting paid, laws and regulations for equal gender pay (Score)	No	100 Percent	55	Other targets	WB	Normative
SE1	Inequality in income based Palma ratio (Ratio)	No	0.841778 Ratio	2	Mean top 5 performers	WB	Method based on Sachs et al. (2019)
SE2	Population with access to basic services by urban/ rural, i.e. electricity (Ratio)	Yes	1 equality Ratio	113	Other targets	SE4ALL	Normative
SE3	Share of youth (aged 15-24 years) not in education, employment or training (Percent)	Yes	0 Percent	0	SDG Target (implicit)	ILO	OECD (2019)
SP1	Proportion population above statutory pensionable age receiving a pension (Percent)	Yes	100 Percent	51	SDG Target (implicit)	ILO	OECD (2019)

Table 9 Details on the sustainability targets used to benchmark the indicators *(continued)*

Codes	Indicators	Unstat SDG Indicator	Targets	Counties Reaching Targets	Types of Targets	Source of data	Source of targets
SP2	Universal health coverage (UHC) service coverage index (Index)	Yes	100 Index score	0	Other targets	WHO	Normative
SP3	Proportion of urban population living in slums (Percent)	Yes	0 Percent	0	Other targets	UN-Habitat	Normative

[i] Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program

[ii] Alternative target is 58.62368011 percent based on OECD report (2019)

[iii] Alternative targets are 10 percent and 12.5 percent based on OECD (2019) and Sachs et al. (2019), respectively

[iv] OECD (2017) metadata, based on Share of agricultural land area under certified organic farm management

[v] UN Environment: Secretariat of the International Resource Panel (IRP), website:resourcepanel@unep.org

[vi] Institute for Health Metrics and Evaluation (IHME)

[vii] WRI (2015) CAIT country greenhouse gas emissions: sources & methods. CAIT dataset of the World Resources Institute (WRI) is based on various sources including International Energy Agency (IEA), Carbon Dioxide Information Analysis Center (CDIAC) of the U.S. Dept. of Energy), Energy Information Administration (EIA) of the U.S. Dept. of Energy.

[viii] WRI (2015) CAIT country greenhouse gas emissions: sources & methods. CAIT dataset is based on United States Environmental Protection Agency (EPA).

[ix] Alternative targets are 92.69 and 37.73 percent for mountain and terrestrial/freshwater based on OECD (2019)

[x] Based on scores for other OHI indicators

[xi] World Database on Protected Areas (WDPA) where the compilation and management is carried out by United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) in collaboration with governments, non-governmental organizations, academia and industry. The data is available online through the Protected Planet website (protectedplanet.net).

[xii] Average value for 17 percent terrestrial and 10 percent marine

[xiii] World Intellectual Property Organization (WIPO)

[xiv] WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene (washdata.org).

[xv] Alternative targets are 100 percent for electricity and 95 percent for clean fuels based on OECD (2019)

[xvi] International Telecommunication Union (ITU), World Telecommunication/ICT Development Report and database

[xvii] Alternative targets are 40.37400055 percent for total fixed broadband subscriptions per 100 inhabitants and 100 percent for proportion of population covered by a mobile network, by technology, based on OECD (2019)

[xviii] Inter-Parliamentary Union (IPU)

[xix] Refers to the actual indicator and not to the ratio between female and male

[xx] Palma ratio was computed from the income data downloaded from the World Bank

[xxi] Refers to the actual indicator and not to the ratio between urban and rural

[xxii] Alternative target is 8.1 percent based on Sachs et al. (2019)

[xxiii] WHO (2019) The Global Health Observatory, https://www.who.int/data/gho/data/major-themes/universal-health-coverage-major

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7 Application of the Green Growth Index

7.1 Completed projects 2022

7.1.1 Zambia Green Growth Index

Collaborators: GGGI and Ministry of Green Economy and Environment, Zambia

Duration: February-December 2022

Objectives: The creation of a Green Economy and Environment Ministry is a clear demonstration of the political will of the Government of Zambia to transition to a green economy growth model to create a more sustainable and inclusive path to resource use, economic growth, employment creation, and poverty reduction. Climate variability and change are major threats to sustainable development in Zambia. The impact of the COVID-19 pandemic on the economy has also shifted the country's focus toward green economic recovery. The Government of Zambia finalized its 8th 5-Year National Development Plan (8NDP) beginning in 2022. GGGI supports the government through this project to present green growth as an innovative path for economic growth and inclusive and sustainable development by highlighting potential green interventions aligned with 8NDP. The Green Growth Potential Assessment (GGPA) participatory approach and Green Growth Performance Measurement (GGPM) tools were used to develop the Zambia Green Growth Index.

Main Outputs:

- Zambia Green Growth Index report
- Zambia Green Growth Index website (https://zambia-greengrowthindex.gggi.org/)
- Baseline data and information for the development of Zambia's National Green Growth Strategy and Implementation Plan

The highlights of the results are presented in chapter 6.1 of this report.

7.1.2 SDG co-benefits of the Low Emission Development Strategies (LEDS) in Ethiopia and Burkina Faso

Collaborators: CAID Team, Government agencies, and GGGI Ethiopia and Burkina Faso Teams

Duration: July 2021-December 2022

Objectives: The Paris Agreement invites Parties to submit their Long Term–Low Emissions Development Strategy (LT-LEDS) by 2020 towards achieving the ambitious commitment by all countries to limit the global average temperature to below 2°C and pursue efforts to limit the increase to 1.5°C. COVID-19 will significantly slow down the country's double-digit economic growth. Hence, the LEDS will help the country recover from this shock within a short time by creating green jobs and sustaining development while following a long-term low-emission development pathway. Overall, the LEDS will help governments to have a long-term vision and not to be distracted by the impact of COVID-19, but on the contrary, to incorporate issues of resilience, including climate resilience, in its LT-LEDS. The LEDS projects aimed to support the development of a concise and strategic LEDS document through a participatory stakeholders' consultation process describing the pathways to low-carbon and resilient development for different scenarios, including BAU. Among others, recommendations on policy options and an implementation action plan to help realize the mitigation potential were provided. The GGPM Team worked with the CAID Team to assess SDG co-benefits for the business-as-usual (BAU) and low-emission scenarios developed for Ethiopia and Burkina Faso.

Main outputs: The indicators included in the co-benefit assessments in the LEDS include the following:

- SDG 7.3.1 energy intensity level of primary energy supply and SDG 7.2.1 renewable energy share in the total final energy consumption for the energy sector
- SDG 6.4.1 water use efficiency and SDG 6.4.2 level of water stress: freshwater withdrawal as a proportion of available freshwater resources, and SDG 6.3.1 proportion of wastewater safely treated for the water and waste sector
- SDG 12.3.1 food loss and food waste and SDG 15.3.1 nutrient balance per unit area for the agriculture sector
- SDG 15.1.1 forest area as a percent of total land area, SDG 15.2.1 above-ground biomass stock in the forest, and SDG 15.3.1 proportion of (forest) land that is degraded over the total land area for the forest sector.

The LEDS low-emission scenarios include maximum ambition, NDC 2030, and late action for Ethiopia and high ambition, moderate ambition, and late action for Burkina Faso. Although the scenarios have similarities between the two countries, the policy interventions in these scenarios are different. Figure 38 presents selected SDG indicators assessed in the LEDS for Ethiopia and Burkina Faso. In the water sector, water use efficiency across all sectors (SDG 6.4.1) showed an increasing trend in both countries from 2010 to 2020. This progress is expected to continue in the BAU scenario until 2050. Water use efficiency will follow different trends in the two countries. In the case of Ethiopia, the upward trend in the low-emission scenarios will be disrupted in 2030 and will pick up again only in 2040 but will be below the values in the BAU scenarios. From 2030 to 2040, water use efficiency declined for two reasons. First, the expansion of irrigated areas will cause an increase in water withdrawal in the agricultural sector, increasing the share of this sector to total water withdrawal relative to the municipal sector. But the municipal sector has higher water use efficiency than the agriculture sector so this shift will reduce the overall efficiency in the country. Second, the level of irrigation technology (i.e., 4 percent sprinkler, 46 percent drip) and traditional irrigation (50 percent surface) will not be sufficient to increase water use efficiency in the larger area of irrigated land. In the case of Burkina Faso, water use efficiency in the low-emission scenarios will remain lower than the BAU from 2020 to 2050. The main reason for this will be the increase in the agricultural area under irrigation from 72 thousand hectares in BAU to 175 and 233 thousand hectares in late action/moderate ambition and high ambition scenarios, respectively, in 2050. Burkina Faso will thus capitalize on its available water resources to develop the agriculture sector, which accounts for 85 percent of the total water withdrawal in the country. Like in Ethiopia, increasing efficient technology like drip irrigation in the low emission scenarios will not be enough to significantly reduce water

use because, in terms of land area, surface irrigation is more widely applied than drip irrigation.

In the agriculture sector, average food loss and food waste (SDG 15.3.1) will increase in Ethiopia and decrease in Burkina Faso until 2050 in the BAU scenario. In the absence of policy interventions and the face of the growing population and food demand in Ethiopia, food loss and waste will increase under the BAU scenario. The maximum ambition scenario will also achieve the most significant progress in reducing food loss and waste, enabling the decreasing trend from 2010-2017 to continue until 2050. Like in Ethiopia, the high ambition scenario will also offer the best opportunity to improve performance in reducing food loss and waste and thus improve performance in SDG 15.3.1 in Burkina Faso. The average food loss and waste will be 2.5 percent in the high ambition scenario compared to 13.3 percent in the BAU scenario in 2050. In contrast to the high ambition scenarios, there will be less reduction in average food loss and waste in the late action scenario due to delay in implementing policy interventions and in moderate ambition due to fewer policy efforts. Finally, in the forest sector, the increase in forest land directly impacts performance in above-ground biomass (SDG 15.2.1), which measures the gains in forest growth through biomass stock and reduction through wood removals, fire, wind, pest, diseases, and natural losses. For both countries, the maximum ambition scenario will offer the best opportunity to achieve significant progress in improving above-ground biomass. In the case of Burkina Faso, policy interventions in the moderate ambition scenario will also contribute to the same level of above-ground biomass as in the high ambition scenario in 2050. The low-emission scenarios will reverse the declining trend in above-ground biomass in the BAU scenario. Higher levels of above-ground biomass per hectare will lead to higher amounts of CO_2 captured by the forests, which will enhance the mitigation potential in the forest sector.

Figure 38 SDG Co-benefits assessment in the LEDS for (a) Ethiopia and (b) Burkina Faso

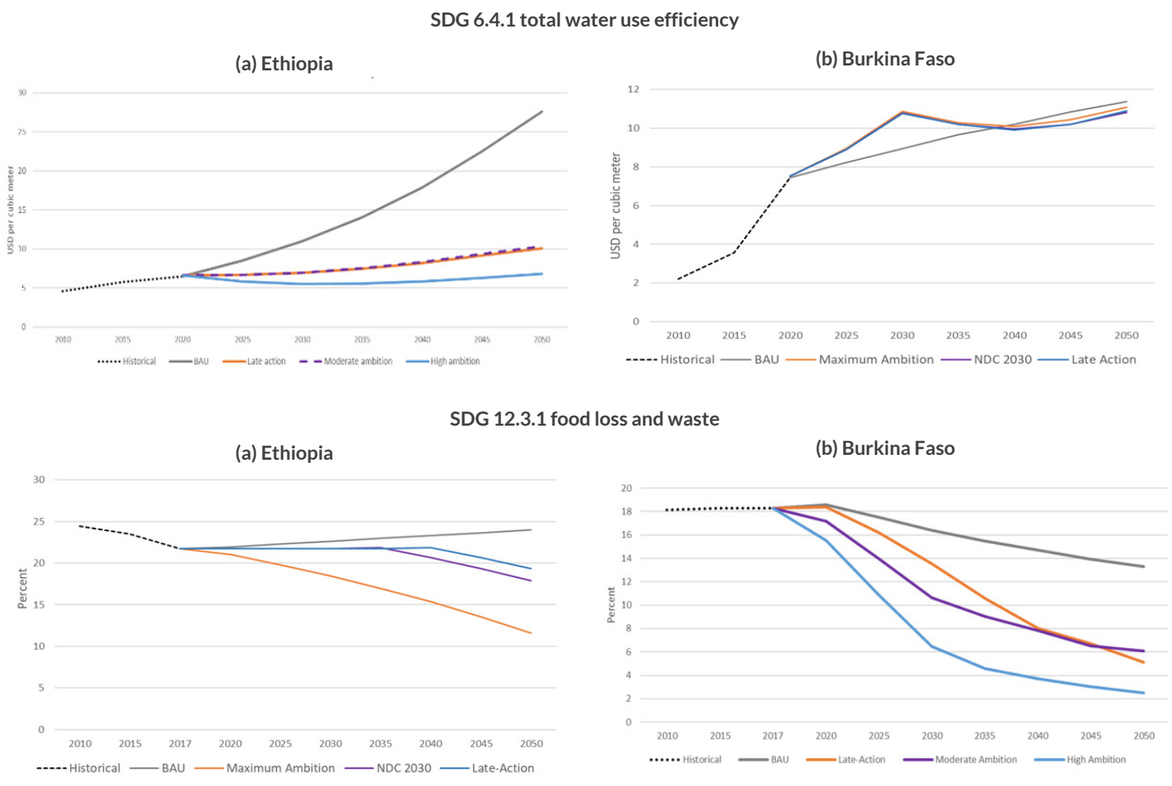
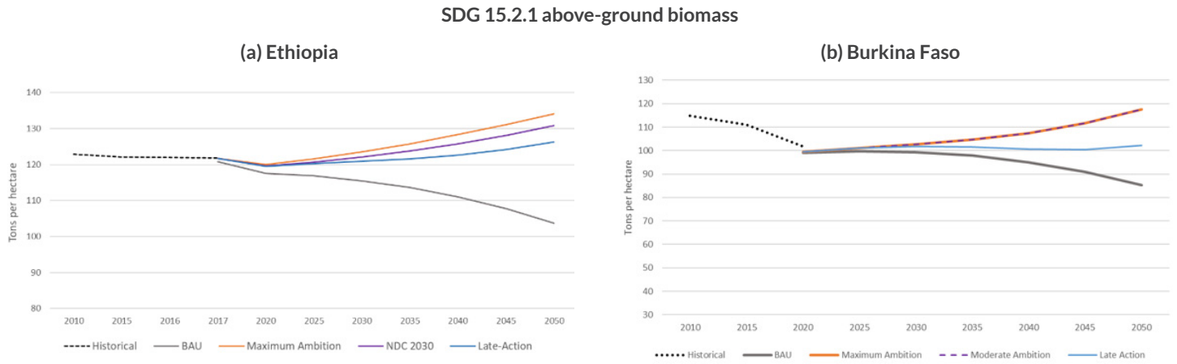


Figure 38 SDG Co-benefits assessment in the LEDS for (a) Ethiopia and (b) Burkina Faso *(continued)*



7.1.3 SDG co-benefits of the Green Emerging Senegal Plan (PSE)

Collaborators: GGPM Team, Bureau Opérationnel de Suivi du Plan Sénégal Émergent (BOS), and GGGI Senegal Team

Duration: January 2021-June 2022

Objectives: Senegal's short-term economic growth prospects have been strongly affected by the COVID-19 pandemic. To account for the impacts of the pandemic, the Government of Senegal updated in September 2020 the second Priority Action Plan (PAP2, 2019-2023) of the second phase of the PSE, the country's main long-term development policy. Although the PSE references improved natural resources management as an objective, the Adjusted and Accelerated PAP (PAP2a), now Senegal's recovery plan, does not refer to the conservation of nature and biodiversity as guiding principles for the post-COVID-19 era. The Green PSE is expected to provide practical responses to the dynamics of environmental degradation and state efforts in achieving the SDGs. The project aims to help catalyze investment in nature for a green recovery and allow Senegal to progress toward its environmental commitments. It will position the integration of nature conservation and restoration at the heart of Senegal's main long-term development policy and as a tool for Senegal's recovery from the COVID-19 pandemic. Moreover, it will support the Government of Senegal in the conceptualization, operationalization, and financing of the Green PSE, allowing the country to progress towards its environmental targets of restoring 2 million hectares under the Bonn Challenge and other international environmental conventions. Expected impacts include creating political momentum and catalyzing investment for the benefit of nature conservation and restoration projects, helping identify and prepare priority projects for Government. As part of the project, GGPM Team is applying the Green Growth Simulation Tool (GGSim) to assess the co-benefits from implementing the PSE with a particular focus on the AFOLU sector and co-benefits for energy, water, and waste sectors.

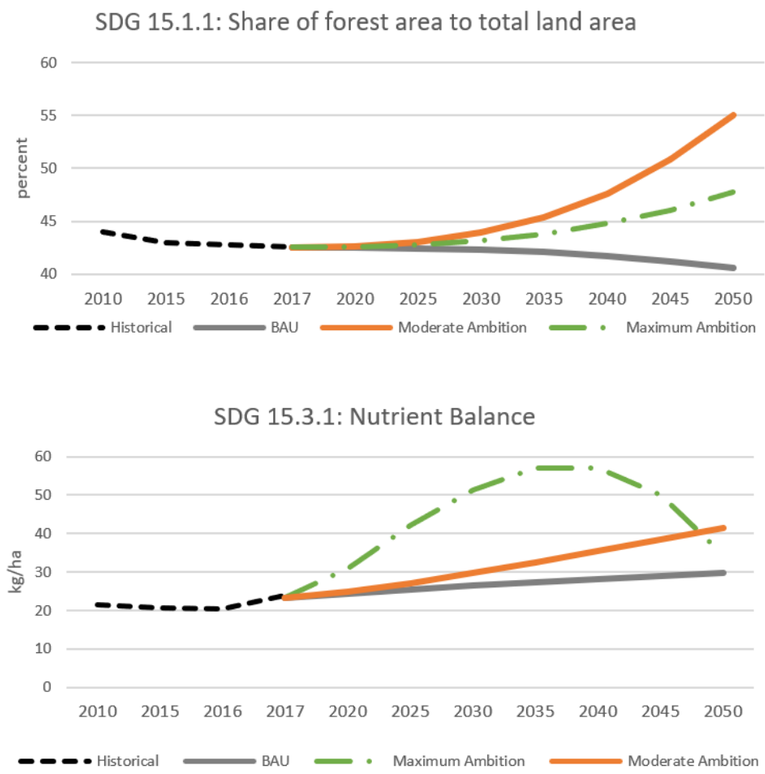
Main outputs: SDG indicators in the AFOLU sector including the following:

- SDG 15.1.1 share of forest area to total land area
- SDG 15.2.1 above-ground biomass
- SDG 12.3.1 food waste and food losses
- Nutrient balance per hectare (linked with SDG 15.3.1)
- Ratio of non-CO_2 emissions in agriculture to population (linked with SDG 13.3.2)

Figure 39 presents selected results for nutrient balance per hectare (linked with SDG 15.3.1) and the ratio of non-CO_2 emissions in agriculture to population (linked with SDG 13.3.2). SDG 15.3.1, the proportion of land that is degraded, is directly linked with nutrient balance per hectare, which measures the total nitrogen left on cropland after crop removals and fertilizer applications. While inputs ensure productivity, their excessive is harmful to the environment due to ammonia and GHG emissions. The nutrient balance will increase sharply in the maximum ambition scenario compared to BAU, but around 2035 the nutrient balance will decrease again. The moderate ambition scenario shows a continuous increase, which is higher than the BAU scenario. The increase in the nutrient balance can be attributed to policies regarding manure. Less manure will be left on pasture lands and applied to agricultural cropland. Additional policies on synthetic fertilizer application could decrease the nutrient flow again.

Agriculture is an important contributor to total greenhouse gas emissions. The ratio of non-CO_2 emissions in agriculture to population is linked to SDG 13.3.2. The total non-CO_2 emissions in the GGSim model consist of enteric fermentation, manure management, manure applied to soils, manure left on pasture lands, and emissions from synthetic fertilizer, rice cultivation, crop residues, and crop burning. There will be an increase in the performance in moderate and maximum ambition scenarios compared to BAU. The policy on substituting livestock for poultry is one of the main contributors to this increase in performance. Also, different manure policies and indirect food loss- and waste prevention will help to reduce agricultural emissions.

Figure 39 SDG Co-benefits assessment for Senegal's Green PSE



7.1.4 Complementary approach – GGSim and network science tools

Collaborators: GGPM Team and Abonyi Lab, University of Pannonia, Veszprém, Hungary

Duration: April - December 2022

Objectives: The Global Green Growth Institute (GGGI) develops and applies robust models to support its Member Countries' decision-making and prudent planning in the context of carbon neutrality. In the National Clean Development Strategy (NCDS) that informs about Hungary's national climate neutrality commitment, GGGI has delivered various low-carbon scenarios, such as the late action (LA) and early action (EA) climate neutrality scenarios using the Green Economy Model. Based on these scenarios, significant climate action positively impacts the GDP and green jobs. The analysis was extended to assess the co-benefits of selected Sustainable Development Goals (SDG) indicators by using the Green Growth Index Simulation Tool (GGSim) (Figure 1), focusing on transport-related policy measures under Hungary's NCDS. To validate and complement the system dynamics models in the GGSim tool, GGGI is collaborating with Abonyi Lab, University of Pannonia, Veszprém to develop models to assess causality and correlation of SDG indicators and SDG-related variables using network analysis.

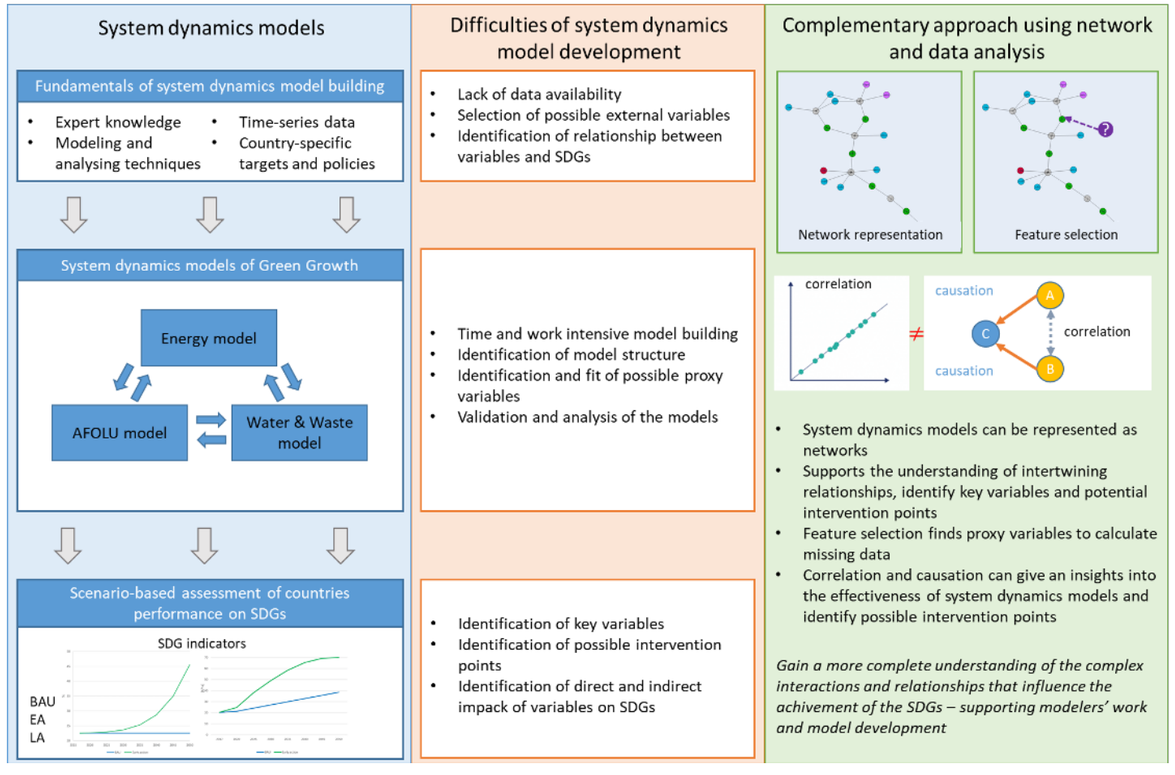
Main outputs:

- Establish collaboration between the GGPM and Abonyi Lab
- Network science tools to complement the GGSim's system dynamics models
- Webinar on December 8, 2022, informing on the highlights of the climate neutrality scenarios in Hungary's National Clean Development Strategy (NCDS) using the Green Economy Model, results of co-benefits on selected SDG indicators using Green Growth Simulation Tool, and the potential of using network analysis to assess SDG co-benefits where lack of data constraints the use of system dynamics models

The complex relationships between policies and social, economic, and environmental issues require models and analyses considering each dimension and predicting countries' sustainable development performance. System dynamics models can simulate complex systems and support understanding the potential impacts of changes in the model , such as policy interventions with different scenarios (e.g., BAU- business as usual, EA- early action, LA- late action). In addition to simulating the impacts of various policies, system dynamics models can also be used to identify key drivers and constraints that affect the achievement of the SDGs. By identifying these key drivers and constraints, system dynamics models can help policymakers, and other stakeholders prioritize actions and allocate resources to maximize the chances of achieving the SDGs. However, developing system dynamics models requires broad expertise in modeling techniques and validation methods and highly relies on data and information, as well as understanding the relationships between variables and how they may change over time. A common challenge in developing system dynamics models is model identification which refers to accurately representing the complex system in a model. Model identification problems can arise due to the complexity of the modeled system, data and information limitations, and modeling techniques. Furthermore, the country-specific nature of developing system dynamics models for assessing countries' performance on SDG indicators arises from the fact that each country has a unique development phase, distinct policies, and specific targets to reach, as well as varying databases with data availability. These challenges can make it difficult to develop accurate and reliable system dynamics models and can limit their usefulness in understanding the behavior of complex systems. We must pay attention to the life cycle of developing systems dynamics models and the difficulties arising in each stage.

Therefore, a complementary approach has been developed to support system dynamics model-based assessment of SDG co-benefits analysis, validation, and identification. The network and data analysis-based methods were identified to support the GGPM's work and obtain more accurate, automatic, and efficient model development procedures during the whole life cycle of system dynamics models (Figure 40). The methods are based on correlation analysis, causality analysis, feature selection (machine learning), and network science tools. System dynamics models can be represented as networks, and sustainable development-related problems can be evaluated using network science tools. Network analysis can help understand the complex networks of stakeholders, institutions, and processes that influence sustainability outcomes. Furthermore, it can be used to understand the relationships between different goals and targets within the SDGs. For example, network tools can help identify the interdependencies between different goals and understand how progress in one area can impact others. The important variables of the model can be identified, which can serve as possible intervention points.

Figure 40 The framework of applying network and data analysis to complement GGSim's system dynamics models



Data-based methods such as correlation and causality can support model development. Correlation analysis is a statistical technique used to assess the relationship between two or more variables. In contrast, causality analysis is a method for determining whether one variable cause another to change. Together, these techniques are used to help data scientists understand complex data sets and make predictions about future events.[92] Correlation and causality analysis can be used to assess the effectiveness of system dynamics models in achieving the SDGs in several ways. Using correlation analysis, it is possible to identify the relationships between different variables in a system and determine how they relate to each other. Causality analysis can be used to understand the underlying mechanisms that drive the relationships between different variables in a system. This can help identify the key causal factors that need to be addressed to achieve the SDGs and provide insights into the potential impact of different interventions on the system.[93] For example, suppose a system dynamics model is being used to assess a particular policy's impact on achieving a certain SDG. In that case, causality analysis can fundamentally identify the key causal mechanisms that drive the relationship between the policy and the goal. It can also provide insights into how the policy is likely to affect the achievement of the goal. Overall, correlation and causality analysis make it possible to understand better a system's dynamics and the underlying relationships between different variables. This can provide valuable insights into the effectiveness of system dynamics models in achieving the SDGs and help identify the key factors that need to be addressed to achieve those goals and support the development of evidence-based policies and interventions.

Another common data science (machine learning) tool is feature selection, which is used to identify the most relevant and informative variables (also known as "features") in a data set, as well as allows to identify external variables that fit the model.[94] By selecting the most informative variables, feature selection can help improve the accuracy and relevance of predictive models and support decision-making in assessing progress toward Sustainable Development Goals (SDGs) and other sustainability outcomes. Additionally, feature selection can be used to evaluate the relevance of existing and external variables concerning a given predictive model. It can help data scientists to identify the most informative and relevant variables for model training.

By combining network and data analysis with system dynamics modeling, stakeholders can understand the complex interactions and relationships that influence the achievement of the SDGs. This can inform and improve efforts to achieve the goals.

7.2 Ongoing projects 2022-2023

7.2.1 Lao PDR Green Growth Index

Collaborators: GGPM Team, Ministry of Planning and Investment (MPI), and GGGI Lao PDR Country Team

Duration: April 2022 – March 2023

Objectives: Under the National Green Growth Strategy (NGGS), a monitoring and evaluation framework included an early attempt at developing an index through which the Ministry of Planning and Investment (MPI) could monitor and track green investment in Lao PDR. However, this needed to be operationalized. As the Government of Lao PDR has scaled up its commitment to green growth over the past five years, an improved operational index is needed. Such an index will allow MPI to a) monitor the implementation of the National Green Growth Strategy, at the same time, be used as an essential tool in mainstreaming green growth into national, sub-national, and sectoral strategies and development plans in the more comprehensive manner, b) evaluate the implementation towards the outcomes, targets, and indicators set in the National Green Growth Strategy, and c) review and revise the national Green Growth Index for future update of the National Green Growth Strategy. GGGI has been leading global efforts at building and applying the Green Growth Index, and these experiences can be channeled into Lao PDR. For this, a new index needs to be built in collaboration with MPI, and the capacity of government officials to use and deploy this index needs to be built. Notably, MPI is creating a new internal policy think tank within MPI called the Development Research Institute (DRI), which will manage the Green Growth Index.

Main outputs:

- Government capacity to manage and deploy a National Green Growth Index is built through developing and delivering a national training program, which will be implemented through a series of workshops.
- A new National Green Growth Index is designed and deployed. A technical report will be developed with recommendations for MPI for improving and revising the green growth indicators and index under the NGGS.

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7.2.2 Qatar green growth indicators

Collaborators: GGPM Team, Qatar Ministry of Environment and Climate Change (MOECC), and GGGI Qatar Country Team

Duration: June 2022 – March 2023

Objectives: GGGI is cooperating with the Qatar Ministry of Environment and Climate Change (MOECC) in a multi-year cooperation program that consists of five work streams, including (1) Qatar Green Growth Pathway; (2) National Adaptation Planning; (3) Measurement, Reporting, and Verification (MRV) Development; (4) Circular Economy Promotion; and (5) Capacity Building and International Cooperation. To support the first work stream on the green growth pathway, a set of green growth indicators was identified that could be used to track key progress in achieving goals of the Qatar National Vision 2030, Second National Development Strategy, Qatar National Development Framework 2032, Qatar National Climate Change Action Plan, Qatar National Environment and Climate Change Strategy, revised Nationally Determined Contribution (NDC), and Qatar National Biodiversity Strategy and Action Plan 2015-2025 while meeting the SDGs. The project will produce a scoping report that proposes the green growth indicators for Qatar and discusses the rationale for selecting them. It assesses the social, economic, and environmental issues that set the scenes for the policy goals and development priorities and the challenges and opportunities for green growth transition. The knowledge gained from the assessment supported the checklist approach, which was applied to guide the systematic selection of the green growth indicators.

Main outputs:

- Scoping report proposing the green growth indicators for Qatar and discussing the rationale for selecting them
- Complete database of draft green growth indicators for Qatar with links for the online sources of data
- Slides on the green growth indicators for two webinars

7.2.3 Azerbaijan and Central Asian countries' inclusive and green growth transition

Collaborators: GGPM Team, Asian Development Bank (ADB)

Duration: October - January 2023

Objectives: The fall of the Soviet Union in the early 1990s and the subsequent rise of independent states in Central Asia heralded a new era of growth for the region. The region's first major oil contracts for exploration and production started pouring in the 1990s and transformed several Central Asian economies into net exporters of fossil fuels and set the next stage of the region's country's rapid economic development. Azerbaijan, for example, transformed itself into an upper-middle-income country by 2009. By early 2015 poverty rate was down to five percent before going up again to 6.2 percent in 2020 at the height of the COVID-19 pandemic. Falling oil prices in 2014/2015 exposed the region's macroeconomic vulnerability and economic dependence on the volatile global price of hydrocarbons. Across the region, governments recognize the urgent need to reduce fiscal dependency on oil revenues and diversify the economy by finding new drivers of non-oil growth to achieve macroeconomic stability and more sustainable development. A central question of interest is to take stock of the ongoing efforts towards green growth and the opportunities, challenges, and options for Central Asian states as they move towards a net zero economy. While the example provided above is for Azerbaijan, the report's focus could be other Central Asian economies compared to neighboring countries in the region.

Main outputs:

- A paper overview of ongoing efforts toward low-carbon transition and opportunities, challenges, and policy options for the country as it goes along this path.
- Virtual PowerPoint Presentation of findings to ADB or governments, including finalization of the report by incorporating comments and inputs from ADB or government.

7.3 Upcoming projects 2023

7.3.1 Uzbekistan scoping for Strategic Environmental Assessment (SEA)

Collaborators: GGPM Team, Agence Française de Développement (AFD), State Committee on Ecology and Environmental Protection (SCEEP), and GGGI Uzbekistan Country Team

Duration: January - December 2023

Objectives: Uzbekistan does not use strategic environmental assessments (SEAs). It has yet to formalize environmental screening for its proposed policy, plans, and programs. The introduction of SEA could help Uzbekistan mainstream its green economy policy and environmental objectives. It is particularly relevant as the country is embarking on its new Green Growth Strategic Framework (GGSF). The Project aims to support the GoU in piloting the first SEA to generalize the practice later. To do so, the technical assistance will seek to (a) support the GoU in identifying a relevant strategy/ investment plan at the right stage of preparation to be the object of a SEA; (b) mainstream capacities on SEA among all parties of the GoU involved; and (c) support the authorities in taking stock of this first experience. GGGI will mobilize and provide SCEEP with technical support, policy advice, and facilitation for stakeholder consultations (notably workshops) to carry out these objectives.

Main outputs:

- Phase 1 – Preparation and screening: List of consultations and objectives; Workshop and minutes; Approved selected plan; and List of collected documents on selected program
- Phase 2 – Scoping study: Determine the content of the SEA and the criteria used for the assessment
- Phase 4 – Stocktaking & learning: General guidelines; Quality control checklist; and Workshop and minutes

7.3.2 Pakistan Green Growth Index

C**ollaborators:** GGPM Team and GGGI Asia Regional Program Team

Duration: February - December 2023

Objectives: Pakistan is a party to the Paris Agreement, and the Government has expressed its ambition toward a climate-resilient and low-carbon economy. Pakistan became GGGI's 41st Member on 12 November 2021. Initial discussions were held with the Embassy of Pakistan in Korea in November and December 2021. Further talks still need to be conducted with the Government to identify how GGGI could effectively support the country's transition to a low-carbon and climate-resilient economy. This project aims to provide evidence-based support to the Government of Pakistan in establishing the GGGI Pakistan Country Program. This will be done through the Green Growth Potential Assessment (GGPA), which would identify the country's green growth priorities and guide GGGI and the Government of Pakistan in designing the GGGI Pakistan Country Program. The results of the GGPM will inform the preparation of project concept notes for green financing as well as the GCF Readiness Proposal. The GGPM recommendations will inform the preparation of the Pakistan Country Planning Framework.

Main outputs:

- Preliminary Assessment: This activity includes quantitative research based on at least 170 indicators to assess green growth in various areas and qualitative analysis of each area. The deliverable will be green growth priorities based on available data.
- Stakeholder consultation: This activity uses the Delphi survey to identify and prioritize areas and sectors. This activity will be participated by government ministries, the private sector, academia, and civil society. The deliverable will be green growth priorities based on consensus.
- Final analysis: This activity will consult with experts to look deeper into the causes and interventions for identified priorities and prepare the final report that comprehensively analyzes priorities, causes, and recommendations. The deliverable will be recommendations on green growth interventions.

8 Statistical Tables

Table 10 Green growth dimension sub-indices and Green Growth Index and ranks for the African countries

African Countries/ Territories	Africa Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Gabon	Middle	74.14	73.46	21.55	60.79	61.56	High	1
Tanzania	Eastern	63.88	66.78	52.66	51.27	59.44	Moderate	2
Botswana	Southern	69.72	72.68	17.34	57.25	57.90	Moderate	3
Morocco	Northern	46.59	74.02	21.24	71.83	56.35	Moderate	4
Togo	Western	57.19	66.59	40.15	52.15	56.21	Moderate	5
Cabo Verde	Western	60.94	63.14	16.25	67.74	55.71	Moderate	6
Namibia	Southern	57.99	67.62	18.72	62.72	55.52	Moderate	7
Cote d'Ivoire	Western	69.90	70.85	14.86	50.55	54.54	Moderate	8
Congo Republic	Middle	66.02	72.23	22.33	44.05	53.90	Moderate	9
Mauritius	Eastern	58.41	52.46	15.14	77.85	53.86	Moderate	10
Senegal	Western	55.89	65.29	21.31	55.94	53.19	Moderate	11
Uganda	Eastern	63.50	70.79	20.06	44.09	52.40	Moderate	12
Ghana	Western	59.86	66.73	12.95	52.91	51.14	Moderate	13
Kenya	Eastern	57.39	61.28	18.49	53.25	51.10	Moderate	14
Ethiopia	Eastern	58.58	68.22	24.58	42.26	50.97	Moderate	15
South Africa	Southern	38.59	64.87	23.31	67.47	50.70	Moderate	16
Rwanda	Eastern	66.06	67.69	10.35	48.97	50.54	Moderate	17
Zambia	Eastern	60.66	70.00	36.17	33.64	50.38	Moderate	18
Mali	Western	64.53	62.19	17.53	44.55	50.13	Moderate	19
Zimbabwe	Eastern	52.77	78.09	11.93	48.79	49.96	Moderate	20
Tunisia	Northern	29.71	60.52	34.29	76.80	49.61	Moderate	21
Burkina Faso	Western	65.18	72.28	18.26	35.58	49.37	Moderate	22
Benin	Western	60.40	65.53	20.42	40.38	49.21	Moderate	23
Cameroon	Middle	60.43	57.10	12.42	52.69	48.68	Moderate	24
Mozambique	Eastern	53.00	68.80	15.40	36.92	45.45	Moderate	25
Burundi	Eastern	62.86	64.51	7.95	40.66	45.20	Moderate	26
Lesotho	Southern	59.36	41.34	14.22	54.84	45.08	Moderate	27
Sierra Leone	Western	65.95	63.19	8.81	37.63	44.99	Moderate	28
Gambia	Western	61.02	64.65	4.28	49.34	44.65	Moderate	29
Angola	Middle	66.58	57.42	10.32	37.41	44.46	Moderate	30
Algeria	Northern	27.57	53.01	18.08	73.24	43.11	Moderate	31
Nigeria	Western	57.39	60.00	5.70	44.83	42.87	Moderate	32
Eswatini	Southern	28.77	60.14	16.52	61.46	42.64	Moderate	33
Mauritania	Western	64.74	37.28	16.91	39.55	41.38	Moderate	34
Madagascar	Eastern	58.01	56.70	18.48	27.03	40.86	Moderate	35
Egypt	Northern	22.79	54.98	23.04	64.12	40.53	Moderate	36
Niger	Western	60.98	51.34	7.08	27.19	36.65	Low	37
Sudan	Northern	26.51	50.68	14.16	43.37	35.05	Low	38
Libya	Northern	22.69	28.21	18.86	48.08	29.79	Low	39
Central African Republic	Middle	65.40	56.97		17.99			

Table 10 Green growth dimension sub-indices and Green Growth Index and ranks for the Africa countries *(continued)*

African Countries/ Territories	Africa Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Chad	Middle	65.20	54.18		21.37			
Comoros	Eastern	70.48	59.22		45.83			
Djibouti	Eastern	57.99	38.61		45.30			
DR Congo	Middle	59.23	69.37		29.26			
Guinea	Western	57.14	69.84		40.54			
Guinea-Bissau	Western	56.24	62.93		20.74			
Liberia	Western	54.23	60.21		35.31			
Malawi	Eastern	64.87	74.43		42.60			
Sao Tome and Principe	Middle	70.46	72.01		44.76			
Seychelles	Eastern	51.57	72.91		74.84			
Somalia	Eastern	50.92	49.11		31.28			
South Sudan	Eastern	76.62	62.67		26.97			
Eritrea	Eastern	64.05	46.55	8.58				
Equatorial Guinea	Middle	64.48	57.24					

Table 11 Green growth dimension sub-indices and Green Growth Index and ranks for the American countries

American Countries/ Territories	America Subregion	Dimensions		Green Growth Index				
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Paraguay	Southern	63.81	70.90	29.12	69.51	62.47	High	1
Brazil	Southern	66.51	71.96	20.13	72.55	62.03	High	2
United States	Northern	55.48	61.97	34.16	83.94	61.87	High	3
Mexico	Central	48.89	73.18	31.68	79.10	61.04	High	4
Dominican Republic	Caribbean	60.24	75.12	21.87	68.40	60.42	High	5
Canada	Northern	54.51	57.97	29.39	86.26	59.91	Moderate	6
Costa Rica	Central	55.65	71.28	20.08	72.22	58.53	Moderate	7
Peru	Southern	56.89	72.53	19.88	69.58	58.51	Moderate	8
Panama	Central	60.85	70.04	19.17	67.05	58.22	Moderate	9
Bolivia	Southern	53.10	75.16	15.98	75.73	58.14	Moderate	10
Chile	Southern	50.41	73.35	18.13	76.91	57.81	Moderate	11
El Salvador	Central	54.73	64.20	26.35	70.24	57.51	Moderate	12
Uruguay	Southern	66.79	58.55	11.98	80.79	57.25	Moderate	13
Ecuador	Southern	54.47	71.47	16.43	72.07	57.01	Moderate	14
Nicaragua	Central	57.84	73.47	22.20	58.67	56.71	Moderate	15
Colombia	Southern	57.87	72.00	16.33	65.17	56.42	Moderate	16
Bahamas	Caribbean	56.48	66.57	23.78	60.61	55.58	Moderate	17
Honduras	Central	57.82	72.51	21.57	55.95	55.52	Moderate	18
Jamaica	Caribbean	51.93	66.31	27.87	62.26	55.45	Moderate	19
Argentina	Southern	56.67	60.33	13.55	76.17	54.69	Moderate	20
Guatemala	Central	58.95	66.27	9.20	56.29	50.01	Moderate	21
Trinidad and Tobago	Caribbean	31.17	51.44	23.15	76.38	46.01	Moderate	22
Barbados	Caribbean	37.61	58.98		62.07			
Belize	Central	57.50	77.94		65.18			
Grenada	Caribbean	65.72	61.23		68.01			
Guyana	Southern	57.46	71.30		74.65			
Haiti	Caribbean	56.67	52.66		33.35			
St. Lucia	Caribbean	70.49	71.81		60.21			
St. Vincent and the Grenadines	Caribbean	68.35	71.38		53.44			
Suriname	Southern	53.58	72.24		72.49			
Venezuela	Southern	46.10	71.19		64.91			
Cuba	Caribbean	62.63	65.52	2.96				
Antigua and Barbuda	Caribbean	64.34	62.77					

Table 11 Green growth dimension sub-indices and Green Growth Index and ranks for the American countries *(continued)*

American Countries/ Territories	America Subregion	Dimensions		Green Growth Index				
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Bermuda	Northern	61.37	56.18					
Dominica	Caribbean	56.01	65.08					
Puerto Rico	Caribbean	64.27	48.71					
St. Kitts and Nevis	Caribbean	55.25	67.44					
Greenland	Northern		41.49					
United States Virgin Islands	Caribbean		48.95					

Table 12 Green growth dimension sub-indices and Green Growth Index and ranks for the Asian countries

Asian Countries/ Territories	Asia Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Japan	Eastern	60.68	71.04	32.41	80.48	65.03	High	1
Thailand	South-eastern	57.00	73.71	30.01	72.40	62.04	High	2
China	Eastern	55.71	63.81	28.85	76.56	59.77	Moderate	3
Philippines	South-eastern	57.82	74.42	26.75	64.57	59.69	Moderate	4
Georgia	Western	53.00	72.71	23.87	74.27	59.54	Moderate	5
Cyprus	Western	56.26	69.17	17.80	80.24	59.35	Moderate	6
Nepal	Southern	63.35	72.43	15.65	67.70	58.50	Moderate	7
Bhutan	Southern	58.73	79.05	22.11	57.32	57.81	Moderate	8
Singapore	South-eastern	50.47	58.88	31.03	77.99	57.37	Moderate	9
Indonesia	South-eastern	55.74	65.00	25.50	68.26	57.36	Moderate	10
Laos	South-eastern	64.92	75.88	13.53	60.90	57.05	Moderate	11
Kyrgyz Republic	Central	50.69	63.35	29.62	71.38	56.91	Moderate	12
Vietnam	South-eastern	54.34	62.20	21.32	72.44	56.17	Moderate	13
South Korea	Eastern	38.40	57.80	41.13	80.83	54.65	Moderate	14
Armenia	Western	41.73	70.24	21.26	76.11	54.61	Moderate	15
Malaysia	South-eastern	50.42	68.38	20.09	64.94	54.36	Moderate	16
Cambodia	South-eastern	57.92	78.50	10.41	59.05	53.75	Moderate	17
Brunei Darussalam	South-eastern	42.67	59.29	28.20	70.87	52.61	Moderate	18
Israel	Western	48.14	47.08	20.94	81.62	51.55	Moderate	19
Kazakhstan	Central	51.21	47.73	17.60	78.30	51.19	Moderate	20
Azerbaijan	Western	43.97	64.89	19.84	59.54	49.98	Moderate	21
Myanmar	South-eastern	60.37	60.82	9.96	55.04	49.15	Moderate	22
Mongolia	Eastern	44.51	58.70	11.36	72.36	48.81	Moderate	23
Tajikistan	Central	36.05	61.23	13.55	68.92	46.54	Moderate	24
Sri Lanka	Southern	36.58	64.32	18.75	57.61	46.44	Moderate	25
India	Southern	39.42	53.61	26.76	56.72	46.38	Moderate	26
Bangladesh	Southern	54.75	55.63	8.86	54.17	45.71	Moderate	27
Maldives	Southern	58.00	52.09	4.01	69.52	45.40	Moderate	28
Lebanon	Western	44.94	58.79	7.87	60.31	44.70	Moderate	29
United Arab Emirates	Western	36.63	49.59	17.42	64.19	44.07	Moderate	30
Jordan	Western	34.08	47.29	23.56	61.06	43.16	Moderate	31
Qatar	Western	47.31	33.69	14.50	54.62	39.64	Low	32
Oman	Western	32.66	41.56	21.64	52.14	38.77	Low	33
Saudi Arabia	Western	30.63	34.93	24.54	60.83	38.28	Low	34
Iran	Southern	21.51	57.30	16.50	60.20	38.27	Low	35
Uzbekistan	Central	18.63	55.40	14.99	66.26	36.99	Low	36
Bahrain	Western	35.90	23.84	23.96	59.76	35.53	Low	37
Pakistan	Southern	25.59	52.58	14.11	44.65	35.37	Low	38

Table 12 Green growth dimension sub-indices and Green Growth Index and ranks for the Asian countries *(continued)*

Asian Countries/ Territories	Asia Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Afghanistan	Southern	45.84	44.70	7.28	36.29	35.28	Low	39
Kuwait	Western	34.57	35.49	13.95	48.76	35.28	Low	40
Iraq	Western	19.92	36.78	11.74	60.75	31.73	Low	41
Yemen	Western	22.71	38.51	24.97	26.66	28.19	Low	42
Syria	Western	10.09	40.23	28.48	41.30	25.87	Low	43
Hong Kong	Eastern	57.41		16.19	93.68			
Timor-Leste	South-eastern	65.57	63.70		62.27			
Turkmenistan	Central	16.55	45.20		71.73			
Palestine	Western	51.35	42.97	29.75				
North Korea	Eastern	69.19	59.01					
Turkey	Western		40.83	25.38				
Macau	Eastern			2.09				

Table 13 Green growth dimension sub-indices and Green Growth Index and ranks for the European countries

European Countries/ Territories	Europe Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Austria	Western	78.97	80.28	38.99	93.45	77.78	High	1
Sweden	Northern	77.30	77.99	37.56	94.71	76.64	High	2
Denmark	Northern	77.69	71.56	50.53	90.80	76.08	High	3
Switzerland	Western	80.89	78.17	31.31	92.42	75.78	High	4
Czech Republic	Eastern	74.56	81.67	40.09	85.85	75.13	High	5
Germany	Western	64.95	82.65	46.76	92.04	75.01	High	6
Slovakia	Eastern	73.67	84.30	38.30	81.43	74.04	High	7
Finland	Northern	69.43	73.06	37.00	90.55	71.69	High	8
United Kingdom	Northern	66.31	79.07	32.84	90.95	71.64	High	9
France	Western	64.98	78.51	31.28	91.91	70.93	High	10
Italy	Southern	65.86	80.39	32.61	87.15	70.89	High	11
Hungary	Eastern	65.74	81.18	32.67	81.87	69.75	High	12
Portugal	Southern	64.81	78.66	28.06	89.27	69.54	High	13
Latvia	Northern	71.75	76.38	24.07	84.55	68.85	High	14
Lithuania	Northern	68.52	73.33	30.91	83.68	68.57	High	15
Spain	Southern	60.83	75.99	29.51	91.29	68.33	High	16
Estonia	Northern	62.91	74.24	32.90	86.92	68.27	High	17
Belarus	Eastern	60.60	72.95	38.07	86.75	68.10	High	18
Croatia	Southern	63.99	83.74	25.48	81.66	68.07	High	19
Romania	Eastern	64.88	77.32	32.72	80.02	68.01	High	20
Luxembourg	Western	66.38	74.78	25.13	88.23	67.99	High	21
Slovenia	Southern	60.05	78.97	31.21	84.64	67.68	High	22
Norway	Northern	64.36	68.85	28.21	92.60	67.45	High	23
Poland	Eastern	57.30	76.02	32.66	86.27	66.66	High	24
Netherlands	Western	56.52	71.23	30.20	92.88	66.04	High	25
Macedonia	Southern	60.03	74.85	39.59	71.85	64.93	High	26
Greece	Southern	61.25	77.01	19.32	84.85	64.46	High	27
Belgium	Western	50.36	77.07	27.96	90.54	64.33	High	28
Bulgaria	Eastern	50.84	78.31	32.07	82.58	63.93	High	29
Serbia	Southern	60.72	70.27	31.02	76.16	63.49	High	30
Bosnia and Herzegovina	Southern	64.64	62.83	27.76	70.83	60.53	High	31
Albania	Southern	64.72	82.38	9.63	76.54	60.48	High	32
Ireland	Northern	65.43	59.22	15.03	88.17	59.95	Moderate	33
Moldova	Eastern	59.58	67.36	20.60	74.83	59.52	Moderate	34

Table 13 Green growth dimension sub-indices and Green Growth Index and ranks for the European countries *(continued)*

European Countries/ Territories	Europe Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
Montenegro	Southern	58.91	64.34	21.29	72.47	58.14	Moderate	35
Ukraine	Eastern	56.03	65.40	20.75	72.06	57.31	Moderate	36
Russia	Eastern	53.86	55.93	19.93	77.26	54.96	Moderate	37
Iceland	Northern	56.00	44.60	13.63	87.29	51.88	Moderate	38
Malta	Southern	43.13	63.37	9.87	82.37	50.72	Moderate	39
Andorra	Southern		75.56					
Liechtenstein	Western		84.26					
Monaco	Western		16.29					

Table 14 Green growth dimension sub-indices and Green Growth Index and ranks for the Oceania countries

Oceania Countries/ Territories	Oceania Subregion	Dimensions				Green Growth Index		
		Efficient and Sustainable Resource Use	Natural Capital Protection	Green Economic Opportunities	Social Inclusion	Scores	Level	Rank
New Zealand	Australia and New Zealand	59.88	67.84	20.10	87.11	62.37	High	1
Fiji	Melanesia	62.23	68.25	33.74	65.01	60.97	High	2
Australia	Australia and New Zealand	65.98	53.79	20.11	87.84	60.04	High	3
Tonga	Polynesia	61.13	62.24	6.56	56.39	47.99	Moderate	4
Kiribati	Micronesia	77.21	52.83		59.27			
Papua New Guinea	Melanesia	71.52	54.57		27.66			
Samoa	Polynesia	85.54	65.93		60.11			
Solomon Islands	Melanesia	72.33	55.38		34.73			
Vanuatu	Melanesia	74.84	63.06		36.58			
Micronesia, Fed. Sts.	Micronesia		58.41		52.26			
Tuvalu	Polynesia	77.44	70.89					
Nauru	Micronesia	68.36	25.70					
American Samoa	Polynesia		74.52					
Guam	Micronesia		16.04					
Marshall Islands	Micronesia		63.91					
Northern Mariana Islands	Micronesia		69.23					
Palau	Micronesia		71.81					

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
AFRICA						
South Sudan	-	76.62	-	52.13	97.94	88.10
Gabon	1	74.14	56.10	68.94	97.37	80.24
Comoros	-	70.48	67.78	66.86	68.60	79.36
Sao Tome and Principe	-	70.46	58.88	50.51	99.48	83.32
Cote d'Ivoire	8	69.90	73.09	57.48	67.46	84.22
Botswana	3	69.72	57.78	64.10	84.90	75.17
Angola	30	66.58	62.93	59.26	66.88	78.78
Rwanda	17	66.06	70.29	52.83	66.86	76.71
Congo Republic	9	66.02	58.11	46.22	100.00	70.75
Sierra Leone	28	65.95	56.76	59.69	75.96	73.52
Central African Republic	-	65.40	49.60	53.72	96.72	70.99
Chad	-	65.20	64.74	52.41	98.12	54.30
Burkina Faso	22	65.18	65.03	52.87	67.13	78.20
Malawi		64.87	68.11	51.10	64.17	79.26
Mauritania	34	64.74	48.07	51.20	98.10	72.77
Mali	19	64.53	64.43	50.82	66.83	79.26
Equatorial Guinea	-	64.48	36.90	51.32	100.00	91.30
Eritrea	-	64.05	52.74	51.08	97.52	
Tanzania	2	63.88	64.50	51.86	68.51	72.68
Uganda	12	63.50	49.99	56.85	70.67	80.97
Burundi	26	62.86	50.73	51.66	66.27	89.93
Gambia	29	61.02	65.29	57.05	65.94	56.42
Niger	37	60.98	57.76	50.96	66.69	70.46
Cabo Verde	6	60.94	65.54	42.26	66.40	74.99
Zambia	18	60.66	57.12	53.00	62.87	71.15
Cameroon	24	60.43	65.17	37.76	66.73	81.24
Benin	23	60.40	60.07	39.58	67.99	82.31
Ghana	13	59.86	62.60	39.16	67.56	77.52
Lesotho	27	59.36	43.99	59.27	66.63	71.46
DR Congo	-	59.23	51.21	59.70	67.96	
Ethiopia	15	58.58	54.34	44.23	65.67	74.62
Mauritius	10	58.41	45.22	54.07	57.87	82.23
Madagascar	35	58.01	51.75	46.23	67.42	70.23
Djibouti		57.99	56.98	52.23	51.47	73.82
Namibia	7	57.99	55.63	43.70	63.90	72.79
Kenya	14	57.39	64.94	30.22	67.96	81.34
Nigeria	32	57.39	59.03	38.60	66.12	72.00
Togo	5	57.19	53.80	37.66	69.72	75.74
Guinea	-	57.14	57.64	40.28	66.82	68.72
Guinea-Bissau	-	56.24	51.64	40.57	65.78	72.59

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank *(continued)*

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
Senegal	11	55.89	54.11	37.78	64.92	73.53
Liberia	-	54.23	37.02	51.28	66.85	68.15
Mozambique	25	53.00	46.00	36.69	67.07	69.68
Zimbabwe	20	52.77	43.79	40.99	65.34	66.09
Seychelles	-	51.57	43.68	22.41	86.27	83.76
Somalia	-	50.92	41.64	50.50	65.22	49.03
Morocco	4	46.59	41.06	20.07	66.69	85.73
South Africa	16	38.59	37.53	10.67	64.39	86.01
Tunisia	21	29.71	41.26	2.90	74.80	87.16
Eswatini	33	28.77	85.45	1.63	65.32	75.43
Algeria	31	27.57	28.06	3.68	66.93	83.61
Sudan	38	26.51	62.60	1.52	65.50	79.46
Egypt	36	22.79	40.48	1.67	48.08	82.91
Libya	39	22.69	16.60	1.88	99.01	86.06
Reunion	-	-	-	-	65.41	-
THE AMERICAS						
St. Lucia	-	70.49	52.61	-	85.82	77.58
Uruguay	13	66.79	70.27	35.81	94.41	83.77
St. Vincent and the Grenadines	-	68.35	50.12	50.62	98.28	87.52
Brazil	2	66.51	67.98	54.39	64.74	81.74
Grenada	-	65.72	53.84	54.04	68.32	93.83
Antigua and Barbuda	-	64.34	41.67	51.24	92.37	86.88
Puerto Rico	-	64.27	52.83	55.85	58.06	99.60
Paraguay	1	63.81	69.68	53.09	56.45	79.41
Cuba	-	62.63	49.81	52.86	65.75	88.88
Bermuda	-	61.37	48.76	50.73	-	93.42
Panama	9	60.85	59.04	40.93	64.99	87.27
Dominican Republic	5	60.24	47.82	37.69	79.42	92.01
Guatemala	21	58.95	63.46	36.41	64.60	80.90
Colombia	16	57.87	60.45	35.25	58.91	89.34
Nicaragua	15	57.84	63.11	35.83	64.18	77.15
Honduras	18	57.82	61.85	35.67	61.36	82.54
Belize	-	57.50	58.21	37.86	61.42	80.79
Guyana	-	57.46	37.83	36.43	96.78	81.73
Peru	8	56.89	55.22	35.17	68.86	78.33
Argentina	20	56.67	44.80	36.25	73.57	86.35
Haiti	-	56.67	56.07	35.28	66.31	78.59
Bahamas	17	56.48	36.92	-	55.30	88.28
Dominica	-	56.01	50.46	51.72	68.51	55.03
Costa Rica	7	55.65	63.13	36.18	49.74	84.41
United States	3	55.48	52.28	37.49	52.59	91.93

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank *(continued)*

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
St. Kitts and Nevis	-	55.25	45.78	25.73	95.15	83.18
El Salvador	12	54.73	46.95	35.95	60.58	87.73
Canada	6	54.51	51.64	39.46	67.35	64.34
Ecuador	14	54.47	49.47	35.80	58.66	84.74
Suriname	-	53.58	52.60	39.63	58.15	68.00
Bolivia	10	53.10	36.53	53.10	51.67	79.31
Jamaica	19	51.93	36.86	35.82	64.46	85.46
Chile	11	50.41	57.94	35.32	48.64	64.89
Mexico	4	48.89	47.09	22.83	62.94	84.43
Venezuela	-	46.10	20.58	51.39	54.97	77.70
Barbados	-	37.61	44.59	7.54	65.04	91.52
Trinidad and Tobago	22	31.17	6.31	41.27	43.87	82.59
Aruba	-	-	48.99	-	-	89.91
Cayman Islands	-	-	46.32	-	-	97.01
Turks and Caicos Islands	-	-	36.23	-	-	97.34
British Virgin Islands	-	-	-	-	-	98.97
Greenland	-	-	-	-	-	94.37
Curacao	-	-	23.95	-	-	-
Sint Maarten	-	-	20.31	-	-	-
Guadeloupe	-	-	-	-	51.63	-
Martinique	-	-	-	-	56.33	-
ASIA						
North Korea	-	69.19	-	48.06	98.75	69.80
Timor-Leste	-	65.57	57.28	47.49	91.69	74.10
Laos	11	64.92	64.34	50.82	66.68	81.45
Nepal	7	63.35	61.90	50.90	61.12	83.64
Japan	1	60.68	55.17	49.85	56.57	87.17
Myanmar	22	60.37	63.95	40.15	62.55	82.68
Bhutan	8	58.73	51.09	51.62	66.84	67.48
Maldives	28	58.00	37.98	63.73	-	80.62
Cambodia	17	57.92	64.06	36.92	67.17	70.84
Philippines	4	57.82	57.02	35.75	67.75	80.93
Hong Kong	-	57.41	54.57	-	57.61	60.20
Thailand	2	57.00	55.84	35.96	63.04	83.37
Cyprus	6	56.26	50.29	41.37	68.57	70.23
Indonesia	10	55.74	53.50	34.89	62.74	82.42
China	3	55.71	47.09	37.05	66.04	83.64
Bangladesh	27	54.75	53.08	35.78	53.47	88.51
Vietnam	13	54.34	49.89	38.12	55.22	83.03
Georgia	5	53.00	48.04	35.18	56.57	82.53

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank *(continued)*

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
Palestine	-	51.35	56.93	34.60	68.72	-
Kazakhstan	20	51.21	30.44	44.28	67.30	75.84
Kyrgyz Republic	12	50.69	47.87	25.84	65.10	81.95
Singapore	9	50.47	52.47		39.36	62.24
Malaysia	16	50.42	42.40	43.49	66.19	52.96
Israel	19	48.14	47.54	26.04	56.48	76.79
Qatar	32	47.31	35.15	39.94	72.08	49.51
Afghanistan	39	45.84	42.17	21.16	65.06	76.07
Lebanon	29	44.94	38.87	21.43	60.43	81.07
Mongolia	23	44.51	24.81	54.97	50.68	56.80
Azerbaijan	21	43.97	30.89	20.88	66.44	87.21
Brunei Darussalam	18	42.67	28.03	51.72	40.22	56.86
Armenia	15	41.73	41.06	18.68	47.66	83.00
India	26	39.42	59.71	7.63	59.52	89.10
South Korea	14	38.40	42.69	11.24	50.40	89.92
United Arab Emirates	30	36.63	49.84	14.93	45.09	53.69
Sri Lanka	25	36.58	71.00	3.98	73.95	85.79
Tajikistan	24	36.05	52.82	6.14	64.90	80.23
Bahrain	37	35.90	24.18	11.01	86.04	72.58
Kuwait	40	34.57	26.94	14.25	59.31	62.72
Jordan	31	34.08	39.82	7.12	60.53	78.57
Oman	33	32.66	30.97	8.83	56.99	73.05
Saudi Arabia	34	30.63	33.36	6.21	62.09	68.42
Pakistan	38	25.59	57.42	1.64	53.71	84.98
Yemen	42	22.71	9.11	5.40	99.87	54.17
Iran	35	21.51	17.59	2.15	64.10	88.20
Iraq	41	19.92	24.65	1.44	64.53	68.61
Uzbekistan	36	18.63	22.28	1.25	48.43	89.18
Turkmenistan		16.55	7.59	1.21	98.56	82.95
Syria	43	10.09	13.25	1.15	67.31	
Macao	-	-	58.62	-	-	87.18
EUROPE						
Switzerland	4	80.89	69.16	100.00	71.85	86.16
Austria	1	78.97	73.27	70.03	87.52	86.61
Denmark	3	77.69	77.48	67.22	87.82	79.65
Sweden	2	77.30	82.28	59.01	91.04	80.77
Czech Republic	5	74.56	54.59	69.22	86.85	94.18
Slovakia	7	73.67	48.73	76.70	88.07	89.46
Latvia	14	71.75	64.19	52.57	95.44	82.27
Finland	8	69.43	74.08	43.30	93.35	77.60
Lithuania	15	68.52	61.56	54.45	82.92	79.32

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank *(continued)*

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
Luxembourg	21	66.38	59.15	100.00	46.52	70.56
United Kingdom	9	66.31	60.40	67.05	52.75	90.50
Italy	11	65.86	60.56	36.87	90.71	92.90
Hungary	12	65.74	51.97	55.55	77.36	83.61
Ireland	33	65.43	57.93	64.22	62.04	79.40
France	10	64.98	58.36	44.59	79.49	86.19
Germany	6	64.95	64.66	42.40	73.64	88.16
Romania	20	64.88	67.72	37.64	76.22	91.19
Portugal	13	64.81	66.30	38.18	78.95	88.26
Albania	32	64.72	63.52	52.12	59.82	88.61
Bosnia and Herzegovina	31	64.64	53.44		59.23	85.32
Norway	23	64.36	79.69	52.53	59.64	68.74
Croatia	19	63.99	61.28	41.76	75.55	86.73
Estonia	17	62.91	59.55	37.20	94.37	74.91
Greece	27	61.25	54.41	36.25	88.26	80.86
Spain	16	60.83	61.05	29.09	86.34	89.30
Serbia	30	60.72	46.76	51.63	67.47	83.47
Belarus	18	60.60	32.63	56.95	85.53	84.84
Slovenia	22	60.05	55.51	39.63	72.00	82.07
Macedonia	26	60.03	46.32	52.15	63.21	85.04
Moldova	34	59.58	43.49	52.06	69.27	80.32
Montenegro	35	58.91	61.13		39.01	85.74
Poland	24	57.30	52.58	36.12	64.81	87.60
Netherlands	25	56.52	56.39	44.97	49.53	81.23
Ukraine	36	56.03	32.54	51.79	69.20	84.50
Iceland	38	56.00	50.93	49.21	52.91	74.18
Russia	37	53.86	25.99	54.06	67.34	88.96
Bulgaria	29	50.84	48.23	25.16	68.19	80.75
Belgium	28	50.36	55.50	27.54	53.18	79.15
Malta	39	43.13	47.31	24.39	42.15	71.16
Faeroe Islands	-	-	-	-	58.26	-
Liechtenstein	-	-	-	-	-	99.91
Andorra	-	-	-	-	-	81.97
Kosovo	-	-	58.07	-	-	
Monaco	-	-	-	-	-	100.00
San Marino	-	-	-	-	-	99.97
OCEANIA						
Samoa	-	85.54	69.81	-	99.40	90.22
Tuvalu	-	77.44	52.03	-	89.61	99.61
Kiribati	-	77.21	70.46	-	78.88	82.83
Vanuatu	-	74.84	71.16	-	69.62	84.59

Table 15 Scores on pillars for efficient and sustainable resource use by region and rank *(continued)*

Country	Regional Rank	Efficient and Sustainable Resource Use	Pillars			
			Efficient and sustainable energy	Efficient and sustainable water use	Sustainable land use	Material use efficiency
Solomon Islands	-	72.33	63.14	-	72.12	83.12
Papua New Guinea	-	71.52	58.12	-	73.38	85.78
Nauru	-	68.36	34.99	-	96.16	94.94
Australia	3	65.98	51.21	65.78	92.30	60.94
Fiji	2	62.23	52.32	41.16	82.59	84.29
Tonga	4	61.13	42.62	-	75.30	71.17
New Zealand	1	59.88	65.82	40.57	59.64	80.72
Palau	-	-	16.49	-	-	95.44
Marshall Islands	-	-	27.08	-	-	98.78
Micronesia, Fed. Sts.	-	-	34.29	-	98.95	
French Polynesia	-	-	-	-	75.06	91.66
New Caledonia	-	-	-	-	56.41	67.34
Cook Islands	-	-	-	-	58.71	-
Niue	-	-	-	-	69.32	-
Tokelau	-	-	-	-	96.28	-

Table 16 Scores on pillars for natural capital protection by region and rank

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
AFRICA						
Zimbabwe	20	78.09	76.02	86.75	68.26	82.60
Malawi	-	74.43	70.09	91.78	56.87	83.87
Morocco	4	74.02	83.52	90.57	48.87	81.20
Gabon	1	73.46	74.96	85.26	69.52	65.54
Seychelles	-	72.91	81.64	77.43	65.54	68.19
Botswana	3	72.68	80.49	61.75	57.30	97.95
Burkina Faso	22	72.28	52.49	87.11	60.37	98.88
Congo Republic	9	72.23	63.27	87.87	72.50	67.53
Sao Tome and Principe	-	72.01	85.84	97.09	74.97	43.04
Cote d'Ivoire	8	70.85	73.25	95.26	52.02	69.41
Uganda	12	70.79	65.38	89.69	53.83	79.55
Zambia	18	70.00	68.14	70.32	55.89	89.63
Guinea	-	69.84	67.27	80.22	69.10	63.79
DR Congo	-	69.37	61.84	91.79	67.64	60.32
Mozambique	25	68.80	77.33	83.66	57.70	60.03
Ethiopia	15	68.22	63.13	86.63	45.30	87.44
Rwanda	17	67.69	63.18	96.53	46.43	74.13
Namibia	7	67.62	76.89	67.26	50.94	79.34
Tanzania	2	66.78	74.32	83.51	55.37	57.86
Ghana	13	66.73	74.91	91.12	61.11	47.52
Togo	5	66.59	53.81	92.94	61.02	64.43
Benin	23	65.53	65.84	91.80	47.47	64.28
Senegal	11	65.29	63.34	87.79	46.10	70.90
South Africa	16	64.87	76.37	76.41	47.67	63.65
Gambia	29	64.65	74.15	91.10	52.15	49.59
Burundi	26	64.51	49.67	96.34	52.28	69.21
Sierra Leone	28	63.19	69.01	92.68	61.54	40.51
Cabo Verde	6	63.14	80.68	95.27	33.48	61.77
Guinea-Bissau	-	62.93	55.79	86.63	49.55	65.50
South Sudan	-	62.67	48.09	61.19	55.72	94.05
Mali	19	62.19	55.57	80.54	42.34	78.97
Kenya	14	61.28	69.60	88.74	40.92	55.81
Tunisia	21	60.52	82.70	87.79	27.96	66.06
Liberia	-	60.21	65.09	86.01	62.19	37.74
Eswatini	33	60.14	70.72	82.49	44.52	50.38
Nigeria	32	60.00	39.81	91.14	63.06	56.64
Comoros	-	59.22	75.55	96.12	59.32	28.54
Angola	30	57.42	64.46	80.25	48.50	43.32
Equatorial Guinea		57.24	74.23	59.25	75.26	32.44
Cameroon	24	57.10	40.10	71.87	65.63	56.21

Table 16 Scores on pillars for natural capital protection by region and rank *(continued)*

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
Central African Republic	-	56.97	43.79	33.97	74.82	94.62
Madagascar	35	56.70	58.76	90.09	57.10	34.19
Egypt	36	54.98	62.36	89.18	22.90	71.75
Chad	-	54.18	43.49	62.24	34.33	92.76
Algeria	31	53.01	80.76	81.05	23.38	51.60
Mauritius	10	52.46	89.70	77.56	46.34	23.49
Niger	37	51.34	30.77	82.31	29.01	94.54
Sudan	38	50.68	71.29	78.96	29.81	39.31
Somalia	-	49.11	54.97	83.45	27.39	46.28
Eritrea	-	46.55	49.03	80.09	23.50	50.88
Lesotho	27	41.34	59.44	84.38	12.51	46.54
Djibouti	-	38.61	68.83	89.78	8.47	42.47
Mauritania	34	37.28	62.51	76.59	9.67	41.72
Libya	39	28.21	73.96	49.17	5.03	34.60
Mayotte	-	-	-	-	-	65.70
Reunion	-	-	-	-	41.36	-
Western Sahara	-	-	-	-	-	59.44
St. Helena	-	-	-	-	-	38.97
British Indian Ocean Territory	-	-	-	-	-	54.02
THE AMERICAS						
Belize	-	77.94	85.79	76.00	64.83	87.30
Bolivia	10	75.16	87.87	66.46	60.71	89.99
Dominican Republic	5	75.12	85.66	84.47	68.17	64.54
Nicaragua	15	73.47	88.66	78.31	62.97	66.65
Chile	11	73.35	86.38	82.44	63.02	64.51
Mexico	4	73.18	84.72	79.52	52.82	80.61
Peru	8	72.53	86.01	85.81	65.02	57.66
Honduras	18	72.51	85.14	86.44	65.73	57.12
Suriname	-	72.24	87.25	67.92	79.24	57.99
Colombia	16	72.00	90.18	78.40	64.92	58.53
Brazil	2	71.96	88.25	69.08	62.79	70.03
St. Lucia	-	71.81	82.79	80.83	67.76	58.63
Ecuador	14	71.47	88.85	82.91	62.33	56.83
St. Vincent and the Grenadines	-	71.38	86.23	90.17	62.88	53.09
Guyana	-	71.30	85.07	62.77	100.00	48.40
Costa Rica	7	71.28	89.80	83.86	64.17	53.43
Venezuela	-	71.19	87.67	62.21	75.47	62.42
Paraguay	1	70.90	91.06	52.48	55.00	96.12
Panama	9	70.04	88.39	79.47	65.16	52.58
St. Kitts and Nevis	-	67.44	74.30	74.62	59.12	63.11
Bahamas	17	66.57	79.61	82.82	42.02	70.88

Table 16 Scores on pillars for natural capital protection by region and rank *(continued)*

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
Jamaica	19	66.31	88.60	91.44	52.24	45.69
Guatemala	21	66.27	83.69	89.00	53.95	47.99
Cuba	-	65.52	89.12	82.92	66.92	37.25
Dominica	-	65.08	90.18	87.48	54.62	41.64
El Salvador	12	64.20	85.83	91.11	58.81	36.95
Antigua and Barbuda	-	62.77	87.55	56.58	52.88	59.26
United States	3	61.97	80.63	48.26	52.44	72.28
Grenada	-	61.23	86.78	61.15	52.94	50.05
Argentina	20	60.33	88.30	53.80	48.62	57.36
Barbados	-	58.98	78.90	58.63	44.23	59.15
Uruguay	13	58.55	90.80	56.44	39.68	57.80
Canada	6	57.97	83.14	39.96	51.49	66.04
Bermuda	-	56.18	67.95	-	57.42	45.45
Haiti	-	52.66	73.09	94.46	39.97	27.86
Trinidad and Tobago	22	51.44	80.38	49.10	48.00	36.97
United States Virgin Islands	-	48.95	65.50	-	44.94	39.84
Puerto Rico	-	48.71	69.88	-	53.77	30.76
Greenland	-	41.49	78.40	-	12.07	75.44
Anguilla	-	-	-	-	30.42	93.41
Aruba	-	-	-	-	15.35	65.03
British Virgin Islands	-	-	-	-	51.27	53.70
Cayman Islands	-	-	-	-	70.77	56.04
Curacao	-	-	-	-	14.78	59.43
Falkland Islands	-	-	-	-	5.93	50.69
French Guiana	-	-	-	-	72.48	59.90
Guadeloupe	-	-	-	-	74.26	-
Martinique	-	-	-	-	85.00	-
Saint-Martin	-	-	-	-	55.83	95.43
Sint Maarten	-	-	-	-	34.11	86.36
Turks and Caicos Islands	-	-	-	-	37.25	59.44
St. Pierre and Miquelon	-	-	-	-	4.44	34.86
Montserrat	-	-	-	-	-	84.21
St. Barths	-	-	-	-	31.14	-
ASIA						
Bhutan	8	79.05	80.75	84.35	68.89	83.21
Cambodia	17	78.50	88.15	82.08	59.50	88.23
Laos	11	75.88	85.48	80.86	56.71	84.58
Philippines	4	74.42	89.64	90.48	66.49	56.88
Thailand	2	73.71	82.55	73.64	64.27	75.53
Georgia	5	72.71	89.37	78.56	56.04	71.02
Nepal	7	72.43	57.72	86.51	63.99	86.13

Table 16 Scores on pillars for natural capital protection by region and rank *(continued)*

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
Japan	1	71.04	91.30	81.45	64.10	53.42
Armenia	15	70.24	87.14	85.75	38.02	85.67
Cyprus	6	69.17	81.96	80.85	57.93	59.64
Malaysia	16	68.38	86.18	69.66	61.49	59.22
Indonesia	10	65.00	83.19	81.99	57.52	45.51
Azerbaijan	21	64.89	87.54	54.72	58.47	63.30
Sri Lanka	25	64.32	95.12	93.35	53.95	35.71
China	3	63.81	76.83	76.18	42.16	67.19
Timor-Leste	-	63.70	87.76	61.11	55.11	55.69
Kyrgyz Republic	12	63.35	89.38	87.06	28.09	73.69
Vietnam	13	62.20	89.00	84.71	50.90	39.00
Tajikistan	24	61.23	76.42	90.96	20.43	98.95
Myanmar	22	60.82	82.44	82.13	52.36	38.60
Brunei Darussalam	18	59.29	87.73	38.85	66.76	54.30
North Korea	-	59.01	86.22	91.15	38.80	39.77
Singapore	9	58.88	88.78	57.95	46.46	50.27
Lebanon	29	58.79	82.16	85.77	35.11	48.29
Mongolia	23	58.70	64.07	50.79	37.83	96.46
South Korea	14	57.80	84.91	66.75	55.13	35.71
Iran	35	57.30	82.65	67.36	40.18	48.17
Bangladesh	27	55.63	71.64	92.83	40.19	35.84
Uzbekistan	36	55.40	89.10	61.71	28.31	60.50
India	26	53.61	52.41	91.07	41.65	41.56
Pakistan	38	52.58	60.32	88.86	26.12	54.59
Maldives	28	52.09	85.83	87.69	16.70	58.60
United Arab Emirates	30	49.59	73.79	34.19	30.86	77.68
Kazakhstan	20	47.73	91.25	54.87	20.21	51.31
Jordan	31	47.29	83.47	87.37	12.23	56.10
Israel	19	47.08	80.40	64.72	21.04	44.86
Turkmenistan	-	45.20	92.02	32.66	22.99	60.41
Afghanistan	39	44.70	72.00	78.63	18.99	37.14
Palestine	-	42.97	81.90	-	13.35	72.53
Oman	33	41.56	76.45	61.54	14.39	44.04
Turkey	-	40.83	75.67	83.13		10.82
Syria	43	40.23	81.14	88.36	10.37	35.26
Yemen	42	38.51	68.46	95.95	12.19	27.46
Iraq	41	36.78	70.53	86.77	10.01	29.88
Kuwait	40	35.49	66.58	34.15	12.38	56.32
Saudi Arabia	34	34.93	57.78	45.58	10.82	52.21
Qatar	32	33.69	57.86	37.53	10.90	54.44
Bahrain	37	23.84	60.32	39.80	3.60	37.39

Table 16 Scores on pillars for natural capital protection by region and rank *(continued)*

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
Hong Kong	-	-	-	-	-	86.67
Taiwan	-	-	88.39	-	-	-
EUROPE						
Slovakia	7	84.30	86.80	79.62	76.12	95.98
Liechtenstein	-	84.26	-	85.57	70.44	99.24
Croatia	19	83.74	86.06	80.69	75.19	94.16
Germany	6	82.65	84.73	76.48	74.40	96.81
Albania	32	82.38	86.74	82.46	81.78	78.73
Czech Republic	5	81.67	85.49	68.54	77.86	97.52
Hungary	12	81.18	88.08	79.31	70.15	88.63
Italy	11	80.39	85.59	80.76	68.30	88.48
Austria	1	80.28	85.07	76.94	69.60	91.19
United Kingdom	9	79.07	88.79	79.35	64.43	86.10
Slovenia	22	78.97	85.53	76.13	78.10	76.48
Portugal	13	78.66	87.72	77.82	61.25	91.53
France	10	78.51	86.25	77.46	71.52	79.53
Bulgaria	29	78.31	86.29	75.02	80.65	72.03
Switzerland	4	78.17	82.99	84.27	63.39	84.24
Sweden	2	77.99	89.29	85.70	60.68	79.67
Romania	20	77.32	90.86	78.30	75.22	66.78
Belgium	28	77.07	89.02	75.36	70.58	74.49
Greece	27	77.01	85.21	74.46	65.44	84.69
Latvia	14	76.38	87.64	74.25	67.86	77.07
Poland	24	76.02	87.63	69.21	76.64	71.84
Spain	16	75.99	88.64	78.41	59.19	81.04
Andorra		75.56	87.46	78.02	51.62	92.52
Macedonia	26	74.85	84.90	81.13	54.68	83.32
Luxembourg	21	74.78	81.00	63.83	61.26	98.71
Estonia	17	74.24	90.65	63.13	66.46	79.88
Lithuania	15	73.33	87.42	69.22	66.62	71.73
Finland	8	73.06	86.51	70.84	63.79	72.90
Belarus	18	72.95	85.50	61.39	65.60	82.24
Denmark	3	71.56	79.86	70.64	62.91	73.90
Netherlands	25	71.23	87.14	71.86	48.29	85.12
Serbia	30	70.27	85.98	68.15	55.88	74.47
Norway	23	68.85	81.50	72.23	58.98	64.70
Moldova	34	67.36	69.87	80.00	60.27	61.10
Ukraine	36	65.40	87.33	75.85	64.99	42.49
Montenegro	35	64.34	82.69	75.67	51.05	53.65
Malta	39	63.37	82.01	87.53	28.66	78.40
Bosnia and Herzegovina	31	62.83	84.34	76.78	61.81	38.94

Table 16 Scores on pillars for natural capital protection by region and rank *(continued)*

Country	Regional Rank	Natural Capital Protection	Pillars			
			Environmental quality	GHG emissions reductions	Biodiversity and ecosystem protection	Cultural and social value
Ireland	33	59.22	85.75	51.91	58.92	46.89
Russia	37	55.93	87.00	42.77	49.29	53.37
Iceland	38	44.60	84.36	60.03	12.66	61.71
Monaco	-	16.29	56.47	-	1.00	76.49
Faeroe Islands	-	-	-	-	5.18	40.04
Gibraltar	-	-	-	-	1.00	92.81
San Marino	-		81.52	-	60.04	
Guernsey	-	-	-	-	-	41.20
Isle of Man	-	-	-	-	-	98.57
Jersey	-	-	-	-	-	40.52
Svalbard and Jan Mayen Islands	-	-	-	-	39.12	-
OCEANIA						
American Samoa	-	74.52	88.47	-	64.68	72.32
Palau	-	71.81	79.62	61.33	75.96	71.69
Tuvalu	-	70.89	81.27	90.02	-	48.70
Northern Mariana Islands	-	69.23	83.03	-	63.36	63.08
Fiji	2	68.25	89.64	87.64	52.36	52.76
New Zealand	1	67.84	82.55	46.74	69.18	79.36
Samoa	-	65.93	93.46	80.31	53.37	47.17
Marshall Islands	-	63.91	90.51	88.23	45.65	45.76
Vanuatu	-	63.06	82.13	76.84	51.73	48.45
Tonga	4	62.24	93.74	84.16	43.83	43.40
Micronesia, Fed. Sts.	-	58.41	89.14	90.38	67.13	21.53
Solomon Islands	-	55.38	72.55	92.10	42.03	33.50
Papua New Guinea	-	54.57	78.82	82.88	48.92	27.76
Australia	3	53.79	86.55	21.39	59.33	76.22
Kiribati	-	52.83	74.77	97.20	14.27	75.14
Nauru	-	25.70	77.78	90.20	1.00	62.22
Guam	-	16.04	76.25	-	43.11	1.26
French Polynesia	-	-	-	-	45.46	45.32
New Caledonia	-	-	-	-	56.15	77.48
Niue	-	-	-	-	29.66	72.96
Tokelau	-	-	-	-	1.00	75.65
Wallis and Futuna Islands	-	-	-	-	23.24	76.48
Cook Islands	-	-	-	-	-	71.70
Christmas Island	-	-	-	-	-	48.79
Cocos (Keeling) Islands	-	-	-	-	-	75.65
Norfolk Island	-	-	-	-	-	68.91
Pitcairn	-	-	-	-	-	66.96

Table 17 Scores on pillars for green economic opportunities by region and rank

Country	Regional Rank	Green Economic Opportunities	Pillars			
			Green investment	Green Trade	Green employment	Green innovation
AFRICA						
Tanzania	2	52.66	84.78	29.71	51.71	59.05
Togo	5	40.15	55.83	23.21	-	49.96
Zambia	18	36.17	86.40	7.39	-	74.13
Tunisia	21	34.29	58.89	40.71	50.64	11.39
Ethiopia	15	24.58	67.28	5.63	50.72	18.98
South Africa	16	23.31	33.91	46.55	24.95	7.50
Egypt	36	23.04	44.93	15.46	54.79	7.41
Congo Republic	9	22.33	21.72	7.28	-	70.45
Gabon	1	21.55	67.97	7.46	-	19.74
Senegal	11	21.31	66.64	4.02	23.80	32.35
Morocco	4	21.24	75.01	7.87	17.23	20.01
Benin	23	20.42	55.21	2.94	-	52.39
Uganda	12	20.06	54.69	4.13	68.70	10.44
Libya	39	18.86	100.00	1.61	-	41.77
Namibia	7	18.72	50.71	5.69	-	22.72
Kenya	14	18.49	38.45	8.96	26.77	12.69
Madagascar	35	18.48	31.86	3.32	19.17	57.59
Burkina Faso	22	18.26	52.02	2.65	-	44.15
Algeria	31	18.08	78.09	5.00	-	15.15
Mali	19	17.53	45.58	2.75		42.90
Botswana	3	17.34	61.34	1.76	10.76	77.86
Mauritania	34	16.91	82.39	1.00	-	58.60
Eswatini	33	16.52	44.67	2.40	22.59	30.77
Cabo Verde	6	16.25	84.94	1.10	45.88	
Mozambique	25	15.40	34.79	1.82	-	57.53
Mauritius	10	15.14	47.38	4.30	10.96	23.54
Cote d'Ivoire	8	14.86	65.57	3.48	-	14.38
Lesotho	27	14.22	43.02	7.00	1.36	100.00
Sudan	38	14.16	65.37	1.03	-	42.00
Ghana	13	12.95	45.95	4.05	7.44	20.31
Cameroon	24	12.42	35.22	4.75	8.60	16.55
Zimbabwe	20	11.93	24.25	2.09	14.02	28.49
Rwanda	17	10.35	31.45	2.60	1.40	100.00
Angola	30	10.32	18.40	2.14	14.89	19.40
Sierra Leone	28	8.81	9.23	2.56		28.99
Eritrea	-	8.58	-	8.73	1.00	72.43
Burundi	26	7.95	2.16	4.55	4.89	82.73
Niger	37	7.08	73.83	2.14	1.00	15.88
Nigeria	32	5.70	49.63	1.29	1.00	16.52

Table 17 Scores on pillars for green economic opportunities by region and rank *(continued)*

Country	Regional Rank	Green Economic Opportunities	Pillars			
			Green investment	Green Trade	Green employment	Green innovation
Gambia	29	4.28	29.24	2.67	1.00	-
Malawi	-	-		2.67	23.20	-
DR Congo	-	-	47.80	1.24	-	-
Guinea	-	-	23.63	4.32	-	-
Seychelles	-	-		1.97	-	-
Guinea-Bissau	-	-	29.84	1.00	-	-
Central African Republic	-	-		2.90	-	58.52
Comoros	-	-	38.80	1.25	-	-
Djibouti	-	-	67.77	2.44	-	-
Sao Tome and Principe	-	-	-	11.16	-	-
Liberia	-	-	-	-	-	52.98
South Sudan	-	-	16.51	-	-	-
Chad	-	-	-	-	-	100.00
THE AMERICAS						
United States	3	34.16	49.84	46.55	76.50	7.67
Mexico	4	31.68	50.91	44.53	54.56	8.14
Canada	6	29.39	49.40	25.94	69.67	8.36
Paraguay	1	29.12	71.04	3.72	46.10	59.07
Jamaica	19	27.87	72.31	12.39	-	24.15
El Salvador	12	26.35	46.25	13.96	-	28.34
Bahamas	17	23.78	67.05	22.62	8.86	-
Trinidad and Tobago	22	23.15	-	96.27	10.43	12.37
Nicaragua	15	22.20	69.04	2.14	-	74.10
Dominican Republic	5	21.87	71.98	9.58	16.20	20.49
Honduras	18	21.57	76.17	3.65	-	36.16
Brazil	2	20.13	50.97	15.96	23.48	8.60
Costa Rica	7	20.08	66.84	12.29	31.65	6.25
Peru	8	19.88	56.37	5.33	35.37	14.70
Panama	9	19.17	83.67	10.79	15.54	9.62
Chile	11	18.13	52.07	3.44	39.66	15.20
Ecuador	14	16.43	46.83	3.07	53.60	9.45
Colombia	16	16.33	44.67	5.49	33.74	8.59
Bolivia	10	15.98	46.83	2.38	22.75	25.71
Argentina	20	13.55	47.30	6.28	27.34	4.16
Uruguay	13	11.98	47.70	2.63	15.98	10.30
Guatemala	21	9.20	46.17	7.21	1.01	21.23
Cuba	-	2.96	-	5.37	1.00	4.84
Belize	-	-	45.89	11.74	-	-
Suriname	-	-	82.68	2.40	-	-
Guyana	-	-	41.89	7.72	-	-

Table 17 Scores on pillars for green economic opportunities by region and rank *(continued)*

Country	Regional Rank	Green Economic Opportunities	Pillars			
			Green investment	Green Trade	Green employment	Green innovation
Barbados	-	-	34.43	13.64	-	-
Bermuda	-	-	-	33.22	18.78	
Venezuela	-	-	-	1.79	-	15.06
St. Vincent and the Grenadines	-	-	-	14.42	-	-
St. Lucia	-	-	-	9.24	-	-
St. Kitts and Nevis	-	-	-	10.24	-	-
Antigua and Barbuda	-	-	-	3.30	-	-
Haiti	-	-	59.10	-	-	-
Greenland	-	-	-	1.35	-	-
Aruba	-	-	-	17.96	-	-
Grenada	-	-	-	23.64	-	-
ASIA						
South Korea	14	41.13	72.02	49.81	73.93	10.80
Japan	1	32.41	47.61	58.36	45.24	8.77
Singapore	9	31.03	90.85	31.00	52.14	6.32
Thailand	2	30.01	64.50	30.20	46.40	8.97
Palestine	-	29.75	-	8.50	35.59	87.05
Kyrgyz Republic	12	29.62	57.34	5.30	45.16	56.09
China	3	28.85	68.82	37.23	49.01	5.52
Syria	43	28.48	55.56	12.40	34.21	27.92
Brunei Darussalam	18	28.20	93.74	6.37	36.97	28.62
India	26	26.76	70.03	23.71	48.27	6.40
Philippines	4	26.75	76.13	18.80	34.00	10.52
Indonesia	10	25.50	61.94	10.58	25.30	-
Turkey	-	25.38	61.60	26.06	51.27	5.04
Yemen	42	24.97	-	4.82	32.30	100.00
Saudi Arabia	34	24.54	63.04	6.44	48.71	18.33
Bahrain	37	23.96	54.56	7.09	-	35.54
Georgia	5	23.87	42.99	24.99	27.26	11.09
Jordan	31	23.56	47.10	13.03	39.94	12.56
Bhutan	8	22.11	58.58	12.12		15.22
Oman	33	21.64	17.22	13.16	51.84	18.68
Vietnam	13	21.32	54.76	9.83	30.98	12.38
Armenia	15	21.26	39.79	9.71	40.93	12.92
Israel	19	20.94	69.09	41.80	17.46	3.81
Malaysia	16	20.09	35.24	29.28	34.14	4.62
Azerbaijan	21	19.84	50.41	2.15	71.47	19.99
Sri Lanka	25	18.75	70.15	12.69	16.89	8.23
Cyprus	6	17.80	49.56	11.76	38.10	4.52

Table 17 Scores on pillars for green economic opportunities by region and rank *(continued)*

Country	Regional Rank	Green Economic Opportunities	Pillars			
			Green investment	Green Trade	Green employment	Green innovation
Kazakhstan	20	17.60	50.15	3.05	39.46	15.89
United Arab Emirates	30	17.42	-	12.35	54.52	7.86
Iran	35	16.50	-	6.79	64.57	10.24
Hong Kong	-	16.19	-	16.68	35.47	7.18
Nepal	7	15.65	100.00	2.70	25.65	8.66
Uzbekistan	36	14.99	63.59	2.08	25.41	-
Qatar	32	14.50	83.42	1.00	21.89	24.17
Pakistan	38	14.11	52.77	4.04	18.73	9.95
Kuwait	40	13.95	60.70	2.72	12.38	18.54
Tajikistan	24	13.55	72.86		1.00	34.15
Laos	11	13.53	33.50	3.05	5.78	56.70
Iraq	41	11.74	65.98		1.00	24.52
Mongolia	23	11.36	38.44	1.69	20.54	12.49
Cambodia	17	10.41	69.51	3.28	1.06	48.64
Myanmar	22	9.96	75.91	5.16	1.64	15.39
Bangladesh	27	8.86	97.36	2.43	13.53	1.92
Lebanon	29	7.87	1.00	14.21	38.78	6.96
Afghanistan	39	7.28	-	5.86	1.00	65.69
Maldives	28	4.01	60.30	1.07	1.00	-
Timor-Leste	-	-	14.89	4.39	-	-
Turkmenistan	-	-	-	-	3.20	100.00
Macao	-	2.09	-	1.45	1.00	6.30
EUROPE						
Denmark	3	50.53	76.13	48.51	94.80	18.62
Germany	6	46.76	64.50	75.86	88.53	11.03
Czech Republic	5	40.09	55.24	61.45	87.47	8.70
Macedonia	26	39.59	65.63	100.00		9.45
Austria	1	38.99	60.72	56.75	67.68	9.91
Slovakia	7	38.30	50.55	47.09	80.26	11.26
Belarus	18	38.07	62.88	17.63	49.75	
Sweden	2	37.56	73.38	41.61	62.97	10.35
Finland	8	37.00	56.58	45.01	69.85	10.53
Estonia	17	32.90	67.66	42.25	43.58	9.40
United Kingdom	9	32.84	44.22	46.92	64.29	8.72
Romania	20	32.72	48.22	71.06	49.09	6.81
Hungary	12	32.67	58.94	51.18	63.95	5.91
Poland	24	32.66	57.96	37.42	58.79	8.93
Italy	11	32.61	47.72	55.49	60.41	7.07
Bulgaria	29	32.07	57.53	27.12	48.33	14.02
Switzerland	4	31.31	61.77	33.79	100.00	4.60

Table 17 Scores on pillars for green economic opportunities by region and rank *(continued)*

Country	Regional Rank	Green Economic Opportunities	Pillars			
			Green investment	Green Trade	Green employment	Green innovation
France	10	31.28	54.32	35.63	49.23	10.05
Slovenia	22	31.21	58.92	39.49	59.69	6.83
Serbia	30	31.02	47.35	29.47	66.95	9.91
Lithuania	15	30.91	58.28	38.08	43.16	9.53
Netherlands	25	30.20	66.55	30.65	53.69	7.59
Spain	16	29.51	56.33	24.27	57.19	9.70
Norway	23	28.21	67.51	25.08	49.18	7.61
Portugal	13	28.06	45.18	45.00	47.98	6.35
Belgium	28	27.96	58.85	29.37	47.51	7.44
Bosnia and Herzegovina	31	27.76	-	35.74	31.69	18.88
Croatia	19	25.48	58.68	23.42	54.42	5.63
Luxembourg	21	25.13	68.76	41.69	18.34	7.59
Latvia	14	24.07	46.01	22.41	42.57	7.64
Montenegro	35	21.29	-	8.87	24.47	44.42
Ukraine	36	20.75	34.83	11.26	62.50	7.55
Moldova	34	20.60	47.01	12.49	30.62	10.02
Russia	37	19.93	55.68	9.04	49.54	6.33
Greece	27	19.32	29.96	19.41	32.25	7.43
Ireland	33	15.03	68.97	11.37	19.37	3.36
Iceland	38	13.63	53.19	6.12	30.77	3.45
Malta	39	9.87		23.76	2.79	14.52
Albania	32	9.63	35.46	1.70	7.59	18.74
Liechtenstein	-	-	-	-	1.00	1.00
Andorra	-	-	-	9.38	-	-
OCEANIA						
Fiji	2	33.74	53.99	4.37	84.72	64.82
Australia	3	20.11	50.45	8.99	52.25	6.90
New Zealand	1	20.10	62.32	8.96	45.02	6.50
Tonga	4	6.56	50.67	5.58	1.00	-
Vanuatu	-	-	99.18	1.86	-	-
Solomon Islands	-	-	45.48	1.44	-	-
Papua New Guinea	-	-	46.22	3.85	-	-
Samoa	-	-	-	3.17	-	-
Tuvalu	-	-	-	5.11	-	-
Kiribati	-	-	-	4.56	-	-
Palau	-	-	-	1.66	-	-
Micronesia, Fed. Sts.	-	-	-	1.59	-	-
French Polynesia	-	-	-	5.15	-	-
New Caledonia	-	-	-	2.68	-	-

Table 18 Scores on pillars for social inclusion by region and rank

Country	Regional Rank	Social Inclusion	Pillars			
			Access to basic services and resources	Gender balance	Social equity	Social protection
AFRICA						
Mauritius	10	77.85	77.62	74.41	83.46	76.22
Tunisia	21	76.80	76.58	59.62	96.54	78.91
Seychelles	-	74.84	78.27	59.12	85.16	79.61
Algeria	31	73.24	69.63	62.98	86.32	76.02
Morocco	4	71.83	65.65	58.02	92.05	75.93
Cabo Verde	6	67.74	63.03	61.50	76.06	71.40
South Africa	16	67.47	66.57	94.97	46.52	70.46
Egypt	36	64.12	69.47	41.74	80.84	72.09
Namibia	7	62.72	45.56	96.18	51.71	68.29
Eswatini	33	61.46	56.39	54.44	60.19	77.20
Gabon	1	60.79	78.58	51.93	79.50	42.09
Botswana	3	57.25	47.27	63.89	54.47	65.31
Senegal	11	55.94	46.11	69.37	71.65	42.72
Lesotho	27	54.84	30.61	73.91	61.01	65.54
Kenya	14	53.25	36.87	80.67	80.34	33.64
Ghana	13	52.91	50.83	58.09	72.40	36.66
Cameroon	24	52.69	49.63	61.63	69.51	36.26
Togo	5	52.15	41.72	76.66	67.15	34.45
Tanzania	2	51.27	33.38	89.82	76.64	30.07
Cote d'Ivoire	8	50.55	48.43	55.37	70.14	34.72
Gambia	29	49.34	44.25	62.62	60.31	35.46
Rwanda	17	48.97	27.40	90.39	68.79	33.77
Zimbabwe	20	48.79	27.24	78.78	56.97	46.34
Libya	39	48.08	28.05	68.23	-	58.09
Comoros	-	45.83	33.75	68.52	73.48	25.96
Djibouti	-	45.30	40.43	62.67	74.69	22.24
Nigeria	32	44.83	40.63	49.94	70.74	28.14
Sao Tome and Principe	-	44.76	43.19	19.00	90.47	54.06
Mali	19	44.55	40.95	53.79	62.77	28.49
Uganda	12	44.09	20.63	89.11	70.48	29.15
Congo Republic	9	44.05	40.75	47.96	60.80	31.68
Sudan	38	43.37	44.61	46.43	90.16	18.95
Malawi	-	42.60	31.62	76.51	50.80	26.79
Ethiopia	15	42.26	32.12	65.52	85.54	17.72
Burundi	26	40.66	18.94	82.10	58.42	30.10
Guinea	-	40.54	17.36	62.42	79.10	31.51
Benin	23	40.38	42.28	51.91	64.45	18.79
Mauritania	34	39.55	43.06	51.66	42.99	25.59
Sierra Leone	28	37.63	25.78	55.90	58.00	23.98
Angola	30	37.41	44.35	66.94	29.63	22.27

Table 18 Scores on pillars for social inclusion by region and rank *(continued)*

Country	Regional Rank	Social Inclusion	Pillars			
			Access to basic services and resources	Gender balance	Social equity	Social protection
Mozambique	25	36.92	23.39	73.44	26.33	41.10
Burkina Faso	22	35.58	31.33	47.00	32.11	33.90
Liberia	-	35.31	19.82	71.68	56.09	19.51
Zambia	18	33.64	15.60	76.73	33.12	32.30
Somalia	-	31.28	9.01	64.91	52.35	-
DR Congo	-	29.26	17.52	58.91	40.69	17.44
Niger	37	27.19	7.52	65.25	70.74	15.75
Madagascar	35	27.03	10.71	53.78	59.73	15.51
South Sudan	-	26.97	-	78.00	77.24	3.26
Chad	-	21.37	15.08	55.23	40.03	6.25
Guinea-Bissau	-	20.74	10.20	14.59	72.03	17.27
Central African Republic	-	17.99	8.37	43.02	21.28	13.66
Equatorial Guinea	-	-	28.49	73.27	-	-
Eritrea	-	-	17.32	59.91	-	-
THE AMERICAS						
Canada	6	86.26	78.81	84.80	89.61	92.47
United States	3	83.94	89.41	72.84	86.23	88.40
Uruguay	13	80.79	79.54	72.15	83.69	88.69
Mexico	4	79.10	67.36	89.23	79.41	82.04
Chile	11	76.91	74.01	73.33	81.66	78.95
Trinidad and Tobago	22	76.38	69.46	78.05	-	82.19
Argentina	20	76.17	69.38	75.74	81.30	78.81
Bolivia	10	75.73	56.75	99.53	84.76	68.71
Guyana	-	74.65	67.50	82.06	66.77	83.95
Brazil	2	72.55	73.80	68.34	68.14	80.63
Suriname	-	72.49	59.81	67.24	86.36	79.51
Costa Rica	7	72.22	67.03	70.97	76.97	74.31
Ecuador	14	72.07	64.33	91.17	79.76	57.66
El Salvador	12	70.24	70.72	76.92	78.53	56.96
Peru	8	69.58	62.12	82.36	80.78	56.72
Paraguay	1	69.51	57.52	76.61	81.03	65.37
Dominican Republic	5	68.40	70.63	76.03	79.31	51.38
Grenada	-	68.01	60.50	96.70	-	53.77
Panama	9	67.05	71.02	61.70	76.21	60.52
Belize	-	65.18	67.38	55.64	76.43	63.01
Colombia	16	65.17	57.76	61.99	71.64	70.31
Venezuela	-	64.91	48.25	72.75	79.04	64.00
Jamaica	19	62.26	66.76	61.81	72.76	50.05
Barbados	-	62.07	81.72	45.55	-	64.25
Bahamas	17	60.61	58.85	50.82	-	74.46
St. Lucia	-	60.21	61.31	67.00	67.28	47.55

Table 18 Scores on pillars for social inclusion by region and rank *(continued)*

Country	Regional Rank	Social Inclusion	Pillars			
			Access to basic services and resources	Gender balance	Social equity	Social protection
Nicaragua	15	58.67	47.25	86.04	74.19	39.30
Guatemala	21	56.29	56.08	62.71	71.60	39.87
Honduras	18	55.95	52.07	62.36	70.62	42.74
St. Vincent and the Grenadines	-	53.44	74.58	38.66	-	52.93
Haiti	-	33.35	16.96	67.67	41.41	26.02
Antigua and Barbuda	-	-	-	49.12	-	68.98
Dominica	-	-	68.84	50.50	-	-
Cuba	-	-	73.16	-	-	55.11
St. Kitts and Nevis	-	-	-	38.95	-	-
Puerto Rico	-	-	-	86.64		-
Curacao	-	-	-	-	92.46	-
French Guiana	-	-	-	-	-	-
Guadeloupe	-	-	-	-	-	-
ASIA						
Hong Kong	-	93.68	100.00	87.58	93.87	-
Israel	19	81.62	85.07	68.04	86.08	89.08
South Korea	14	80.83	89.96	53.49	97.36	91.11
Japan	1	80.48	85.65	57.03	95.69	89.76
Cyprus	6	80.24	77.92	70.45	89.27	84.61
Kazakhstan	20	78.30	75.99	59.78	93.29	88.70
Singapore	9	77.99	90.88	74.07	95.87	57.32
China	3	76.56	72.13	58.30	93.15	87.73
Armenia	15	76.11	79.93	72.25	81.24	71.52
Georgia	5	74.27	71.45	68.60	78.91	78.66
Vietnam	13	72.44	70.06	67.99	89.11	64.88
Thailand	2	72.40	67.33	53.99	87.60	86.29
Mongolia	23	72.36	59.71	69.86	85.38	76.98
Turkmenistan	-	71.73	65.70	72.81	-	77.16
Kyrgyz Republic	12	71.38	65.02	54.56	85.56	85.55
Brunei Darussalam	18	70.87	81.75	47.12	82.02	79.84
Maldives	28	69.52	63.46	60.92	81.91	73.74
Tajikistan	24	68.92	49.45	62.21	95.81	76.54
Indonesia	10	68.26	69.92	72.21	92.89	46.29
Nepal	7	67.70	53.42	87.52	75.65	59.41
Uzbekistan	36	66.26	69.72	51.96	-	80.28
Malaysia	16	64.94	78.95	60.04	86.51	43.37
Philippines	4	64.57	61.51	85.10	81.83	40.57
United Arab Emirates	30	64.19	75.62	48.17	99.78	46.71
Timor-Leste	-	62.27	42.11	-	85.78	66.85
Jordan	31	61.06	62.29	47.05	75.48	62.83
Laos	11	60.90	67.17	76.16	69.28	38.82

Table 18 Scores on pillars for social inclusion by region and rank *(continued)*

Country	Regional Rank	Social Inclusion	Pillars			
			Access to basic services and resources	Gender balance	Social equity	Social protection
Saudi Arabia	34	60.83	62.75	53.40	84.11	48.57
Iraq	41	60.75	52.56	65.62	98.07	40.27
Lebanon	29	60.31	56.77	49.81	83.60	55.96
Iran	35	60.20	71.59	53.96	74.91	45.39
Bahrain	37	59.76	72.91	43.08	-	67.96
Azerbaijan	21	59.54	71.75	44.74	-	65.74
Cambodia	17	59.05	51.42	71.97	87.36	37.61
Sri Lanka	25	57.61	64.33	45.78	81.73	45.75
Bhutan	8	57.32	45.37	74.51	93.96	34.00
India	26	56.72	57.00	50.32	78.11	46.20
Myanmar	22	55.04	54.30	57.30	87.12	33.84
Qatar	32	54.62	68.25	56.30		42.42
Bangladesh	27	54.17	51.86	52.47	80.75	39.20
Oman	33	52.14	65.33	41.22		52.64
Kuwait	40	48.76	77.33	34.26		43.77
Pakistan	38	44.65	48.85	42.78	77.89	24.43
Syria	43	41.30	60.10	40.37		29.04
Afghanistan	39	36.29	41.04	39.99	50.36	20.98
Yemen	42	26.66	27.89	9.47	66.81	28.63
Palestine	-	-	-	-	76.95	54.54
North Korea	-	-	31.40	-	-	-
Macao	-	-	95.53	-	95.41	-
EUROPE						
Sweden	2	94.71	94.90	97.98	94.97	91.11
Austria	1	93.45	96.57	93.31	93.75	90.27
Netherlands	25	92.88	96.33	89.00	95.98	90.44
Norway	23	92.60	89.76	94.10	96.24	90.44
Switzerland	4	92.42	96.66	88.44	93.65	91.11
Germany	6	92.04	96.76	87.75	93.47	90.44
France	10	91.91	95.09	92.90	90.67	89.08
Spain	16	91.29	93.34	93.60	88.78	89.54
United Kingdom	9	90.95	92.35	89.32	90.35	91.79
Denmark	3	90.80	87.33	91.70	94.57	89.76
Finland	8	90.55	85.90	94.69	93.48	88.40
Belgium	28	90.54	86.38	92.52	93.69	89.76
Portugal	13	89.27	90.87	89.96	92.11	84.33
Luxembourg	21	88.23	83.49	85.63	93.73	90.44
Ireland	33	88.17	91.20	81.61	90.95	89.29
Iceland	38	87.29	83.82	93.19	96.60	76.96
Italy	11	87.15	87.37	90.39	85.30	85.63
Estonia	17	86.92	84.56	85.25	93.11	85.02

Table 18 Scores on pillars for social inclusion by region and rank *(continued)*

Country	Regional Rank	Social Inclusion	Pillars			
			Access to basic services and resources	Gender balance	Social equity	Social protection
Belarus	18	86.75	88.65	73.27	99.73	87.41
Poland	24	86.27	93.59	85.59	93.22	74.19
Czech Republic	5	85.85	86.34	81.40	95.75	80.71
Greece	27	84.85	87.76	79.50	89.58	82.94
Slovenia	22	84.64	81.77	76.27	95.27	86.37
Latvia	14	84.55	83.09	86.09	92.78	77.00
Lithuania	15	83.68	84.63	81.41	91.05	78.17
Bulgaria	29	82.58	83.72	84.71	85.57	76.64
Malta	39	82.37	84.26	67.54	92.90	87.05
Hungary	12	81.87	89.31	66.69	91.88	82.10
Croatia	19	81.66	79.81	79.50	91.50	76.59
Slovakia	7	81.43	82.25	71.78	93.45	79.69
Romania	20	80.02	86.59	69.78	88.07	77.06
Russia	37	77.26	79.83	60.86	88.39	82.99
Albania	32	76.54	64.90	86.29	82.58	74.22
Serbia	30	76.16	68.39	90.67	87.20	62.21
Moldova	34	74.83	73.35	73.77	77.70	74.59
Montenegro	35	72.47	71.25	57.60	85.24	78.86
Ukraine	36	72.06	83.79	41.72	89.58	86.12
Macedonia	26	71.85	65.52	75.70	85.68	62.71
Bosnia and Herzegovina	31	70.83	64.68	63.51	84.32	72.68
San Marino	-	-	-	64.53	-	-
OCEANIA						
Australia	3	87.84	82.50	86.35	91.70	91.11
New Zealand	1	87.11	84.75	84.57	88.82	90.44
Samoa	-	60.11	59.24	48.03	71.86	63.84
Fiji	2	65.01	63.90	43.38	86.08	74.86
Kiribati	-	59.27	49.81	56.95	68.31	63.68
Tonga	4	56.39	44.24	45.46	77.11	65.18
Micronesia, Fed. Sts.	-	52.26	38.13	38.13	79.31	64.71
Vanuatu	-	36.58	45.56	25.75	68.94	22.13
Solomon Islands	-	34.73	37.85	15.37	93.62	26.72
Papua New Guinea	-	27.66	30.99	13.38	87.70	16.10
Palau	-	-	-	50.50	88.08	-
Marshall Islands	-	-	-	47.12	71.29	-
New Caledonia	-	-	92.61	-	89.07	-
French Polynesia	-	-	92.05	-	-	-
Nauru	-	-	-	-	95.47	-
Tuvalu	-	-	-	-	77.22	-

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
AFRICA													
Gabon	1	60.41	100.00	7.90	37.88	100.00	-	95.24		99.95	97.43	86.28	57.01
Tanzania	2	58.83	100.00	34.67	3.72	100.00	-	99.46	14.23	99.31		96.50	48.85
Botswana	3	86.64	50.25	36.46	28.19	100.00	-	72.37		100.00	91.89	70.86	62.76
Morocco	4	81.47	21.59	20.11	4.32	49.01	6.88	99.30	1.37	99.58	93.92	90.25	73.03
Togo	5	44.28	100.00	17.13	8.97	100.00	4.01	99.95	13.50	99.43	87.60	95.22	44.40
Namibia	6	80.04	60.11	26.74	13.35	100.00	17.75	91.51	1.00	99.98	88.52	71.79	58.06
Cabo Verde	7	87.35	43.74		22.41	100.00	4.37	-	27.74	98.81	95.24		54.74
Cote d'Ivoire	8	81.63	100.00	37.65	14.96	100.00	-	99.28	4.43	99.88	93.24	93.81	65.60
Mauritius	9	91.08	18.22	26.36	8.14	100.00	-	78.03	1.20	96.55	97.35	87.14	62.22
Congo Republic	10	55.96	100.00	18.37	34.75	100.00	3.90	100.00	-	100.00	93.02	-	48.48
Senegal	11	78.85	72.65	10.82	3.84	100.00	9.49	94.47	2.35	99.17	90.21	94.42	35.96
Uganda	12	28.71	100.00	21.26	13.70	100.00	-	99.48	18.88	98.73	88.28	97.14	57.50
Kenya	13	65.82	100.00	29.01	5.37	83.68	1.60	99.52	10.60	98.76	93.17	95.58	55.28
Ghana	14	85.36	81.51	20.94	13.04	100.00	4.45	100.00	4.68	99.65	85.92	87.27	59.38
Ethiopia	15	48.18	100.00	14.84	2.83	85.63	-	94.10	14.05	98.09	84.18	96.22	43.45
South Africa	16	44.20	21.22	47.15	6.30	23.65	2.07	92.71	1.42	99.81	93.64	80.84	83.55
Rwanda	17	76.70	100.00	34.17	5.65	100.00	-	99.92	2.17	98.81	91.68	97.76	40.69
Zambia	18	51.67	100.00	19.68	6.00	100.00	-	88.81	1.00	99.84	79.23	89.26	44.95
Mali	19	71.54	100.00	21.74	1.64	100.00	-	99.75	1.74	99.52	77.43	92.68	67.66
Zimbabwe	20	24.82	100.00	6.55	2.58	79.40	-	95.68	1.20	99.67	88.12	93.57	16.58
Tunisia	21	78.21	24.50	21.07	4.79	1.00	-	98.56	41.51	99.58	94.11	88.43	78.96
Burkina Faso	22	72.33	100.00	22.75	5.73	100.00	-	97.27	11.31	98.80	80.76	94.93	58.92
Benin	23	62.80	90.50	26.90	15.51	100.00	3.23	100.00	11.69	99.22	88.88	94.91	63.15
Cameroon	24	73.60	100.00	21.92	10.53	100.00	2.74	100.00	1.00	99.19	91.27	95.58	56.86
Mozambique	25	13.22	100.00	24.78	3.83	100.00	6.25	100.00	1.47	99.96	90.57	97.37	21.09
Burundi	26	47.46	100.00	4.72	3.31	100.00	-	98.67	1.05	99.22	81.01	98.86	-
Sierra Leone	27	65.10	100.00	5.19	4.20	100.00	74.86		50.80	99.64	86.51	97.14	36.91
Gambia	28	84.41	95.84	15.63	5.41	100.00	65.75	97.78	1.14	99.16	89.00	-	23.85
Angola	29	84.65	100.00	4.15	52.75	100.00	25.03	99.74	1.00	99.93	96.15	93.07	47.11
Lesotho	30	43.33	77.02	11.63	18.54	100.00	-	-	1.00	99.69	73.56	91.73	49.09
Algeria	31	65.74	1.31	17.15	6.36	1.00	-	100.00	1.00	99.79	93.38	87.58	69.86
Nigeria	32	57.24	100.00	19.86	12.74	100.00	3.05	97.54	1.87	99.38	95.90	95.96	24.14
Egypt	33	80.91	11.21	29.33	2.34	1.00	-	29.44	100.00	96.07	93.04	-	72.78
Eswatini	34	70.90	100.00	-	2.26	1.00	-	-	2.05	99.50	89.66	-	61.21
Madagascar	35	39.99	100.00	15.25	1.22	100.00	37.45	100.00	3.07	99.81	84.60	97.95	28.14
Mauritania	36	82.27	48.57	13.37	2.40	100.00	-	-	-	99.88	84.44	86.12	47.74
Niger	37	68.36	100.00	4.92	1.92	100.00	-	99.54	1.00	99.58	73.87	95.58	41.93
Sudan	38	71.30	100.00	16.49	2.03	1.00	-	95.68	3.46	99.29	91.88	91.87	54.63
Libya	39	37.29	6.39	6.10	2.75	1.00	-	98.30	-	99.88	95.71	76.42	-
Malawi		82.74	100.00	21.60	2.20	100.00	-	91.48	4.05	99.00	81.54	96.74	59.51

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Central African Republic	-	41.34	100.00	7.46	7.44	100.00	-	95.01	-	98.88	72.76	96.17	44.03
Chad	-	78.05	100.00	16.16	4.81	100.00	-	-	-	99.02	62.58	90.04	10.28
Comoros	-	82.66	100.00	20.67	27.18	100.00	73.41	-	10.10	99.45	93.44	98.18	46.45
Djibouti	-	92.99	54.78	23.18	-	100.00	4.46	-	-	99.74	93.57	84.25	43.65
DR Congo	-	2.41	100.00	-	19.40	100.00	-	100.00	20.66	99.96	78.98	-	-
Equatorial Guinea	-	84.09	13.67	12.93	-	100.00	2.64	-	-	100.00	98.54	84.06	-
Eritrea	-	-	100.00	5.48	2.17	100.00	-	95.79	-	99.65	79.52	-	-
Guinea	-	63.75	100.00	9.16	4.53	100.00	16.29	99.91	1.14	99.48	70.23	87.59	48.35
Guinea-Bissau	-	39.76	100.00	15.18	2.24	100.00	19.48	-	3.88	98.74	86.60	98.61	32.56
Liberia	-	1.00	100.00	10.07	2.56	100.00	-	-	1.00	99.81	75.05	94.93	34.48
Mayotte	-	-	-	-	-	-	-	-	5.08	-	-	-	-
Reunion	-	-	-	-	-	100.00	-	-	100.00	-	-	-	-
Sao Tome and Principe	-	80.44	72.44	23.78	3.82	100.00	47.70	-	100.00	99.53	96.12	98.67	55.18
Seychelles	-	83.54	3.83	-	38.14	-	6.68	-	-	97.68	98.28	80.98	72.02
Somalia	-	15.52	100.00	9.41	1.00	100.00	-	-	-	99.67	1.00	97.07	-
South Sudan	-	-	52.33		4.26	100.00	-	-	-	99.43	80.51	95.69	-
St. Helena	-	-	19.12	-	-	-	-	-	-	-	-	-	-
THE AMERICAS													
Paraguay	1	81.07	100.00	27.95	6.18	100.00	-	-	9.65	99.22	89.29	70.86	78.08
United States	2	72.17	21.07	63.60	17.58	93.74	1.15	-	11.69	99.45	98.82	-	85.05
Brazil	3	76.78	92.62	34.53	8.79	100.00	-	-	17.44	98.74	92.89	71.78	80.56
Canada	4	52.87	43.59	58.48	16.83	100.00	1.55	82.66	100.00	99.53	96.23	10.04	86.76
Dominican Republic	5	91.48	27.93	24.06	4.19	71.18	-	100.00	80.92	97.06	97.14	93.06	85.83
Mexico	6	83.70	20.92	36.65	5.80	60.96	1.72	87.80	4.66	99.34	96.61	83.29	73.39
Peru	7	87.35	53.24	25.07	2.78	100.00	2.73	88.20	100.00	99.41	90.93	73.04	71.03
Costa Rica	8	91.24	69.88	28.26	7.40	100.00	1.15	50.07	12.94	98.62	97.70	80.55	74.99
Bolivia	9	77.66	17.70	14.25	6.19	100.00	-	-	9.14	99.52	86.52	80.63	70.78
Panama	10	95.77	37.42	43.91	19.60	100.00	3.21	93.38	8.66	98.95	98.56	84.21	79.04
Bahamas	11	87.91	3.20	19.65	-	-	5.34	68.93	100.00	95.86	99.30	-	77.26
Chile	12	78.93	49.65	45.24	3.68	100.00	2.28	49.00	6.12	99.58	88.60	27.86	78.19
Ecuador	13	82.11	35.15	31.16	4.33	100.00	3.09	72.70	30.36	98.42	96.27	88.40	69.55
El Salvador	14	81.23	38.35	21.27	4.82	100.00	3.03	82.19	3.02	99.05	96.13	91.36	75.72
Uruguay	15	86.00	100.00	24.81	5.90	100.00	1.53	-	100.00	98.92	96.86	70.07	84.37
Nicaragua	16	70.82	98.67	19.83	3.31	100.00	4.18	87.67	16.22	98.61	86.48	88.08	56.90
Colombia	17	88.07	60.17	33.10	4.49	100.00	1.27	78.00	2.28	99.24	96.44	87.81	83.77
Honduras	18	73.84	89.52	22.19	5.77	100.00	1.24	79.36	23.61	98.66	93.47	91.52	62.64
Argentina	19	81.39	21.69	31.34	5.66	100.00	3.08	-	86.29	99.53	96.32	76.52	86.21
Jamaica	20	72.65	18.51	19.43	4.24	100.00	3.23	93.56	2.62	98.74	95.62	85.76	75.00
Guatemala	21	74.32	100.00	16.07	7.83	100.00	1.41	77.85	53.26	98.21	93.70	87.31	61.70

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Trinidad and Tobago	22	1.00	1.83	16.10	22.41	100.00	1.39	1.00	-	86.74	97.12	79.84	70.81
Anguilla	-	-	1.94	-	-	-	13.92	-	-	-	99.90	-	-
Antigua and Barbuda		80.60	2.75	-	46.82	100.00	6.89	-	-	98.18	99.00	90.49	71.16
Aruba	-	82.58	15.41	-	-	-	-	-	-	-	98.64	81.17	-
Barbados	-	79.88	9.30	-	20.26	1.00	1.36	45.18	-	90.01	99.64	96.42	78.51
Belize	-	59.38	57.03	-	6.10	100.00	7.48	83.73	29.69	98.88	90.84	70.99	80.53
Bermuda	-	94.90	2.62	-	-	100.00	1.47	-	-	-	99.88	86.97	-
Bonaire, Saint Eustatius and Saba	-	-	24.90	-	-	-	-	-	-	-	-	-	-
British Virgin Islands	-	-	3.37	-	-	-	-	-	7.60	-	99.92	98.02	-
Cayman Islands	-	91.64	1.00	-	-	-	1.36		-	-	99.92	94.09	-
Cuba	-	97.92	42.49	9.04	5.71	100.00	-	97.27	1.40	98.98	96.61	88.70	81.33
Curacao	-	41.74	6.16	-	-	-	-	-	-	-	99.99	-	-
Dominica	-	84.41	16.50	-	-	100.00	3.44		24.96	99.14	98.66	1.00	65.43
Falkland Islands	-	-	9.86	-	-	-	-	-	26.05	-	-	-	-
Greenland	-	-	25.27	-	-	-	100.00	-	-	-	100.00	88.74	-
Grenada	-	86.71	20.97	-	-	100.00	8.08	-	36.36	98.23	99.54	98.54	83.40
Guadeloupe	-	-	-	-	-	-	-	-	21.21	-	-	-	-
Guyana	-	76.39	22.86	14.25	1.89	100.00	7.39	94.56	-	99.52	86.50	68.55	90.15
Haiti	-	61.92	100.00	6.29	2.66	100.00	3.18	-	2.99	98.28	95.57	98.37	41.85
Martinique	-	-	-	-	-	-	-	-	62.42	-	-	-	-
Montserrat	-	-	1.81	-	-	-	2.21	-	-	-	-	-	-
Puerto Rico	-	100.00	5.66	-	11.70	100.00	-	-	-	-	99.77	99.42	
Saint-Martin	-	-		-	-	-	-	-	-	-	-	-	-
Sint Maarten	-	39.52	1.10	-	-	-	-	-	-	-	-	-	-
St. Kitts and Nevis	-	87.51	4.04	-	-	48.85	2.60	-	-	-	-	-	67.08
St. Lucia	-	85.44	19.78	-	-	100.00	-	-	-	-	99.18		55.98
St. Pierre and Miquelon	-	-	2.73	-	-	-	-	-	-	-	-	-	-
St. Vincent and the Grenadines	-	88.30	11.94	-	-	100.00	1.24	-	-	97.92	97.99	-	77.05
Suriname	-	76.46	28.74	-	3.54	100.00	15.34	77.05	93.44	98.04	83.32	51.56	69.11
Turks and Caicos Islands	-	70.58	1.87	-	-	-	2.60	-	-	-	99.86	94.81	-
United States Virgin Islands	-	-	8.05	-	-	-	-	-	81.28	-	-	-	-
Venezuela	-	-	31.09	10.07	2.79	100.00	-	67.88	1.34	98.93	95.19	-	60.21
ASIA													
Japan	1	81.55	15.81	68.15	22.20	77.49	-	72.46	19.73	96.57	99.09	78.67	83.75
Thailand	2	72.09	47.15	48.28	3.78	100.00	4.11	84.36	13.93	99.38	94.38	82.22	73.50

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Cyprus	3	86.79	24.21	39.87	28.15	94.83	1.12	72.50	100.00	98.08	96.57	44.76	69.37
Philippines	4	86.71	52.48	31.88	2.47	97.52	7.27	91.69	30.55	98.78	93.65	88.85	60.29
Georgia	5	77.58	49.58	16.98	4.37	100.00	1.16	71.37	2.46	99.50	93.27	82.08	72.23
Bhutan	6	45.16	100.00	8.13	3.23	100.00	-	90.37	79.71	99.38	75.83	59.12	-
China	7	57.87	28.83	54.55	10.17	63.92	-	-	7.82	99.31	93.14	70.20	87.58
Singapore	8	87.59	2.62	67.19	-	1.00	-	-	100.00	1.00	99.12	25.37	-
Nepal	9	66.45	100.00	19.25	1.80	100.00	-	85.38	7.66	96.43	84.66	93.50	72.77
Indonesia	10	82.90	37.77	39.84	2.47	90.70	11.49	88.75	4.01	98.52	94.99	90.12	62.15
Kyrgyz Republic	11	68.60	54.70	20.32	1.26	50.42	-	93.55	4.00	99.72	79.83	-	84.07
Laos	12	73.45	94.28	25.30	1.65	100.00	-	-	29.04	97.42	83.37	-	79.53
Vietnam	13	68.92	36.92	43.85	1.93	100.00	12.43	65.61	11.76	98.01	89.39	-	76.67
South Korea	14	65.82	7.47	54.78	21.48	1.00	-	48.42	82.73	92.81	98.13	-	81.71
Armenia	15	79.96	20.92	22.31	2.29	35.06	-	47.09	1.42	99.55	89.13	78.09	81.76
Malaysia	16	74.24	10.84	42.13	23.73	100.00	6.73	98.34	1.32	99.29	94.28	63.60	1.00
Cambodia	17	70.82	100.00	21.37	4.02	100.00	6.75	96.51	16.73	99.16	85.88	90.14	36.49
Brunei Darussalam	18	57.55	1.02	25.50	-	100.00	3.43	-	-	79.45	99.11	14.61	-
Israel	19	88.07	9.61	44.94	51.09	1.00	-	66.99	24.40	97.53	98.36	61.75	70.25
Kazakhstan	20	58.19	4.27	28.85	3.72	84.85	-	100.00	2.14	99.98	92.04	44.40	91.08
Azerbaijan	21	71.38	4.12	17.16	2.35	39.42	-	93.31	12.38	99.05	95.39	83.67	82.57
Myanmar	22	79.56	100.00	12.29	1.66	100.00	18.78	90.25	4.34	96.65	92.07	93.41	62.56
Mongolia	23	52.31	7.39	14.73	9.93	100.00	-	-	1.00	99.86	66.97	23.72	79.71
Sri Lanka	24	93.87	97.13	21.99	3.28	1.00	7.64	99.70	48.76	99.48	97.89	95.55	63.95
United Arab Emirates	25	81.31	2.29	65.91	28.85	1.00	-	-	100.00	94.95	98.11	8.47	54.48
Tajikistan	26	69.55	75.27	13.64	1.27	11.01	-	93.09	6.64	99.26	84.33	92.93	63.43
India	27	74.00	64.43	40.70	2.09	17.85	2.95	69.77	21.45	98.30	91.89	93.90	81.50
Bangladesh	28	89.26	48.67	21.30	3.42	100.00	3.90	66.49	1.11	95.95	95.56	97.73	72.23
Maldives	29	86.64	3.14	24.18		100.00	27.46	-	-	-	97.59	88.43	55.84
Lebanon	30	79.25	11.52	25.84	9.77	33.09	-	82.09	4.30	97.72	96.52	86.51	60.16
Jordan	31	77.82	16.74	24.90	13.24	1.00	-	82.25	11.05	98.83	95.40	89.80	50.51
Oman	32	50.56	1.00	41.35	18.94	1.00	6.54	-	1.00	99.07	94.81	48.73	75.61
Saudi Arabia	33	63.67	1.06	35.35	11.42	1.00	-	86.44	1.10	100.00	96.18	55.18	53.89
Iran	34	19.65	2.89	30.23	2.49	1.00	2.97	92.49	1.86	99.26	93.46	-	82.93
Qatar	35	54.06	1.08	50.32	78.88	1.00	-	-	-	90.68	98.01	1.00	-
Uzbekistan	36	41.50	4.02	21.32	1.50	1.00	-	49.65	1.00	99.33	90.34	87.99	89.22
Pakistan	37	71.54	84.51	16.21	1.51	1.00	2.40	65.09	4.32	96.70	92.13	96.15	66.68
Kuwait	38	49.21	1.12	30.50	40.66	1.00	1.09	-	2.98	92.43	96.31	23.08	68.76
Afghanistan	39	88.86	36.65	1.00	1.23	41.08	-	-	1.00	99.76	93.51	99.46	35.26
Bahrain	40	38.64	1.00	32.88	30.45	1.00	1.57	-	-	77.43	96.20	48.95	-
Iraq	41	63.75	1.83	8.36	2.17	1.00	1.16	93.69	1.00	99.48	97.36	88.84	19.62
Yemen	42	-	6.99	11.24	2.88	1.00	12.32	100.00		99.74	94.86	-	13.48

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Syria	43	24.58	2.96	12.22	1.30	1.00	-	100.00	2.54	99.77	91.68	-	-
Turkey	-	-	-	39.70	-	-	-	-	-	-	-	-	82.49
Hong Kong	-	97.52	1.44	64.73	-	-	-	-	-	81.87	99.13	-	21.28
North Korea	-	-	22.78	-	1.55	94.57	-	-	-	99.04	81.27	-	58.33
Palestine	-	86.16	27.70	-	12.79	56.42	-	-	14.17	99.21	95.67	-	-
Timor-Leste	-	91.08	23.48	-	1.45	93.53	-	-	100.00	98.35	91.45	94.60	36.25
Turkmenistan	-	5.75	1.12	15.91	1.42	1.00	-	-	-	99.89	92.35	76.57	79.93
Taiwan	-	-	-	54.38	-	-	-	-	-	-	-	-	-
EUROPE													
Austria	1	85.60	66.04	68.16	40.05	100.00	-	67.15	100.00	98.47	98.90	62.64	98.30
Sweden	2	77.82	100.00	69.03	75.85	100.00	1.17	76.24	100.00	99.10	98.73	54.07	89.53
Denmark	3	92.12	73.27	67.05	100.00	100.00	1.66	71.08	100.00	96.91	98.99	57.10	82.85
Switzerland	4	94.66	48.69	64.13	100.00	100.00	-	26.09	100.00	97.85	99.69	71.72	87.08
Germany	5	86.08	34.07	73.83	42.97	83.17	1.05	62.36	100.00	98.28	98.95	70.68	94.83
Czech Republic	6	75.27	31.53	56.98	47.75	90.70	-	64.52	100.00	99.33	97.43	-	90.94
Slovakia	7	75.35	34.98	35.87	53.39	100.00	-	80.07	100.00	99.52	97.62	-	81.30
United Kingdom	8	89.73	24.58	66.90	100.00	100.00	1.16	41.56	32.72	98.52	99.35	77.62	94.54
Finland	9	66.77	89.14	66.32	28.58	100.00	1.32	82.49	100.00	99.19	97.96	41.17	93.65
France	10	81.87	30.91	62.29	32.59	100.00	1.20	68.41	100.00	98.69	99.17	79.11	80.28
Italy	11	88.54	34.26	58.89	19.42	90.10	1.09	75.59	100.00	98.81	99.32	84.52	94.85
Portugal	12	87.83	55.30	55.78	12.39	100.00	2.16	70.97	100.00	98.93	98.50	77.84	88.43
Hungary	13	80.12	27.27	48.53	11.11	100.00	-	81.97	70.60	99.64	96.89	72.73	81.20
Luxembourg	14	89.42	32.68	55.36	100.00	100.00	-	9.12	79.12	97.46	99.49	19.26	92.92
Lithuania	15	83.54	65.58	35.56	61.90	100.00	1.46	83.12	100.00	99.65	96.42	49.32	92.20
Norway	16	81.55	100.00	57.51	50.22	100.00	7.37	47.12	100.00	97.61	97.99	13.10	95.13
Croatia	17	83.62	61.86	38.36	23.57	100.00	1.71	69.21	100.00	99.24	97.88	76.13	86.19
Latvia	18	82.74	80.97	28.85	55.83	100.00	1.89	87.73	100.00	99.74	97.41	57.85	91.56
Spain	19	87.03	34.26	61.87	15.83	69.95	1.48	82.97	100.00	99.02	98.98	80.02	88.91
Romania	20	89.10	46.34	-	11.84	100.00	1.09	99.53	49.59	99.48	96.28	77.28	100.00
Slovenia	21	80.20	41.18	45.17	17.88	100.00	1.00	49.80	100.00	98.92	98.26	57.84	90.12
Netherlands	22	83.77	17.45	67.94	33.65	100.00	1.26	-	61.98	93.96	98.98	46.81	97.89
Estonia	23	72.33	61.27	45.06	9.53	100.00	2.06	84.91	100.00	99.60	95.04	33.70	95.99
Belarus	24	60.57	16.08	21.24	13.90	100.00	-	74.17	-	99.29	-	73.80	95.89
Poland	25	80.83	24.46	52.43	19.34	87.93	1.08	68.08	62.99	99.04	96.17	70.46	96.16
Belgium	26	77.26	20.67	68.58	39.10	42.45	1.07	11.02	100.00	95.42	98.56	38.88	100.00
Macedonia	27	81.07	32.43	25.45	4.83	99.47	-	87.65	5.82	99.70	92.95	78.94	83.21
Greece	28	84.97	36.65	41.60	7.30	100.00	1.45	89.46	100.00	99.52	97.90	76.12	68.56
Bulgaria	29	70.35	38.25	36.09	4.28	70.15	1.05	85.94	42.16	99.79	92.61	67.64	82.01
Serbia	30	67.96	42.47	29.85	3.25	100.00	-	97.43	13.46	99.24	91.22	69.39	89.79
Montenegro	31	80.99	75.62	26.77	9.39	-	-	-	82.11	99.48	93.51	80.66	83.05
Bosnia and Herzegovina	32	59.22	72.30	28.80	-	100.00	-	78.50	2.54	99.52	92.26	76.42	87.28

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Albania	33	88.14	78.43	23.99	4.24	100.00	-	80.70	2.16	99.07	93.07	84.06	88.70
Ireland	34	97.52	24.77	51.49	91.36	100.00	1.29	-	21.96	97.44	99.20	45.19	93.81
Moldova	35	69.63	43.45	17.40	4.12	100.00	-	97.39	15.74	99.52	88.28	79.88	72.78
Ukraine	36	52.79	15.33	29.50	3.58	100.00	-	97.68	14.07	99.81	83.80	80.34	89.35
Russia	37	43.65	7.20	27.13	8.12	100.00	-	98.85	19.33	99.86	94.74	72.13	100.00
Iceland	38	10.52	100.00	42.26	24.25	100.00	23.38	-	22.95	99.91	99.08	29.58	93.88
Malta	39	97.12	15.83	28.97	71.14	1.00	1.03	32.16	8.44	97.18	98.46	44.88	70.13
Andorra	-	-	36.44	-	-	-	-	-	1.21	-	97.94	66.00	-
Faeroe Islands	-	-	11.40	-	-	-	100.00	-	4.13	95.38	-	-	-
Gibraltar	-	-	1.00	-	-	-	-	-	-	-	-	-	-
Guernsey	-	-	1.00	-	-	-	-	-	-	-	-	-	-
Isle of Man	-	-	4.66	-	-	-	-	-	-	-	-	-	-
Jersey	-	-	35.11	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	100.00	-	-	-	-	-	100.00	-	99.96	99.86	-
Monaco	-	-	-	-	-	-	-	-	-	-	99.99	100.00	-
San Marino	-	-	-	-	-	-	-	-	-	-	99.95	100.00	-
Kosovo	-	64.86	51.27	-	-	-	-	-	-	-	-	-	-
OCEANIA													
New Zealand	1	76.07	58.11	63.30	14.97	100.00	6.73	-	17.83	98.06	97.85	49.12	95.18
Fiji	2	90.93	52.00	14.03	17.21	100.00	6.27	96.43	100.00	99.19	97.63		70.95
Australia	3	73.84	20.51	59.28	31.57	100.00		93.19	100.00	99.91	97.72	1.00	84.09
Tonga	4	80.83	4.41	-	-	-	17.38	100.00	55.77	98.26	75.26	67.08	-
American Samoa	-	-	1.96	-	-	-	-	-	-	-	-	-	-
Cook Islands	-	-	8.11	-	-	-	4.96	-	100.00	95.86	99.80	-	-
French Polynesia	-	-	15.77	-	-	-	20.89	-	100.00	99.41	99.55	96.69	78.74
Guam	-	-	6.82	-	-	-	-	-	-	-	-	-	-
Kiribati	-	60.89	80.03	-	-	-			94.34	99.55	89.72	95.42	63.33
Marshall Islands	-	30.62	23.54	-	-	-	100.00	-	-	-	99.13	98.43	-
Micronesia, Fed. Sts.	-	64.15	4.43	-	-	-	95.71	-	-	98.40	97.21	-	-
Nauru	-	67.80	2.17	-	-	-	-	-	-	97.22	97.98	91.89	-
New Caledonia	-	-	11.40	-	-	-	-	-	36.52	99.40	95.47	36.04	70.52
Niue	-	-	44.11	-	-	-	-	-	38.21	99.81	-	-	-
Northern Mariana Islands	-	-	1.00	-	-	-	-	-	-	-	-	-	-
Palau	-	31.41	1.56	-	-	-	14.12	-	-	-	99.40	91.47	-
Papua New Guinea	-	66.06	100.00	8.29	-	100.00		94.40	100.00	99.28	91.65	89.24	76.43
Pitcairn	-	-	-	-	-	-	-	-	-	-	-	-	-
Samoa	-	72.73	66.89	-	-	-	17.89		100.00	98.20	95.24	92.92	82.48
Solomon Islands	-	74.08	94.20	21.13	-	-	-	-	100.00	99.72	87.84	90.65	70.87

Table 19 Normalized values of green growth indicators for efficient and sustainable resource use *(continued)*

Country	Regional Rank	Indicators											
		EE1	EE2	EE3	EW1	EW2	EW3	SL1	SL2	SL3	ME1	ME2	ME3
Tokelau	-	-	-	-	-	-	-	-	-	99.34	-	-	-
Tuvalu	-	87.27	16.79	-	-	-	-	-	-	96.75	99.59	99.62	-
Vanuatu	-	79.96	62.36	-	-	-	5.18	-	60.66	98.71	91.85	93.64	68.28
Wallis and Futuna Islands	-	-	2.37	-	-	-	-	-	-	-	-	-	-

Definitons:
EE1: Ratio of total primary energy supply to GDP (MJ per $2011 PPP GDP)
EE2: Share of renewable to total final energy consumption (Percent)
EW1: Water use efficiency (USD per m3)
EW2: Share of freshwater withdrawal to available freshwater resources (Percent)
SL1: Average soil organic carbon content (Ton per hectare)
SL2: Share of organic agriculture to total agricultural land area (percent)
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)

Table 20 Normalized values of green growth indicators for natural capital protection

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
AFRICA													
Tanzania	2	78.74	57.64	86.57	99.31	85.39	65.83	53.90	100.00	12.22	48.38	25.21	100.00
Morocco	4	74.82	89.92	85.81	91.78	92.78	87.14	60.46	75.93	10.21	80.86	62.75	100.00
Botswana	3	85.40	63.46	92.61	83.66	70.06	31.52	35.05	100.00	36.85	95.91	-	100.00
Cabo Verde	7	72.38	88.02	81.64	95.02	96.35	94.45	10.43	67.07	22.94	84.20	100.00	1.11
Mauritius	9	95.03	98.77	75.29	85.22	50.81	96.64	9.33	100.00	29.68	2.47	66.92	1.08
Uganda	12	54.86	55.54	85.73	99.59	90.09	79.39	69.43	68.90	23.17	59.11	-	100.00
Kenya	13	79.29	39.09	90.42	98.61	93.71	73.89	37.53	37.95	47.28	66.41	23.00	78.04
Senegal	11	65.79	35.52	88.70	97.42	86.82	79.13	27.07	100.00	11.22	89.71	22.98	100.00
Ghana	14	72.45	63.94	88.35	97.78	85.46	90.14	60.01	100.00	23.32	73.17	11.27	58.13
Ethiopia	15	67.70	26.29	95.42	99.60	91.35	68.94	17.82	89.07	29.01	74.88	-	100.00
South Africa	16	83.17	71.39	74.57	66.03	79.14	84.06	39.38	82.85	20.78	62.46	35.93	92.56
Tunisia	21	69.17	96.17	82.76	88.38	86.93	88.07	41.98	27.34	14.57	95.14	63.85	39.19
Malawi	-	84.88	30.89	94.50	99.85	88.42	87.07	51.44	100.00	19.17	67.74	-	100.00
Cameroon	24	30.01	1.00	89.29	98.74	32.61	84.25	34.69	100.00	62.21	72.96	14.17	81.49
Zimbabwe	20	86.34	49.91	91.80	96.36	87.32	76.57	81.84	100.00	22.93	65.19	-	100.00
Rwanda	17	62.98	52.80	73.77	99.84	98.14	91.62	38.39	66.15	34.73	80.42	-	67.84
Angola	29	75.05	30.25	88.08	96.22	85.11	59.44	37.49	100.00	8.00	87.99	4.26	37.70
Gambia	28	73.27	59.64	89.54	99.11	91.13	83.07	45.80	100.00	10.65	96.51	41.24	11.02
Madagascar	35	86.02	1.00	89.27	99.66	97.15	73.46	32.62	100.00	38.69	58.25	26.13	18.20
Burundi	26	67.79	1.00	80.23	100.00	97.97	91.07	63.85	64.41	28.57	81.75	-	56.67
Lesotho	30	79.91	1.00	97.42	94.65	77.86	80.64	11.88	7.62	18.02	90.17	-	2.91
Eswatini	34	92.01	31.68	88.47	95.85	77.66	73.95	14.99	100.00	18.56	68.53	-	32.23
Egypt	33	14.18	89.91	82.99	89.02	87.87	90.66	38.73	1.26	28.71	85.96	43.58	85.71
Nigeria	32	31.12	1.00	87.30	97.21	87.87	88.33	57.05	100.00	32.12	75.28	8.51	86.14

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
Niger	37	6.31	1.00	85.00	99.78	87.59	59.56	71.25	5.96	9.82	89.09	-	100.00
Algeria	31	67.81	96.18	78.28	83.87	68.07	91.22	56.59	5.77	7.79	84.77	16.93	53.11
Benin	23	67.68	38.63	91.21	97.11	92.91	85.37	17.50	100.00	24.92	84.19	8.66	100.00
British Indian Ocean Territory	-	-	-	-	-	-	-	50.48	-	-	65.96	42.07	-
Burkina Faso	22	63.29	4.25	89.92	99.26	96.94	65.13	69.07	100.00	12.04	97.76	-	100.00
Central African Republic	-	47.80	1.00	82.57	99.92	1.00	1.00	73.32	100.00	51.13	89.25	-	100.00
Chad	-	37.55	1.00	91.92	99.93	85.78	1.00	59.96	20.95	22.08	85.52	-	100.00
Comoros	-	88.24	46.70	91.72	98.82	100.00	89.54	61.72	100.00	16.24	58.89	24.82	1.92
Congo Republic	10	59.16	42.73	87.91	97.45	88.21	77.94	70.58	100.00	46.91	94.31	8.27	100.00
Cote d'Ivoire	8	82.29	52.93	84.52	98.51	94.38	92.87	80.30	52.95	22.81	83.52	24.71	100.00
Djibouti	-	60.38	57.03	89.07	97.91	94.04	77.38	1.55	2.42	21.44	68.77	48.61	10.03
DR Congo	-	61.09	37.41	87.03	100.00	92.29	83.09	48.58	100.00	54.35	79.97	1.00	100.00
Equatorial Guinea	-	51.80	82.42	88.47	77.20	1.00	99.54	75.24	100.00	50.54	66.28	17.09	13.94
Eritrea	-	57.61	1.00	88.47	99.09	84.82	56.36	1.00	51.77	17.73	82.50	47.46	22.69
French Southern Territories	-	-	-	-	-	-	-	67.21	-	-	69.05	-	-
Gabon	1	61.67	78.80	84.41	90.35	73.20	92.22	56.02	100.00	52.56	92.06	4.56	100.00
Guinea	-	82.10	24.87	94.85	99.10	88.44	53.11	76.02	100.00	31.30	82.10	9.27	100.00
Guinea-Bissau	-	77.96	1.00	88.40	99.49	94.32	66.08	28.26	100.00	20.40	86.35	23.93	86.21
Liberia	-	91.10	15.57	88.60	98.99	62.21	96.83	38.13	100.00	48.43	83.57	19.77	9.88
Libya	39	50.67	95.91	75.29	59.92	1.00	86.60	1.00	1.72	12.38	94.77	5.90	3.11
Mali	19	68.20	7.06	91.44	98.90	96.35	46.36	50.86	64.46	11.71	96.57	-	61.36
Mauritania	36	58.29	38.40	90.83	96.13	97.91	35.73	12.98	2.77	13.27	95.95	20.28	8.92
Mayotte	-	-	-	-	-	-	-	70.49	-	-	77.52	53.88	-
Mozambique	25	87.41	51.05	93.53	99.22	92.63	59.12	48.69	100.00	24.41	66.23	14.23	99.62
Namibia	6	82.88	59.47	88.32	92.32	88.21	21.25	88.30	47.96	16.57	94.88	43.15	100.00
Reunion	-	-	-	-	-	-	-	52.85	-	29.87	29.31	-	-
Sao Tome and Principe	-	79.34	87.65	90.53	97.22	95.48	98.57	86.38	100.00	38.53	64.05	62.27	2.79
Seychelles	-	88.65	95.05	61.20	70.88	61.42	100.00	55.71	100.00	40.91	45.94	100.00	58.64
Sierra Leone	27	87.04	27.91	92.07	99.63	94.28	84.14	64.67	100.00	19.94	88.19	8.17	25.18
Somalia	-	75.44	1.00	88.47	100.00	94.54	55.81	1.00	56.51	24.67	84.13	47.65	7.06
South Sudan	-	60.35	1.00	82.94	99.67	82.90	1.00	44.48	66.96	-	88.11	-	100.00
St. Helena	-	-	-	-	-	-	-	29.96	-	-	42.69	35.24	-
Sudan	38	49.43	69.58	94.86	98.05	93.07	45.76	17.28	58.24	13.93	87.40	9.35	21.19
Togo	5	71.32	1.00	89.12	98.94	91.09	88.78	54.13	100.00	28.93	76.18	17.10	100.00
Western Sahara	-	-	-	-	-	-	-	-	-	10.21	89.21	29.67	-
Zambia	18	80.56	36.84	87.02	98.23	89.07	23.66	56.52	100.00	11.16	79.26	-	100.00

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
THE AMERICAS													
Mexico	6	87.83	96.42	69.92	83.13	78.83	76.60	45.35	100.00	13.11	46.80	95.03	100.00
Brazil	3	96.98	94.81	72.96	91.28	88.11	27.84	47.67	100.00	40.70	83.39	26.71	100.00
Canada	4	100.00	99.85	49.56	29.99	39.27	50.63	32.58	100.00	21.88	93.98	50.66	53.48
United States	2	100.00	99.88	42.00	31.26	49.39	64.12	34.46	100.00	22.86	72.05	44.80	100.00
Paraguay	1	97.87	94.82	80.50	94.71	61.73	1.00	47.87	100.00	17.13	92.24	-	100.00
Peru	7	83.52	93.71	80.79	92.53	88.82	76.07	39.14	100.00	55.91	54.78	20.34	97.86
Chile	12	87.70	99.04	72.39	79.52	84.69	83.11	37.42	100.00	51.64	61.46	32.08	100.00
El Salvador	14	83.87	92.66	80.96	95.78	89.01	88.54	49.20	100.00	27.24	67.77	26.30	16.78
Dominican Republic	5	95.85	88.67	72.48	89.51	90.11	73.80	84.40	100.00	20.10	55.39	38.24	100.00
Ecuador	13	94.55	95.38	76.62	89.76	80.80	78.17	45.11	100.00	41.88	46.93	23.56	100.00
Colombia	17	92.72	96.45	81.36	93.12	79.94	62.16	51.25	100.00	43.52	56.26	19.34	100.00
Bolivia	9	87.11	91.21	85.29	91.10	85.86	22.43	50.81	100.00	31.31	79.99	-	100.00
Costa Rica	8	93.62	97.64	78.14	92.74	83.09	75.76	46.25	100.00	46.26	68.52	55.27	36.50
Nicaragua	16	91.51	93.42	81.03	96.58	90.70	47.64	66.90	100.00	22.02	70.32	29.65	100.00
Bahamas	11	91.79	95.77	51.26	73.40	77.41	97.65	15.87	100.00	10.19	48.90	100.00	63.74
Uruguay	15	100.00	98.57	73.82	91.66	76.65	1.00	27.07	68.58	23.40	75.76	79.71	17.94
Argentina	19	96.31	98.30	70.28	82.08	67.65	11.67	40.18	61.80	43.89	73.80	28.36	69.92
Honduras	18	88.15	84.16	83.12	95.59	86.83	76.92	71.79	100.00	25.41	56.89	32.86	81.62
Panama	10	98.44	93.18	73.56	89.16	74.77	74.48	60.96	100.00	34.51	54.77	63.58	39.39
Guatemala	21	84.32	78.78	87.96	95.26	90.47	81.26	32.22	100.00	29.65	52.59	16.16	75.22
Anguilla	-	-	-	-	-	-	-	11.35	-	49.50	86.83	100.00	-
Antigua and Barbuda	-	90.39	94.79	77.48	75.01	1.00	93.72	9.13	100.00	49.50	81.58	93.27	2.94
Aruba	-	-	-	38.98	-	-	-	16.11	14.59	-	93.07	100.00	2.03
Barbados	-	85.42	95.75	55.52	80.18	1.00	94.71	2.14	86.32	-	82.91	93.49	1.06
Belize	-	85.50	91.97	79.91	92.15	67.26	68.59	44.76	100.00	49.73	61.95	99.93	100.00
Bermuda	-	98.16	96.13	9.55	-	-	-	14.85	100.00	-	35.34	100.00	1.00
Bonaire, Saint Eustatius and Saba	-	-	-	-	-	-	-	34.66	-	-	80.50	-	-
British Virgin Islands	-	-	-	26.97	-	-	-	4.32	100.00	49.50	59.93	100.00	1.17
Cayman Islands	-	-	-	27.54	-	-	-	41.53	100.00	-	70.17	96.20	1.76
Cuba	-	89.18	95.12	83.05	90.11	87.30	71.36	73.53	100.00	27.23	43.71	17.58	50.47
Curacao	-	-	-	88.61	-	-	-	23.17	1.92	19.24	75.33	100.00	2.95
Dominica	-	89.42	94.05	87.08	88.69	90.70	83.07	9.25	100.00	-	44.26	75.22	5.43
Falkland Islands	-	-	-	-	-	-	-	10.86	-	1.00	54.81	46.57	-
French Guiana	-	-	-	-	-	-	-	59.67	-	85.29	89.49	30.31	-
Greenland	-	98.21	99.75	37.22	-	-	-	23.15	1.00	-	84.65	41.66	100.00
Grenada	-	85.82	94.45	80.06	87.88	1.00	94.56	32.54	100.00	26.26	47.54	100.00	2.63
Guadeloupe	-	-	-	-	-	-	-	67.39	-	81.14	36.52	-	-
Guyana	-	86.21	86.09	82.92	85.86	89.92	12.52	-	100.00	100.00	79.07	27.27	38.87

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
Haiti		94.40	40.00	84.86	98.87	96.61	87.90	22.69	74.39	22.83	52.36	9.94	21.28
Jamaica	20	96.21	95.60	73.98	86.92	93.27	94.12	19.12	100.00	37.60	44.28	81.48	11.31
Martinique	-	-	-	-	-	-	-	98.33	-	71.67	59.99	-	-
Montserrat	-	-	-	-	-	-	-	22.18	-	-	68.42	100.00	-
Puerto Rico	-	100.00	95.46	14.17	-	-	-	41.70	100.00	19.60	45.70	-	15.81
Saint-Martin	-	-	-	64.32	-	-	-	37.75	100.00	29.75	88.66	97.62	100.00
Sint Maarten	-	-	-	-	-	-	-	3.84	64.37	-	98.67	100.00	60.41
South Georgia and South Sandwich Is.	-	-	-	-	-	-	-	17.46	-	-	83.52	-	-
St. Barths	-	-	-	-	-	-	-	32.53	-	29.75	98.42	-	-
St. Kitts and Nevis	-	-	91.86	56.74	77.50	52.14	94.23	27.86	100.00	49.50	55.60	100.00	33.73
St. Lucia	-	86.18	93.45	68.76	90.39	58.76	93.34	34.37	100.00	68.90	68.05	100.00	7.82
St. Pierre and Miquelon	-	-	-	-	-	-	-	1.81	-	7.06	23.13	46.59	-
St. Vincent and the Grenadines	-	86.40	92.84	79.47	88.57	87.44	94.50	37.02	100.00	51.61	59.45	95.40	4.42
Suriname	-	83.53	88.83	89.41	83.69	55.23	64.85	52.91	100.00	84.80	97.77	12.98	63.21
Trinidad and Tobago	22	84.27	95.97	60.88	41.98	11.82	93.51	22.17	100.00	21.82	67.25	27.90	15.77
Turks and Caicos Islands	-	-	-	-	-	-	-	14.73	65.49	31.54	75.07	99.41	3.84
United States Virgin Islands	-	99.70	95.79	1.00	-	-	-	21.70	100.00	13.12	71.47	-	8.21
Venezuela	-	92.19	94.12	76.69	78.12	50.90	57.61	78.12	100.00	48.28	70.66	16.59	100.00
ASIA													
Japan	1	98.10	99.86	75.94	60.08	89.46	94.83	65.21	100.00	27.10	61.77	23.96	74.53
Thailand	2	81.88	93.67	72.11	83.33	68.00	69.60	58.91	100.00	33.91	63.50	70.35	92.74
Cyprus	3	91.87	99.86	54.16	72.36	80.88	89.32	63.11	100.00	10.68	98.61	60.79	19.53
Georgia	5	86.41	97.02	84.70	88.57	64.48	82.64	39.55	100.00	28.56	81.22	78.32	53.53
China	7	52.45	98.15	79.91	66.65	76.36	85.52	10.55	100.00	15.95	56.76	44.80	100.00
Philippines	4	91.01	87.95	89.97	94.18	94.62	82.64	47.73	100.00	51.75	46.57	100.00	24.06
Singapore	8	89.88	99.83	76.64	61.49	12.47	99.89	7.04	100.00	32.34	76.44	55.30	19.06
Vietnam	13	78.12	96.67	92.22	88.04	88.66	77.42	37.22	100.00	15.48	53.80	40.72	22.48
Indonesia	10	92.75	74.59	82.23	90.38	83.58	72.01	30.22	100.00	42.33	60.93	35.96	39.63
Turkey	-	61.76	95.49	69.76	77.95	89.15	82.30	-	100.00	-	-	19.24	2.40
Malaysia	16	93.27	95.90	69.37	65.71	58.20	85.07	35.02	100.00	49.47	52.06	58.98	66.63
Nepal	9	1.00	76.43	95.73	98.29	89.22	72.03	50.12	100.00	41.83	72.26	-	100.00
Brunei Darussalam	18	100.00	99.65	63.53	24.00	1.00	91.55	42.24	100.00	58.04	75.68	20.30	66.92
Kyrgyz Republic	11	85.80	95.60	86.73	92.32	94.66	74.20	30.85	40.94	12.47	97.23	-	50.15
Armenia	15	74.89	98.56	87.97	91.63	83.52	82.10	26.24	68.19	19.64	71.35	-	100.00
South Korea	14	83.24	99.76	71.74	44.13	64.44	91.69	33.99	100.00	31.41	50.20	12.94	43.99
Laos	12	83.16	76.96	96.32	88.08	98.33	56.18	41.08	100.00	29.06	69.15	-	100.00
Israel	19	87.31	99.88	53.99	68.44	31.15	94.58	21.68	38.68	2.78	53.81	16.82	63.94

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
Cambodia	17	82.60	86.86	95.00	97.10	93.62	55.52	61.49	100.00	17.00	64.68	100.00	100.00
Kazakhstan	20	95.74	97.77	80.24	45.07	61.51	58.01	32.13	8.45	20.05	78.03	-	24.59
Azerbaijan	21	88.93	95.31	78.37	85.71	1.00	77.46	36.19	80.75	-	85.14	-	41.47
Mongolia	23	66.44	94.21	31.55	69.55	81.81	1.00	45.79	54.01	13.68	92.93	-	100.00
Sri Lanka	24	98.77	95.38	91.22	95.91	92.26	91.87	42.58	100.00	19.28	28.72	52.65	25.77
Myanmar	22	71.51	82.95	92.84	97.47	97.36	51.57	27.08	100.00	29.99	65.62	20.31	29.87
Lebanon	30	77.02	95.41	74.05	81.55	79.31	96.44	7.58	82.59	15.15	88.51	47.72	8.64
India	27	9.86	57.31	90.06	92.04	97.34	83.82	8.08	100.00	16.87	46.58	51.58	26.51
Bangladesh	28	43.33	78.29	93.31	97.92	97.15	83.42	19.79	85.26	15.51	59.47	11.22	36.85
Maldives	29	100.00	94.39	63.11	83.52	79.56	100.00	1.00	16.92	32.18	74.66	99.75	1.38
Jordan	31	74.36	97.47	78.58	89.18	76.44	96.48	15.14	7.39	14.14	94.20	55.03	19.08
Qatar	35	9.51	97.93	66.15	1.00	15.16	96.43	30.69	1.00	1.00	71.78	55.92	35.64
Saudi Arabia	33	13.12	96.70	63.53	30.55	11.82	94.36	21.67	3.65	7.15	84.34	38.09	34.21
Oman	32	65.32	95.29	68.76	31.81	63.65	89.16	16.27	1.05	25.87	81.69	41.97	8.46
Uzbekistan	36	79.43	97.38	90.49	84.79	33.18	67.15	23.04	49.76	12.13	95.25	-	25.75
Kuwait	38	43.44	97.96	58.33	5.10	1.00	96.35	21.72	3.04	-	73.68	15.70	79.59
Pakistan	37	46.18	46.06	88.71	95.82	97.14	73.63	30.82	29.15	18.39	76.53	14.40	72.83
Afghanistan	39	47.71	79.80	88.48	99.34	48.47	88.09	26.18	11.79	-	72.51	-	1.77
Bahrain	40	32.21	96.44	52.30	19.27	1.00	99.13	1.00	6.19	-	58.96	39.86	13.36
Bhutan	6	68.87	84.88	88.50	91.87	82.38	78.79	43.49	100.00	63.20	66.42	-	100.00
Hong Kong	-	-	-	44.47	-	-	-	39.37	-	-	73.35	-	100.00
Iran	34	67.70	96.09	84.16	65.11	49.04	87.93	48.17	39.59	32.79	73.89	13.40	57.22
Iraq	41	42.45	95.08	74.06	77.99	88.08	94.24	5.16	12.07	12.80	65.56	11.85	12.23
North Korea	-	75.47	96.97	-	97.00	82.40	94.06	1.00	100.00	15.39	87.05	22.03	10.24
Palestine	-	74.11	96.00	75.57	-	-	-	15.90	10.81	-	82.76	-	62.30
Syria	43	62.37	96.42	84.64	92.82	83.59	88.67	1.00	17.56	12.54	90.17	9.74	5.86
Tajikistan	26	59.70	85.11	84.46	96.58	97.46	78.84	22.15	18.72	-	97.90	-	100.00
Timor-Leste	-	89.68	77.09	96.50	97.94	7.68	77.71	29.70	100.00	35.64	75.62	52.41	39.05
Turkmenistan	-	86.88	95.74	93.43	44.44	1.00	52.53	14.86	52.14	1.98	96.27	-	24.55
United Arab Emirates	25	65.54	96.88	58.96	7.96	1.00	93.62	47.36	27.02	18.19	75.14	57.91	100.00
Yemen	42	54.91	62.93	87.55	98.76	97.73	91.37	25.28	7.06	4.23	73.92	3.02	5.44
Taiwan	-	-	99.07	77.70	-	-	-	-	-	-	-	26.06	-
EUROPE													
Sweden	2	100.00	99.92	67.97	84.39	93.82	78.90	64.29	100.00	17.74	98.69	40.32	100.00
Austria	1	97.24	99.94	58.02	67.48	88.72	74.61	68.01	100.00	40.79	82.38	-	100.00
Czech Republic	6	93.23	98.91	64.32	56.29	68.34	80.99	94.89	100.00	38.70	95.04	-	100.00
Denmark	3	99.97	99.90	39.70	73.96	91.36	46.59	69.13	92.49	27.12	95.63	26.06	100.00
Switzerland	4	99.66	99.95	49.37	80.08	92.42	80.32	44.59	100.00	45.58	95.39	-	73.08
Slovakia	7	91.57	98.86	69.97	72.42	80.66	85.79	87.83	100.00	40.52	91.96	-	100.00
Germany	5	97.74	99.92	56.52	61.11	89.61	78.71	79.45	100.00	43.76	96.92	93.50	100.00
Finland	9	100.00	99.95	59.60	63.41	81.73	67.37	76.57	100.00	14.80	98.31	23.50	96.88

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
United Kingdom	8	99.47	99.94	66.97	75.79	85.12	77.14	87.94	77.79	27.56	93.60	64.70	100.00
Italy	11	92.48	99.91	64.39	75.38	83.06	83.84	78.35	100.00	26.54	82.57	83.85	99.01
Hungary	13	93.39	98.44	72.41	78.49	83.64	75.80	84.17	100.00	26.29	77.27		100.00
Estonia	23	100.00	98.25	73.69	44.90	86.51	57.97	71.63	100.00	27.76	97.56	42.08	100.00
Latvia	18	96.18	98.04	68.69	82.05	83.70	57.00	73.00	100.00	30.59	98.06	33.15	100.00
Lithuania	15	97.93	98.00	66.32	81.20	79.89	46.56	67.95	100.00	31.92	98.12	17.09	100.00
Portugal	12	100.00	99.78	63.39	78.01	76.24	79.22	73.30	100.00	10.45	77.48	97.12	100.00
France	10	97.98	99.88	60.89	79.24	86.34	66.79	82.27	100.00	32.29	74.08	64.50	100.00
Croatia	17	91.19	98.74	68.26	81.61	81.16	79.29	84.39	100.00	41.19	82.47	100.00	100.00
Romania	20	94.86	97.67	80.06	82.52	76.74	75.63	76.75	100.00	48.92	77.29	23.06	100.00
Slovenia	21	93.29	99.27	64.03	69.21	82.83	76.37	75.14	100.00	59.16	88.01	41.43	100.00
Spain	19	100.00	99.89	66.04	75.16	86.61	73.47	63.67	100.00	13.90	74.34	68.79	100.00
Norway	16	100.00	99.93	44.57	68.06	77.90	70.72	61.14	100.00	15.82	91.14	64.85	38.11
Poland	25	87.88	98.96	76.06	62.44	70.91	74.28	90.58	100.00	39.34	95.37	20.16	100.00
Netherlands	22	97.73	99.95	63.75	60.00	88.20	67.39	66.22	64.91	13.73	90.07	65.30	100.00
Belarus	24	90.23	98.46	67.83	71.73	78.51	33.93	59.74	100.00	37.05	94.90	-	69.59
Luxembourg	14	99.59	99.91	43.50	30.98	91.41	69.12	41.05	100.00	42.73	97.42	-	100.00
Greece	28	93.07	99.95	62.60	72.24	73.49	77.67	87.41	100.00	8.91	72.19	100.00	81.87
Bulgaria	29	89.80	98.08	70.98	72.82	75.40	76.85	99.27	100.00	42.68	89.18	26.90	100.00
Belgium	26	96.78	99.88	70.40	62.76	88.23	75.09	70.94	100.00	40.79	97.22	26.26	100.00
Serbia	30	83.59	98.43	75.91	70.18	59.20	75.06	30.40	100.00	37.25	91.85	-	57.08
Ireland	34	100.00	99.95	57.31	66.77	87.97	1.00	82.87	67.11	26.78	85.75	24.27	30.64
Albania	33	90.86	96.52	72.84	91.34	87.57	68.47	63.57	100.00	-	73.63	62.56	100.00
Ukraine	36	88.51	97.61	75.86	81.10	67.10	79.34	63.59	98.39	32.98	89.22	8.80	29.46
Iceland	38	100.00	99.93	53.16	72.06	61.04	46.99	27.55	3.97	6.46	77.50	87.64	19.97
Russia	37	93.13	97.74	70.12	49.01	1.00	78.30	29.00	100.00	18.86	91.90	11.37	56.85
Moldova	35	93.03	96.64	19.94	85.56	73.88	80.56	88.82	69.45	22.56	90.76	-	31.44
Montenegro	31	87.98	97.90	62.17	82.26	64.77	79.99	29.77	100.00	23.37	67.62	51.75	41.57
Aland Islands	-	-	-	-	-	-	-	-	-	-	97.84	-	-
Andorra	-	99.66	99.95	62.77	72.87	61.21	100.00	18.29	100.00	36.56	85.03	-	100.00
Bosnia and Herzegovina	32	80.22	97.98	74.83	68.92	85.24	76.18	48.33	100.00	37.11	83.17	22.20	11.44
Faeroe Islands	-	-	-	10.73	-	-	-	9.03	1.33		78.69	40.27	1.17
Gibraltar	-	-	-	64.02	-	-	-	1.00	1.00	1.00	89.10	91.95	97.39
Guernsey	-	-	-		-	-	-	-	-	-	40.34	42.05	-
Isle of Man	-	-	-	55.31	-	-	-	-	36.35	-	97.14	-	100.00
Jersey	-	-	-		-	-	-	-	-	-	38.27	42.78	-
Liechtenstein	-	-	-	36.69	83.27	87.88	-	54.32	100.00	56.98	98.47	-	100.00
Macedonia	27	78.01	98.13	78.56	83.90	79.12	80.38	46.51	100.00	17.54	94.84	-	71.80
Malta	39	95.64	99.94	50.44	86.44	81.44	94.71	47.95	9.37	-	78.61	100.00	56.58
Monaco	-	-	-	99.96	12.98	-	-	-	-	1.00	1.00	58.29	71.19	100.00
San Marino	-	-	-	99.95	63.09	-	-	-	-	98.06	22.01	97.47	-	-

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
Svalbard and Jan Mayen Islands	-	-	-	-	-	-	-	77.24	-	1.00	74.85	-	-
Vatican	-	-	-	-	-	-	-	-	-	1.00	88.88	-	-
Kosovo	-	-	-	87.43	-	-	-	-	-	-	-	-	-
OCEANIA													
New Zealand	1	100.00	99.48	48.18	72.28	66.93	1.00	38.49	100.00	69.05	38.07	100.00	100.00
Australia	3	100.00	99.69	59.96	31.57	31.60	1.00	57.59	100.00	20.39	70.34	58.31	100.00
Fiji	2	99.06	85.40	84.47	90.43	85.15	87.33	9.25	100.00	47.83	50.01	100.00	8.26
American Samoa	-	97.24	92.52	75.66	-	-	-	58.23	100.00	35.82	77.15	74.86	64.94
Christmas Island	-	-	-	-	-	-	-	32.13	-	-	10.44	87.14	-
Cocos (Keeling) Islands	-	-	-	-	-	-	-	50.50	-	-	63.70	87.59	-
Cook Islands	-	-	94.80	-	-	-		21.03	-	-	61.15	82.24	-
French Polynesia	-	-	-	61.64	-	-	-	1.00	100.00	35.39	52.67	82.25	1.04
Guam	-	98.18	93.78	36.81	-	-	-	2.46	100.00	26.86	1.00	-	1.51
Heard and McDonald Islands	-	-	-	-	-	-	-	75.24	-	-	86.45	-	-
Kiribati	-	99.29	47.27	77.75	97.09	97.13	97.40	19.05	9.48	-	62.60	-	87.69
Marshall Islands	-	99.73	83.39	88.42	85.32	79.38	100.00	5.44	100.00	31.51	73.93	60.37	2.98
Micronesia, Fed. Sts.	-	98.57	86.50	82.34	92.92	96.99	81.23	1.40	100.00	100.00	41.94	-	1.11
Nauru	-	-	89.41	66.15	70.60	100.00	100.00	1.00	1.00	1.00	62.26	62.18	-
New Caledonia	-	-	-	72.26	-	-	-	33.72	100.00	34.72	40.19	92.26	100.00
Niue	-	-	92.10	-	-	-	-	32.44	-	26.88	68.15	77.76	-
Norfolk Island	-	-	-	-	-	-	-	29.00	-	-	50.97	86.84	-
Northern Mariana Islands	-	100.00	92.38	56.71	-	-	-	26.73	100.00	-	26.16	-	100.00
Palau	-		90.51	68.73	25.89	58.10	100.00	30.77	100.00	97.12	47.73	67.33	100.00
Papua New Guinea	-	97.44	48.13	90.87	96.29	69.42	82.92	5.10	100.00	41.64	72.84	4.18	6.25
Pitcairn	-	-	-	-	-	-	-	29.30	-	-	54.79	79.12	-
Samoa	-	98.27	92.46	89.65	92.75	79.08	69.11	34.87	100.00	25.25	60.35	78.38	2.77
Solomon Islands	-	97.91	42.49	77.25	97.67	82.30	96.33	2.96	100.00	23.12	60.64	37.79	2.08
Tokelau	-	-	91.45	-	-	-	-	1.00	-	1.00	74.81	76.49	-
Tonga	4	99.12	93.74	88.35	91.82	84.04	76.61	12.20	73.39	45.90	54.25	74.43	1.53
Tuvalu	-	-	88.17	74.37	96.27	100.00	73.78	-	100.00	-	71.38	73.52	1.22
United States Minor Outlying Islands	-	-	-	-	-	-	-	47.35	-	-	55.36	-	-

Table 20 Normalized values of green growth indicators for natural capital protection *(continued)*

Country	Regional Rank	Indicators											
		EQ1	EQ2	EQ3	GE1	GE2	GE3	BE1	BE2	BE3	CV1	CV2	CV3
Vanuatu	-	98.1578	66.71	81.52	97.44	82.26	50.81	3.46	100.00	-	43.81	99.89	1.66
Wallis and Futuna Islands	-	-	-	-	-	-	-	1.00	-	45.48	74.83	78.12	-

Definitions:

EQ1: PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m3)
EQ2: DALY rate due to unsafe water sources (DALY lost per 100,000 persons)
EQ3: Municipal solid waste (MSW) generation per capita (Ton per year per capita)
GE1: Ratio of CO2 emissions to population, excluding AFOLU (Metric tons per capita)
GE2: Ratio of non-CO2 emissions to population, excluding AFOLU (Ton per capita)
GE3: Ratio of non-CO2 emissions in agriculture to population (Gigagrams per 1000 persons)
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)
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)

Table 21 Normalized values of green growth indicators for green economic opportunities

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
AFRICA					
Gabon	1	67.97	7.46	-	19.74
Tanzania	2	84.78	29.71	51.71	59.05
Botswana	3	61.34	1.76	10.76	77.86
Morocco	4	75.01	7.87	17.23	20.01
Togo	5	55.83	23.21	-	49.96
Namibia	6	50.71	5.69	-	22.72
Cabo Verde	7	84.94	1.10	45.88	-
Cote d'Ivoire	8	65.57	3.48	-	14.38
Mauritius	9	47.38	4.30	10.96	23.54
Congo Republic	10	21.72	7.28	-	70.45
Senegal	11	66.64	4.02	23.80	32.35
Uganda	12	54.69	4.13	68.70	10.44
Kenya	13	38.45	8.96	26.77	12.69
Ghana	14	45.95	4.05	7.44	20.31
Ethiopia	15	67.28	5.63	50.72	18.98
South Africa	16	33.91	46.55	24.95	7.50
Rwanda	17	31.45	2.60	1.40	100.00
Zambia	18	86.40	7.39	-	74.13
Mali	19	45.58	2.75	-	42.90
Zimbabwe	20	24.25	2.09	14.02	28.49
Tunisia	21	58.89	40.71	50.64	11.39
Burkina Faso	22	52.02	2.65	-	44.15
Benin	23	55.21	2.94	-	52.39
Cameroon	24	35.22	4.75	8.60	16.55
Mozambique	25	34.79	1.82	-	57.53

Table 21 Normalized values of green growth indicators for green economic opportunities *(continued)*

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
Burundi	26	2.16	4.55	4.89	82.73
Sierra Leone	27	9.23	2.56	-	28.99
Gambia	28	29.24	2.67	1.00	-
Angola	29	18.40	2.14	14.89	19.40
Lesotho	30	43.02	7.00	1.36	100.00
Algeria	31	78.09	5.00	-	15.15
Nigeria	32	49.63	1.29	1.00	16.52
Egypt	33	44.93	15.46	54.79	7.41
Eswatini	34	44.67	2.40	22.59	30.77
Madagascar	35	31.86	3.32	19.17	57.59
Mauritania	36	82.39	1.00	-	58.60
Niger	37	73.83	2.14	1.00	15.88
Sudan	38	65.37	1.03	-	42.00
Libya	39	100.00	1.61	-	41.77
Malawi	-	-	2.67	23.20	-
Central African Republic	-	-	2.90	-	58.52
Chad	-	-	-	-	100.00
Comoros	-	38.80	1.25	-	-
Djibouti	-	67.77	2.44	-	-
DR Congo	-	47.80	1.24	-	-
Equatorial Guinea	-	-	-	-	100.00
Eritrea	-	-	8.73	1.00	72.43
Guinea	-	23.63	4.32	-	-
Guinea-Bissau	-	29.84	1.00	-	-
Liberia	-	-	-	-	52.98
Mayotte	-	-	34.29	-	-
Sao Tome and Principe	-	-	11.16	-	-
Seychelles	-	-	1.97	-	-
Somalia	-	-	-	-	100.00
South Sudan	-	16.51	-	-	
THE AMERICAS					
Paraguay	1	71.04	3.72	46.10	59.07
United States	2	49.84	46.55	76.50	7.67
Brazil	3	50.97	15.96	23.48	8.60
Canada	4	49.40	25.94	69.67	8.36
Dominican Republic	5	71.98	9.58	16.20	20.49
Mexico	6	50.91	44.53	54.56	8.14
Peru	7	56.37	5.33	35.37	14.70
Costa Rica	8	66.84	12.29	31.65	6.25
Bolivia	9	46.83	2.38	22.75	25.71
Panama	10	83.67	10.79	15.54	9.62
Bahamas	11	67.05	22.62	8.86	
Chile	12	52.07	3.44	39.66	15.20
Ecuador	13	46.83	3.07	53.60	9.45

Table 21 Normalized values of green growth indicators for green economic opportunities *(continued)*

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
El Salvador	14	46.25	13.96	-	28.34
Uruguay	15	47.70	2.63	15.98	10.30
Nicaragua	16	69.04	2.14	-	74.10
Colombia	17	44.67	5.49	33.74	8.59
Honduras	18	76.17	3.65	-	36.16
Argentina	19	47.30	6.28	27.34	4.16
Jamaica	20	72.31	12.39	-	24.15
Guatemala	21	46.17	7.21	1.01	21.23
Trinidad and Tobago	22	-	96.27	10.43	12.37
Barbados	-	34.43	13.64	-	-
Belize	-	45.89	11.74	-	-
Bermuda	-	-	33.22	18.78	-
Cuba	-	-	5.37	1.00	4.84
Dominica	-	-	3.74	-	-
Greenland	-	-	1.35	-	-
Grenada	-	-	23.64	-	-
Guyana	-	41.89	7.72	-	-
Venezuela	-	-	1.79	-	15.06
Suriname	-	82.68	2.40	-	-
Haiti	-	59.10	-	-	-
Montserrat	-	-	1.76	-	-
St. Kitts and Nevis	-	-	10.24	-	-
St. Lucia	-	-	9.24	-	-
St. Vincent and the Grenadines	-	-	14.42	-	-
Turks and Caicos Islands	-	-	17.45	-	-
Anguilla	-	-	3.55	-	-
Antigua and Barbuda	-	-	3.30	-	-
Aruba	-	-	17.96	-	-
ASIA					
Japan	1	47.61	58.36	45.24	8.77
Thailand	2	64.50	30.20	46.40	8.97
Cyprus	3	49.56	11.76	38.10	4.52
Philippines	4	76.13	18.80	34.00	10.52
Georgia	5	42.99	24.99	27.26	11.09
Bhutan	6	58.58	12.12	-	15.22
China	7	68.82	37.23	49.01	5.52
Singapore	8	90.85	31.00	52.14	6.32
Qatar	9	100.00	2.70	25.65	8.66
Indonesia	10	61.94	10.58	25.30	-
Kyrgyz Republic	11	57.34	5.30	45.16	56.09
Laos	12	33.50	3.05	5.78	56.70
Vietnam	13	54.76	9.83	30.98	12.38
South Korea	14	72.02	49.81	73.93	10.80
Armenia	15	39.79	9.71	40.93	12.92

Table 21 Normalized values of green growth indicators for green economic opportunities *(continued)*

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
Malaysia	16	35.24	29.28	34.14	4.62
Cambodia	17	69.51	3.28	1.06	48.64
Brunei Darussalam	18	93.74	6.37	36.97	28.62
Israel	19	69.09	41.80	17.46	3.81
Kazakhstan	20	50.15	3.05	39.46	15.89
Azerbaijan	21	50.41	2.15	71.47	19.99
Myanmar	22	75.91	5.16	1.64	15.39
Mongolia	23	38.44	1.69	20.54	12.49
Sri Lanka	24	70.15	12.69	16.89	8.23
United Arab Emirates	25	-	12.35	54.52	7.86
Tajikistan	26	72.86	-	1.00	34.15
India	27	70.03	23.71	48.27	6.40
Bangladesh	28	97.36	2.43	13.53	1.92
Maldives	29	60.30	1.07	1.00	-
Lebanon	30	1.00	14.21	38.78	6.96
Jordan	31	47.10	13.03	39.94	12.56
Oman	32	17.22	13.16	51.84	18.68
Saudi Arabia	33	63.04	6.44	48.71	18.33
Iran	34	-	6.79	64.57	10.24
Qatar	35	83.42	1.00	21.89	24.17
Uzbekistan	36	63.59	2.08	25.41	-
Pakistan	37	52.77	4.04	18.73	9.95
Kuwait	38	60.70	2.72	12.38	18.54
Afghanistan	39	-	5.86	1.00	65.69
Bahrain	40	54.56	7.09	-	35.54
Iraq	41	65.98	-	1.00	24.52
Yemen	42	-	4.82	32.30	100.00
Syria	43	55.56	12.40	34.21	27.92
Turkey	-	61.60	26.06	51.27	5.04
Hong Kong	-	-	16.68	35.47	7.18
North Korea	-	-	-	-	9.84
Palestine	-	-	8.50	35.59	87.05
Timor-Leste	-	14.89	4.39	-	
Turkmenistan	-	-	-	3.20	100.00
Taiwan	-	-	-	-	3.34
EUROPE					
Austria	1	60.72	56.75	67.68	9.91
Sweden	2	73.38	41.61	62.97	10.35
Denmark	3	76.13	48.51	94.80	18.62
Switzerland	4	61.77	33.79	100.00	4.60
Germany	5	64.50	75.86	88.53	11.03
Czech Republic	6	55.24	61.45	87.47	8.70
Slovakia	7	50.55	47.09	80.26	11.26

Table 21 Normalized values of green growth indicators for green economic opportunities *(continued)*

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
United Kingdom	8	44.22	46.92	64.29	8.72
Finland	9	56.58	45.01	69.85	10.53
France	10	54.32	35.63	49.23	10.05
Italy	11	47.72	55.49	60.41	7.07
Portugal	12	45.18	45.00	47.98	6.35
Hungary	13	58.94	51.18	63.95	5.91
Luxembourg	14	68.76	41.69	18.34	7.59
Lithuania	15	58.28	38.08	43.16	9.53
Norway	16	67.51	25.08	49.18	7.61
Croatia	17	58.68	23.42	54.42	5.63
Latvia	18	46.01	22.41	42.57	7.64
Spain	19	56.33	24.27	57.19	9.70
Romania	20	48.22	71.06	49.09	6.81
Slovenia	21	58.92	39.49	59.69	6.83
Netherlands	22	66.55	30.65	53.69	7.59
Estonia	23	67.66	42.25	43.58	9.40
Belarus	24	62.88	17.63	49.75	-
Poland	25	57.96	37.42	58.79	8.93
Belgium	26	58.85	29.37	47.51	7.44
Macedonia	27	65.63	100.00	-	9.45
Greece	28	29.96	19.41	32.25	7.43
Bulgaria	29	57.53	27.12	48.33	14.02
Serbia	30	47.35	29.47	66.95	9.91
Montenegro	31	-	8.87	24.47	44.42
Bosnia and Herzegovina	32	-	35.74	31.69	18.88
Albania	33	35.46	1.70	7.59	18.74
Ireland	34	68.97	11.37	19.37	3.36
Moldova	35	47.01	12.49	30.62	10.02
Ukraine	36	34.83	11.26	62.50	7.55
Russia	37	55.68	9.04	49.54	6.33
Iceland	38	53.19	6.12	30.77	3.45
Malta	39	-	23.76	2.79	14.52
Liechtenstein	-	-	-	1.00	1.00
Andorra	-	-	9.38	-	-
Faeroe Islands	-	-	1.45	-	-
OCEANIA					
New Zealand	1	62.32	8.96	45.02	6.50
Fiji	2	53.99	4.37	84.72	64.82
Australia	3	50.45	8.99	52.25	6.90
Tonga	4	50.67	5.58	1.00	-
Papua New Guinea	-	46.22	3.85	-	-
Solomon Islands	-	45.48	1.44	-	-
Vanuatu	-	99.18	1.86	-	-
French Polynesia	-	-	5.15	-	-

Table 21 Normalized values of green growth indicators for green economic opportunities *(continued)*

Country	Regional Rank	Indicators			
		GV1	GT1	GJ1	GN1
Kiribati	-	-	4.56	-	-
Micronesia, Fed. Sts.	-	-	1.59	-	-
New Caledonia	-	-	2.68	-	-
Palau	-	-	1.66	-	-
Samoa	-	-	3.17	-	-
Tuvalu			5.11	-	-

Definitions:
GV1: Adjusted net savings, minus natural resources and pollution damages (Percent GNI)
GT1: Share of export of environmental goods (OECD & APEC class.) to total export (Percent)
GJ1: Share of green employment in total manufacturing employment (Percent)
GN1: Share of patent publications in environmental technology to total patents (Percent)

Table 22 Normalized values of green growth indicators for social inclusion

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
AFRICA													
Gabon	1	89.23	67.93	-	33.08	96.95	25.75	87.06	71.94	-	-	30.78	53.40
Tanzania	2	19.47	57.86	22.81	73.71	95.75	100.00	82.99	74.47	72.46	6.45	26.72	57.03
Botswana	3	66.78	59.17	15.87	19.85	96.57	75.25	52.43	73.17	37.79	100.00	37.55	58.38
Morocco	4	77.33	92.36	27.27	41.61	81.95	50.50	84.10	100.00	-	-	63.27	88.59
Togo	5	19.06	61.97	44.12	35.81	94.16	100.00	79.89	67.77	53.78	19.81	24.01	59.53
Namibia	6	48.46	63.83	24.39	88.58	99.96	100.00	25.28	88.37	41.49	100.00	48.38	56.49
Cabo Verde	7	86.90	67.00	35.20	47.75	-	75.25	79.86	99.89	48.43	84.95	57.86	-
Cote d'Ivoire	8	42.59	91.80	10.91	23.51	92.09	50.50	87.66	86.91	35.84	-	25.37	44.07
Mauritius	9	97.19	87.69	47.98	23.95	99.27	100.00	87.99	99.97	62.41	100.00	52.44	-
Congo Republic	10	40.42	41.08	-	23.29	94.85	25.75	64.48	57.11	-	22.88	18.60	53.56
Senegal	11	36.15	86.02	16.17	86.20	96.16	25.75	86.32	88.89	39.74	30.60	30.78	66.78
Uganda	12	17.07	-	24.19	70.02	97.32	100.00	79.13	87.59	44.71	12.09	32.14	43.23
Kenya	13	42.23	49.85	18.54	43.79	98.22	100.00	82.78	94.50	63.74	14.07	40.26	46.59
Ghana	14	37.22	92.36	22.91	26.56	97.20	50.50	77.38	95.93	43.88	19.81	25.37	64.80
Ethiopia	15	13.53	53.58	29.25	77.74	93.05	25.75	89.94	81.13	-	4.86	15.89	32.41
South Africa	16	84.91	88.81	25.98	85.29	99.63	100.00	1.00	98.26	40.31	81.69	55.15	74.56
Rwanda	17	16.90	34.65	30.64	100.00	95.92	75.25	77.36	86.12	42.89	4.07	37.55	59.69
Zambia	18	22.57	-	8.63	34.20	95.98	100.00	33.48	46.32	19.57	8.72	38.90	49.28
Mali	19	21.11	91.61	10.12	18.50	92.38	50.50	89.31	48.23	50.76	8.23	21.31	55.93
Zimbabwe	20	29.39	-	25.09	64.06	97.02	75.25	76.54	76.82	17.54	22.78	38.90	77.33
Tunisia	21	88.14	94.22	47.39	63.05	90.07	25.75	93.07	100.00	-	85.55	59.21	91.96
Burkina Faso	22	9.55	75.02	9.43	22.82	92.43	25.75	70.84	1.00	24.48	6.94	22.66	72.09
Benin	23	19.02	86.20	21.62	15.32	89.92	50.50	87.01	71.01	35.34	11.89	15.89	28.60
Cameroon	24	40.27	87.51	21.12	62.60	96.53	25.75	70.32	69.59	68.63	19.12	24.01	65.66
Mozambique	25	13.32	40.99	15.87	79.41	90.42	50.50	51.65	1.00	-	52.98	28.07	42.24

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
Burundi	26	3.37	-	34.50	72.99	98.05	75.25	85.72	1.00	88.55	4.96	24.01	61.32
Sierra Leone	27	9.10	48.92	19.34	25.41	91.79	50.50	89.44	1.00	83.56	7.93	17.24	46.77
Gambia	28	31.79	71.01	29.94	18.07	94.55	75.25	89.27	82.90	8.75	17.83	29.43	59.12
Angola	29	45.63	68.68	18.74	60.85	89.48	50.50	58.27	1.00	-	15.36	17.24	34.21
Lesotho	30	37.87	35.31	18.64	47.19	99.29	75.25	74.41	86.52	22.09	94.06	29.43	73.14
Algeria	31	69.63	100.00	39.26	52.42	86.01	50.50	97.60	99.97	61.38	-	65.98	86.05
Nigeria	32	26.42	76.32	19.14	12.01	87.31	50.50	90.60	73.45	48.17	11.89	24.01	48.52
Egypt	33	86.12	90.77	31.53	30.56	93.66	1.00	93.71	100.00	48.80	58.02	59.21	99.05
Eswatini	34	65.59	79.49	24.10	14.27	98.56	50.50	48.27	97.61	34.68	100.00	42.97	88.63
Madagascar	35	12.53	9.58	10.02	39.04	96.56	25.75	79.28	40.18	-	5.55	11.83	29.14
Mauritania	36	42.18	83.41	3.58	41.11	88.13	25.75	93.43	1.00	34.55	17.04	18.60	41.14
Niger	37	8.69	-	6.35	34.58	85.91	75.25	87.25	71.40	53.56	6.74	14.54	25.96
Sudan	38	52.75	78.00	3.08	55.75	82.54	1.00	91.09	89.22	-	10.31	24.01	22.54
Libya	39	42.90	-	13.19	32.60	96.84	75.25	-	1.00	-	70.50	45.67	-
Malawi	-	8.81	66.81	19.24	34.01	95.52	100.00	85.72	21.19	45.48	3.28	29.43	47.67
Central African Republic	-	4.98	2.68	17.45	17.97	85.35	25.75	41.56	1.00	-	5.65	7.77	27.57
Chad	-	3.53	39.03	2.69	31.45	83.74	50.50	87.33	1.00	31.75	2.58	2.35	13.82
Comoros	-	44.50	-	23.01	13.00	92.57	100.00	73.76	97.51	49.18	-	24.01	27.90
Djibouti	-	32.78	74.83	13.69	52.78	84.72	50.50	80.71	78.99	64.38	15.06	29.43	-
DR Congo	-	9.34	30.92	12.30	20.06	97.77	-	80.39	1.00	-	-	17.24	17.64
Equatorial Guinea	-	42.39	-	14.58	46.54	-	100.00	-	1.00	-	-	22.66	-
Eritrea	-	26.80	-	7.84	44.56	-	75.25	-	89.49	-	-	32.14	-
Guinea	-	20.73	-	13.98	44.42	92.34	50.50	96.35	60.82	80.14	-	14.54	48.49
Guinea-Bissau	-	14.14	-	6.25	28.19		1.00	90.68	70.19	55.22	1.20	14.54	36.09
Liberia	-	9.65	28.59	21.22	22.70	92.35	100.00	90.38	59.83	18.06	4.37	21.31	32.86
Mayotte	-	92.62	-	-	-	-	-	-	-	-	-	-	-
Reunion	-	93.67	-	-	-	-	-	-	-	-	-	-	-
Sao Tome and Principe	-	34.77	75.86	18.94	37.00	-	1.00	82.09	98.86	-	71.79	45.67	44.72
Seychelles	-	97.36	-	59.18	43.00	-	75.25	93.94	100.00	61.53	100.00	59.21	-
Somalia	-	25.03	1.00	1.00	49.23	94.99	50.50	-	87.09	17.60	-	1.00	-
South Sudan	-	1.00	-	-	57.35	76.66	100.00	70.90	83.58		1.00	7.77	1.00
St. Helena	-	88.40	-	-	-	-	-	-	-	-	-	-	-
THE AMERICAS													
Paraguay	1	71.40	85.08	16.07	30.70	99.13	100.00	76.41	99.99	66.70	64.95	47.03	84.12
United States	2	97.36	100.00	70.88	43.49	99.79	75.25	81.21	100.00	77.49	100.00	76.81	-
Brazil	3	81.10	97.58	42.73	31.10	98.67	75.25	50.32	99.84	54.26	91.59	65.98	84.34
Canada	4	94.20	100.00	42.23	54.41	100.00	100.00	92.69	100.00	76.12	100.00	84.93	-
Dominican Republic	5	94.44	87.51	29.94	54.14	98.71	75.25	84.55	99.56	53.80	12.19	53.80	88.17
Mexico	6	69.52	88.63	43.92	96.44	96.01	75.25	73.68	99.83	64.71	100.00	64.63	81.50
Peru	7	69.52	84.53	32.32	52.78	94.32	100.00	76.86	97.77	67.71	36.34	70.04	63.77

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
Costa Rica	8	75.19	93.66	32.22	91.31	95.86	25.75	66.40	99.88	64.62	56.64	70.04	96.27
Bolivia	9	76.43	74.08	19.73	100.00	98.59	100.00	77.44	97.53	79.32	100.00	55.15	50.99
Panama	10	91.94	89.19	31.93	37.25	97.36	50.50	61.41	98.85	68.39	30.01	68.69	82.86
Bahamas	11	97.36	-	20.33	26.38	-	75.25	-	100.00	-	89.70	59.21	-
Chile	12	92.88	95.15	34.01	45.71	99.03	75.25	75.22	100.00	69.76	71.79	72.75	92.32
Ecuador	13	74.12	71.29	47.59	79.05	94.45	100.00	72.42	99.74	67.12	60.99	72.75	39.25
El Salvador	14	94.29	85.64	32.22	64.64	90.88	75.25	85.55	99.32	50.73	20.90	67.33	82.65
Uruguay	15	97.28	100.00	41.34	42.00	99.21	75.25	83.73	99.98	67.35	100.00	71.39	94.69
Nicaragua	16	64.82	66.91	10.02	91.39	91.47	75.25	71.78	95.92	54.87	29.31	59.21	29.37
Colombia	17	69.42	87.51	16.36	38.01	97.46	50.50	59.06	100.00	55.86	51.09	70.04	89.80
Honduras	18	60.84	74.74	20.63	42.76	93.81	50.50	65.66	97.98	48.21	11.59	49.73	66.89
Argentina	19	81.02	93.10	34.01	78.04	98.69	50.50	79.52	100.00	64.38	89.90	63.27	83.24
Jamaica	20	91.04	87.14	22.11	35.57	99.35	50.50	-	100.00	45.52	40.90	59.21	-
Guatemala	21	65.92	69.70	32.62	39.37	98.27	50.50	66.85	99.90	48.06	17.53	41.61	60.48
Trinidad and Tobago	22	97.36	86.02	24.99	62.28	96.62	75.25	-	100.00	-	91.19	63.27	92.11
Anguilla	-	100.00	-	-	-	-	-	-	-	-	44.86	-	-
Antigua and Barbuda	-	97.36	-	-	23.00	-	75.25	-	100.00	-	76.04	61.92	-
Aruba	-	100.00	-	-	-	-	-	-	100.00	-	97.53	-	-
Barbados	-	97.36	93.66	54.13	40.60	-	50.50	-	100.00	-	63.87	64.63	-
Belize	-	87.19	86.20	28.75	19.57	96.83	50.50	-	98.71	54.15	50.40	55.15	83.47
Bermuda	-	100.00	-	-	-	-	-	-	100.00	-	100.00	-	-
British Virgin Islands	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-
Cayman Islands	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-
Cuba	-	75.75	100.00	43.72	100.00	-	-	-	100.00	-	3.67	72.75	88.91
Curacao	-	100.00	-	-	-	-	-	-	100.00	84.92	100.00	-	-
Dominica	-	94.20	87.14	25.19	50.50	-	50.50	-	-	-	60.70	-	-
French Guiana	-	90.51	-	-	-	-	-	-	-	-	47.23	-	-
Greenland	-	96.13	-	-	-	-	-	-	100.00	-	100.00	-	-
Grenada	-	89.66	-	31.33	93.41	-	100.00	-	-	-	48.32	59.21	-
Guadeloupe	-	97.89	-	-	-	-	-	-	-	-	72.97	-	-
Guyana	-	86.05	90.86	25.58	64.12	-	100.00	-	99.28	34.26	100.00	64.63	87.23
Haiti	-	21.92	12.00	16.96	6.03	96.99	100.00	81.83	1.00	-	1.40	28.07	48.60
Martinique	-	98.95	-	-	-	-	-	-	-	-	64.46	-	-
Puerto Rico	-	76.45	-	-	-	98.04	75.25	-	100.00	-	100.00	-	-
Saint-Martin	-	98.42	-	-	-	-	-	-	100.00	-	61.19	-	-
Sint Maarten	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-
St. Barths	-	100.00	-	-	-	-	-	-	-	-	-	-	-
St. Kitts and Nevis	-	97.36	-		27.39	-	50.50	-	100.00	-	62.68	-	-
St. Lucia	-	96.84	-	25.78	34.01	-	100.00	57.22	99.67	44.97	33.18	61.92	-
St. Pierre and Miquelon	-	82.07	-	-	-	-	-	-	-	-	100.00	-	-

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
St. Vincent and the Grenadines	-	96.84	88.44	38.47	26.82	-	50.50	-	100.00	-	42.58	63.27	-
Suriname	-	66.57	84.71	28.16	59.23	-	75.25	-	99.74	72.98	100.00	55.15	83.39
Turks and Caicos Islands	-	100.00	-	-	-	-	-	-	100.00	-	68.72	-	-
United States Virgin Islands	-	98.95	-	-	-	-	-	-	100.00	-	100.00	-	-
Venezuela	-	71.18	57.31	16.26	44.88	98.14	75.25	-	100.00	58.07	59.81	59.21	72.98
ASIA													
Japan	1	93.41	94.03	69.49	20.62	99.96	50.50	92.85	100.00	94.22	100.00	79.52	-
Thailand	2	68.33	85.27	48.38	12.39	99.06	50.50	90.71	100.00	72.09	89.21	76.81	92.85
Cyprus	3	92.62	100.00	41.14	36.36	99.75	75.25	94.30	100.00	73.51	97.82	71.39	-
Philippines	4	61.20	90.31	33.02	56.36	98.94	100.00	80.13	99.70	65.67	21.30	38.90	61.51
Georgia	5	70.74	85.83	57.80	31.46	99.09	75.25	89.28	100.00	47.43	90.99	52.44	92.55
Bhutan	6	68.63	-	22.11	30.48	93.04	100.00	87.93	100.00	-	19.61	48.38	-
China	7	82.07	100.00	34.30	50.38	98.77	25.75	86.31	100.00	-	100.00	75.46	-
Singapore	8	98.68	-	83.07	47.37	99.59	75.25	-	100.00	91.73	33.77	80.87	-
Nepal	9	45.14	91.33	23.80	65.81	96.76	100.00	92.74	99.33	34.88	84.36	36.20	57.66
Indonesia	10	89.96	87.88	31.93	42.66	98.72	75.25	86.53	99.25	-	14.96	44.32	79.59
Kyrgyz Republic	11	83.91	90.12	21.02	38.96	98.96	25.75	96.65	99.96	60.06	100.00	59.21	97.43
Laos	12	43.85	90.49	-	55.49	97.73	75.25	85.39	99.95	22.50	7.24	32.14	77.08
Vietnam	13	81.55	89.37	39.26	53.91	99.56	50.50	89.79	100.00	77.54	41.49	59.21	93.93
South Korea	14	98.42	100.00	71.48	34.77	99.96	25.75	94.72	100.00	-	100.00	82.22	-
Armenia	15	87.08	94.41	58.29	46.01	95.48	75.25	94.68	100.00	49.03	65.55	57.86	91.17
Malaysia	16	91.04	95.06	50.76	30.42	99.18	50.50	81.93	100.00	77.61	19.41	67.33	-
Cambodia	17	47.76	88.25	18.25	41.25	99.40	75.25	-	98.09	76.62	7.53	47.03	58.27
Brunei Darussalam	18	97.36	89.00	58.89	19.00	-	75.25	-	100.00	64.04	90.99	68.69	-
Israel	19	96.70	100.00	58.49	53.81	99.82	50.50	86.01	100.00	72.22	100.00	78.16	-
Kazakhstan	20	93.67	100.00	34.30	54.66	98.92	25.75	97.39	100.00	82.47	99.60	67.33	99.16
Azerbaijan	21	74.69	100.00	40.55	34.28	98.95	1.00	-	100.00	-	73.07	52.44	71.70
Myanmar	22	52.91	94.22	15.77	22.06	99.35	50.50	94.83	94.08	72.46	15.75	47.03	38.75
Mongolia	23	56.79	93.29	29.05	34.88	99.45	75.25	93.09	99.41	63.65	100.00	49.73	81.20
Sri Lanka	24	64.15	93.66	35.20	11.65	99.94	25.75	84.29	100.00	60.90	36.34	55.15	-
United Arab Emirates	25	97.89	88.63	40.35	45.55	97.95	1.00	99.55	100.00	-	23.37	70.04	-
Tajikistan	26	77.78	-	21.12	38.72	97.40	50.50	91.67	99.95	-	93.76	53.80	82.06
India	27	69.42	73.43	28.16	25.32	99.88	25.75	88.84	99.83	45.68	43.08	47.03	48.49
Bangladesh	28	52.33	78.75	24.49	42.30	89.37	25.75	93.03	99.70	49.53	38.62	33.49	45.48
Maldives	29	97.36	-	29.55	10.11	97.41	75.25	96.59	100.00	49.14	100.00	57.86	63.37
Lebanon	30	52.19	84.99	33.12	10.29	88.63	50.50	94.19	100.00	56.62	10.70	61.92	95.26
Jordan	31	90.22	68.49	28.16	31.45	83.94	25.75	91.77	99.87	34.81	60.40	45.67	82.42
Oman	32	95.08	83.97	16.96	3.34	94.58	25.75	-	100.00	-	47.43	57.86	-
Saudi Arabia	33	83.83	93.10	11.31	40.34	94.11	25.75	-	100.00	68.22	33.87	63.27	-
Iran	34	96.13	90.86	27.76	12.64	98.72	50.50	82.31	100.00	42.44	22.09	68.69	-

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
Qatar	35	96.84	-	39.66	20.32	98.06	50.50	-	100.00	-	20.21	64.63	-
Uzbekistan	36	80.32	100.00	28.85	32.68	97.46	25.75	-	100.00	-	100.00	60.56	-
Pakistan	37	50.92	75.30	20.33	40.96	61.64	25.75	95.48	92.91	45.26	6.74	25.37	41.17
Kuwait	38	98.68	100.00	33.31	4.05	97.72	1.00	-	100.00	-	28.32	59.21	-
Afghanistan	39	50.33	52.55	20.23	55.52	63.44	1.00	-	99.72	1.00	25.45	14.54	22.96
Bahrain	40	96.05	-	49.77	30.70	97.54	1.00	-	100.00	-	75.35	60.56	-
Iraq	41	73.11	66.91	17.65	53.35	93.00	50.50	96.14	100.00	-	33.77	38.90	48.14
Yemen	42	48.95	22.81	11.90	1.65	1.00	25.75	88.42	94.46	17.54	8.33	24.01	53.54
Syria	43	91.64	-	28.56	26.34	93.76	1.00	-	96.45	-	17.83	40.26	-
Turkey	-	-	-	47.98	-	-	75.25	80.80	-	-	-	-	-
Hong Kong	-	100.00	100.00	-	-	99.91	75.25	-	100.00	87.74	73.47	-	-
North Korea	-	40.35	22.44	-	33.27	-	-	-	93.95	-	-	56.50	-
Palestine	-	81.02	-	-	-	86.10	-	92.45	100.00	38.41	31.69	52.44	79.50
Timor-Leste	-	52.61	53.30	20.43	77.15	-	-	96.62	99.34	61.38	100.00	36.20	64.37
Turkmenistan	-	96.48	93.47	7.15	50.50	95.11	-	-	100.00	-	-	63.27	91.05
Taiwan		-	-	-	-	-	100.00	-	-	-	-	-	-
EUROPE													
Austria	1	98.42	100.00	91.30	79.98	99.95	100.00	95.95	100.00	85.31	100.00	75.46	95.37
Sweden	2	97.36	100.00	87.33	94.04	99.91	100.00	96.88	100.00	88.03	100.00	82.22	
Denmark	3	95.78	100.00	66.22	75.11	99.98	100.00	97.46	100.00	86.25	100.00	79.52	
Switzerland	4	97.10	100.00	92.89	65.35	99.97	100.00	92.71	100.00	88.23	100.00	82.22	
Germany	5	97.89	100.00	92.39	63.27	99.98	100.00	94.15	100.00	86.26	100.00	80.87	
Czech Republic	6	97.36	100.00	61.66	45.06	99.14	100.00	99.48	100.00	87.77	91.39	70.04	-
Slovakia	7	93.67	92.92	60.18	40.60	99.49	75.25	100.00	100.00	80.34	90.69	68.69	-
United Kingdom	8	98.15	100.00	78.91	68.02	99.94	100.00	90.48	100.00	80.58	100.00	83.58	-
Finland	9	94.46	100.00	63.25	84.16	99.90	100.00	97.53	100.00	82.92	100.00	76.81	-
France	10	92.88	100.00	92.39	79.23	99.47	100.00	93.01	100.00	79.00	100.00	78.16	-
Italy	11	96.57	100.00	65.53	71.71	99.46	100.00	90.80	100.00	65.10	94.46	76.81	-
Portugal	12	93.41	100.00	79.21	70.73	99.16	100.00	93.06	100.00	83.26	90.50	78.16	-
Hungary	13	93.67	100.00	74.25	25.87	98.94	75.25	96.04	100.00	79.61	90.60	63.27	92.43
Luxembourg	14	97.63	100.00	52.84	57.09	99.80	100.00	91.84	100.00	89.35	100.00	80.87	-
Lithuania	15	95.78	100.00	58.09	45.23	98.98	100.00	90.29	100.00	82.86	97.13	59.21	-
Norway	16	89.19	100.00	80.10	82.43	99.88	100.00	97.81	100.00	90.92	100.00	80.87	-
Croatia	17	86.99	100.00	52.44	39.69	98.81	100.00	97.09	100.00	77.41	89.90	63.27	-
Latvia	18	93.15	100.00	56.11	58.42	99.84	100.00	91.40	100.00	86.95	92.08	61.92	-
Spain	19	97.63	100.00	82.38	81.33	99.46	100.00	91.91	100.00	74.41	98.22	80.87	-
Romania	20	87.61	100.00	72.17	41.93	97.63	-	91.42	100.00	72.79	93.57	60.56	-
Slovenia	21	90.77	100.00	54.53	53.81	99.75	75.25	100.00	100.00	85.80	100.00	72.75	-
Netherlands	22	97.89	100.00	91.10	66.99	100.00	100.00	96.31	100.00	91.62	100.00	80.87	-
Estonia	23	95.78	100.00	57.90	55.89	99.88	100.00	95.71	100.00	83.63	100.00	70.04	-
Belarus	24	90.51	100.00	75.44	69.41	99.92	50.50	99.46	100.00	-	100.00	64.63	97.60
Poland	25	95.52	100.00	85.25	57.07	99.70	100.00	95.60	100.00	84.06	83.76	64.63	-

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
Belgium	26	95.78	100.00	63.35	77.56	99.99	100.00	98.08	100.00	82.99	100.00	79.52	-
Macedonia	27	64.94	93.85	37.77	78.56	98.04	50.50	93.56	100.00	63.48	68.91	56.50	-
Greece	28	96.57	100.00	66.72	38.96	99.56	100.00	93.12	100.00	75.63	95.84	70.04	-
Bulgaria	29	89.45	94.41	67.31	54.62	99.51	100.00	83.34	100.00	73.36	94.06	59.21	-
Serbia	30	66.52	93.85	44.81	72.33	99.69	100.00	91.44	100.00	70.16	63.87	60.56	-
Montenegro	31	71.53	100.00	42.23	47.45	99.59	25.75	88.68	100.00	67.05	90.69	55.15	90.74
Bosnia and Herzegovina	32	66.78	100.00	27.27	43.43	96.59	50.50	93.17	100.00	59.80	69.81	52.44	95.79
Albania	33	73.64	91.70	29.35	59.43	99.45	100.00	95.32	100.00	52.42	77.23	48.38	97.05
Ireland	34	93.41	100.00	80.20	44.86	99.98	100.00	95.03	100.00	77.82	100.00	76.81	91.06
Moldova	35	89.10	-	57.60	46.08	99.99	75.25	98.86	100.00	34.24	75.45	55.15	93.16
Ukraine	36	88.40	94.78	68.20	25.33	98.83	1.00	99.11	100.00	69.63	96.24	63.27	98.84
Russia	37	79.70	100.00	59.78	32.24	99.82	50.50	88.08	100.00	77.10	100.00	65.98	-
Iceland	38	94.46	100.00	57.00	79.57	100.00	100.00	98.67	100.00	91.12	71.69	82.22	-
Malta	39	96.57	100.00	56.21	27.59	99.78	75.25	94.74	100.00	83.97	100.00	74.10	-
Andorra	-	96.31	-	-	71.72	-	-	-	100.00	-	-	-	-
Faeroe Islands	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-
Gibraltar	-	100.00	-	-	-	-	-	-	100.00	-	-	-	-
Isle of Man	-	98.42	-	-	-	-	-	-	100.00	-	-	-	-
Liechtenstein	-	99.65	-	-	24.76	-	-	-	100.00	-	100.00	-	-
Monaco	-	98.68	-	-	66.99	-	-	-	100.00	-	-	-	-
San Marino	-	90.77	-	-	53.81	-	75.25	-	100.00	-	-	-	-
Kosovo	-	-	-	-	-	92.84	-	96.20	-	-	-	-	-
OCEANIA													
New Zealand	1	93.67	100.00	60.57	78.55	99.90	75.25	-	100.00	77.64	100.00	80.87	-
Fiji	2	74.16	89.37	28.16	36.25	-	50.50	95.28	100.00	62.97	87.43	47.03	90.11
Australia	3	89.10	100.00	58.39	59.08	99.97	100.00	91.62	100.00	83.49	100.00	82.22	-
Tonga	4	59.34	-	29.15	15.67		75.25	87.33	99.82	44.19	90.10	40.26	-
American Samoa	-	97.89	-	-	-	-	-	-	-	-	-	-	-
Cook Islands	-	87.87	-	-	-	-	-	-	-	76.75	100.00	-	-
French Polynesia	-	91.56	92.54	-	-	-	-	-	100.00	-	-	-	-
Guam	-	99.47	-	-	-	-	-	-	100.00	-	-	-	-
Kiribati	-	31.97	92.17	25.28	13.91	-	100.00	97.53	99.06	8.32	93.86	33.49	-
Marshall Islands	-	80.58	-	-	19.00	-	75.25	90.16	99.54	24.17	63.07	-	-
Micronesia, Fed. Sts.	-	45.12	-	31.13	1.00	-	75.25	84.10	97.50	56.34	100.00	29.43	-
Nauru	-	97.36	-	-	21.85	-	-	90.93	100.00	-	95.74	-	-
New Caledonia	-	97.89	87.32	-	-	-	-	-	100.00	78.15			-
Niue	-	96.01	-	-	-	-	-	-	-	-	-	-	-
Northern Mariana Islands	-	95.25	-	-	-	-	-	-	100.00	-	-	-	-
Palau	-	95.08	-	-	25.75	-	75.25	-	100.00	76.16	100.00		-

Table 22 Normalized values of green growth indicators for social inclusion *(continued)*

Country	Regional Rank	Indicators											
		AB1	AB2	AB3	GB1	GB2	GB3	SE1	SE2	SE3	SP1	SP2	SP3
Papua New Guinea	-	31.14	59.73	2.09	1.00	-	25.75	80.57	94.82	-	23.08	9.12	-
Samoa	-	55.18	91.80	30.74	20.80	-	75.25	85.45	100.00	30.13	91.49	36.20	-
Solomon Islands	-	37.96	66.25	9.33	5.00	-	25.75	88.05	99.20		21.30	32.14	-
Tuvalu	-	56.65	-	-	14.21	-		85.11	99.90	46.64	-	-	-
Vanuatu	-	34.27	77.81	24.59	1.00	-	50.50	93.59	92.76	20.45	9.42	34.84	-
Wallis and Futuna Islands	-	56.76	-	-	-	-	-	-	-	-	-	-	-

Definitions:
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)
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)
SE1: Inequality in income based on Atkinson (Index)
SE2: Ratio of urban to rural, access to safely managed water/sanitation & electricity (Percent)
SE3: Share of youth not in education, employment or training, aged 15-24 years (Percent)
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)

Table 23 Data gaps in indicators by dimension and across all indicators

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
AFRICA							
Gabon	1	2	0	1	3	6	15%
Tanzania	2	2	0	0	0	2	5%
Botswana	3	2	1	0	0	3	8%
Morocco	4	0	0	0	2	2	5%
Togo	5	0	0	1	0	1	3%
Cabo Verde	6	2	0	1	2	5	13%
Namibia	7	0	0	1	0	1	3%
Cote d'Ivoire	8	1	0	1	1	3	8%
Congo Republic	9	2	0	1	2	5	13%
Mauritius	10	1	0	0	1	2	5%
Senegal	11	0	0	0	0	0	0%
Uganda	12	1	1	0	1	3	8%
Ghana	13	0	0	0	0	0	0%
Kenya	14	0	0	0	0	0	0%
Ethiopia	15	1	1	0	1	3	8%
South Africa	16	0	0	0	0	0	0%
Rwanda	17	1	1	0	0	2	5%
Zambia	18	1	1	1	1	4	10%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Mali	19	1	1	1	0	3	8%
Zimbabwe	20	1	1	0	1	3	8%
Tunisia	21	1	0	0	1	2	5%
Burkina Faso	22	1	1	1	0	3	8%
Benin	23	0	0	1	0	1	3%
Cameroon	24	0	0	0	0	0	0%
Mozambique	25	0	0	1	1	2	5%
Burundi	26	2	1	0	1	4	10%
Lesotho	27	1	1	0	0	2	5%
Sierra Leone	28	0	0	1	0	1	3%
Gambia	29	1	0	1	0	2	5%
Angola	30	0	0	0	1	1	3%
Algeria	31	1	0	1	1	3	8%
Nigeria	32	0	0	0	0	0	0%
Eswatini	33	3	1	0	0	4	10%
Mauritania	34	2	0	1	0	3	8%
Madagascar	35	0	0	0	1	1	3%
Egypt	36	2	0	0	0	2	5%
Niger	37	1	1	0	1	3	8%
Sudan	38	1	0	1	1	3	8%
Libya	39	3	0	1	4	8	20%
British Indian Ocean Territory	-	12	9	4	12	37	93%
Central African Republic	-	2	1	2	1	6	15%
Chad	-	2	1	3	0	6	15%
Comoros	-	0	0	2	2	4	10%
Djibouti	-	2	0	2	1	5	13%
DR Congo	-	4	0	2	3	9	23%
Equatorial Guinea	-	3	0	3	6	12	30%
Eritrea	-	5	0	1	6	12	30%
French Southern Territories	-	12	10	4	12	38	95%
Guinea	-	0	0	2	2	4	10%
Guinea-Bissau	-	0	0	2	2	4	10%
Liberia	-	1	0	3	0	4	10%
Malawi	-	1	1	2	0	4	10%
Mayotte	-	11	9	3	11	34	85%
Reunion	-	9	9	4	11	33	83%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Sao Tome and Principe	-	0	0	3	2	5	13%
Seychelles	-	3	0	3	3	9	23%
Somalia	-	2	0	3	3	8	20%
South Sudan	-	5	2	3	3	13	33%
St. Helena	-	11	9	4	11	35	88%
Western Sahara	-	12	9	4	12	37	93%
THE AMERICAS							
Paraguay	1	1	1	0	0	2	5%
Brazil	2	1	0	0	0	1	3%
United States	3	2	0	0	1	3	8%
Mexico	4	0	0	0	0	0	0%
Dominican Republic	5	1	0	0	0	1	3%
Canada	6	0	0	0	1	1	3%
Costa Rica	7	0	0	0	0	0	0%
Peru	8	0	0	0	0	0	0%
Panama	9	0	0	0	0	0	0%
Bolivia	10	2	1	0	0	3	8%
Chile	11	0	0	0	0	0	0%
El Salvador	12	0	0	1	0	1	3%
Uruguay	13	0	0	0	0	0	0%
Ecuador	14	0	0	0	0	0	0%
Nicaragua	15	0	0	1	0	1	3%
Colombia	16	0	0	0	0	0	0%
Bahamas	17	3	0	1	5	9	23%
Honduras	18	0	0	1	0	1	3%
Jamaica	19	0	0	1	2	3	8%
Argentina	20	0	0	0	0	0	0%
Guatemala	21	0	0	0	0	0	0%
Trinidad and Tobago	22	1	0	1	2	4	10%
Anguilla	-	9	8	3	10	30	75%
Antigua and Barbuda	-	2	0	3	6	11	28%
Aruba	-	8	6	3	9	26	65%
Barbados	-	2	1	2	4	9	23%
Belize	-	1	0	2	1	4	10%
Bermuda	-	6	4	2	9	21	53%
Bonaire, Saint Eustatius and Saba	-	11	10	4	12	37	93%
Bouvet Island	-	12	12	4	12	40	100%
British Virgin Islands	-	8	5	4	10	27	68%
Cayman Islands	-	7	6	4	10	27	68%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Cuba	-	1	0	1	4	6	15%
Curacao	-	9	5	4	8	26	65%
Dominica	-	2	1	3	6	12	30%
Falkland Islands	-	10	8	4	12	34	85%
French Guiana	-	12	8	4	10	34	85%
Greenland	-	8	4	3	9	24	60%
Grenada	-	2	0	3	6	11	28%
Guadeloupe	-	10	9	4	10	33	83%
Guyana	-	1	1	2	2	6	15%
Haiti	-	0	0	3	1	4	10%
Martinique	-	10	9	4	10	33	83%
Montserrat	-	9	9	3	12	33	83%
Puerto Rico	-	3	4	4	7	18	45%
Saint-Martin	-	12	5	4	9	30	75%
Sint Maarten	-	9	7	4	10	30	75%
South Georgia and South Sandwich Is.	-	12	10	4	12	38	95%
St. Barths	-	12	9	4	11	36	90%
St. Kitts and Nevis	-	4	1	3	7	15	38%
St. Lucia	-	5	0	3	3	11	28%
St. Pierre and Miquelon	-	11	8	4	10	33	83%
St. Vincent and the Grenadines	-	4	0	3	4	11	28%
Suriname	-	1	0	2	2	5	13%
Turks and Caicos Islands	-	7	6	3	9	25	63%
United States Virgin Islands	-	10	4	4	9	27	68%
Venezuela	-	3	0	2	1	6	15%
ASIA							
Japan	1	1	0	0	1	2	5%
Thailand	2	0	0	0	0	0	0%
China	3	1	0	0	2	3	8%
Philippines	4	0	0	0	0	0	0%
Georgia	5	0	0	0	0	0	0%
Cyprus	6	0	0	0	1	1	3%
Nepal	7	1	1	0	0	2	5%
Bhutan	8	2	1	1	3	7	18%
Singapore	9	3	0	0	3	6	15%
Indonesia	10	0	0	1	1	2	5%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Laos	11	2	1	0	1	4	10%
Kyrgyz Republic	12	2	1	0	0	3	8%
Vietnam	13	1	0	0	0	1	3%
South Korea	14	2	0	0	2	4	10%
Armenia	15	1	1	0	0	2	5%
Malaysia	16	0	0	0	1	1	3%
Cambodia	17	0	0	0	1	1	3%
Brunei Darussalam	18	3	0	0	3	6	15%
Israel	19	1	0	0	1	2	5%
Kazakhstan	20	1	1	0	0	2	5%
Azerbaijan	21	1	2	0	2	5	13%
Myanmar	22	0	0	0	0	0	0%
Mongolia	23	1	1	0	0	2	5%
Tajikistan	24	1	2	1	2	6	15%
Sri Lanka	25	0	0	0	1	1	3%
India	26	0	0	0	0	0	0%
Bangladesh	27	0	0	0	0	0	0%
Maldives	28	3	0	1	1	5	13%
Lebanon	29	1	0	0	0	1	3%
United Arab Emirates	30	1	0	1	2	4	10%
Jordan	31	1	0	0	0	1	3%
Qatar	32	3	0	0	4	7	18%
Oman	33	0	0	0	3	3	8%
Saudi Arabia	34	1	0	0	2	3	8%
Iran	35	1	0	1	1	3	8%
Uzbekistan	36	1	1	1	3	6	15%
Bahrain	37	2	1	1	4	8	20%
Pakistan	38	0	0	0	0	0	0%
Afghanistan	39	1	2	1	1	5	13%
Kuwait	40	0	1	0	3	4	10%
Iraq	41	0	0	1	1	2	5%
Yemen	42	3	0	1	0	4	10%
Syria	43	3	0	0	4	7	18%
Hong Kong	-	5	8	1	5	19	48%
Macau	-	8	9	1	7	25	63%
North Korea	-	5	1	3	7	16	40%
Palestine	-	4	5	1	4	14	35%
Timor-Leste	-	2	0	2	2	6	15%
Turkey	-	10	3	0	9	22	55%
Turkmenistan	-	2	1	2	4	9	23%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Taiwan	-	11	9	3	11	34	85%
EUROPE							
Austria	1	1	1	0	0	2	5%
Sweden	2	0	0	0	1	1	3%
Denmark	3	0	0	0	1	1	3%
Switzerland	4	1	1	0	1	3	8%
Czech Republic	5	2	1	0	1	4	10%
Germany	6	0	0	0	1	1	3%
Slovakia	7	2	1	0	1	4	10%
Finland	8	0	0	0	1	1	3%
United Kingdom	9	0	0	0	1	1	3%
France	10	0	0	0	1	1	3%
Italy	11	0	0	0	1	1	3%
Hungary	12	1	1	0	0	2	5%
Portugal	13	0	0	0	1	1	3%
Latvia	14	0	0	0	1	1	3%
Lithuania	15	0	0	0	1	1	3%
Spain	16	0	0	0	1	1	3%
Estonia	17	0	0	0	1	1	3%
Belarus	18	3	1	1	1	6	15%
Croatia	19	0	0	0	1	1	3%
Romania	20	1	0	0	2	3	8%
Luxembourg	21	1	1	0	1	3	8%
Slovenia	22	0	0	0	1	1	3%
Norway	23	0	0	0	1	1	3%
Poland	24	0	0	0	1	1	3%
Netherlands	25	0	0	0	1	1	3%
Macedonia	26	1	1	1	1	4	10%
Greece	27	0	0	0	1	1	3%
Belgium	28	0	0	0	1	1	3%
Bulgaria	29	0	0	0	1	1	3%
Serbia	30	1	1	0	1	3	8%
Bosnia and Herzegovina	31	2	0	1	0	3	8%
Albania	32	1	1	0	0	2	5%
Ireland	33	0	0	0	0	0	0%
Moldova	34	1	1	0	1	3	8%
Montenegro	35	2	0	1	0	3	8%
Ukraine	36	1	0	0	0	1	3%
Russia	37	1	0	0	1	2	5%
Iceland	38	0	0	0	1	1	3%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Malta	39	0	1	1	1	3	8%
Aland Islands	-	12	11	4	12	39	98%
Andorra	-	8	1	3	9	21	53%
Faeroe Islands	-	7	6	3	10	26	65%
Gibraltar	-	11	5	4	10	30	75%
Guernsey	-	11	10	4	12	37	93%
Isle of Man	-	11	8	4	10	33	83%
Jersey	-	11	10	4	12	37	93%
Liechtenstein	-	8	4	2	8	22	55%
Monaco	-	10	5	4	9	28	70%
San Marino	-	10	7	4	8	29	73%
Svalbard and Jan Mayen Islands	-	12	9	4	12	37	93%
Vatican	-	12	10	4	12	38	95%
OCEANIA							
New Zealand	1	0	0	0	2	2	5%
Fiji	2	1	0	0	1	2	5%
Australia	3	1	0	0	1	2	5%
Tonga	4	4	0	1	3	8	20%
American Samoa	-	11	3	4	11	29	73%
Christmas Island	-	12	9	4	12	37	93%
Cocos (Keeling) Islands	-	12	9	4	12	37	93%
Cook Islands	-	6	8	4	9	27	68%
French Polynesia	-	4	5	3	9	21	53%
Guam	-	10	4	4	10	28	70%
Heard and McDonald Islands	-	12	10	4	12	38	95%
Kiribati	-	4	2	3	2	11	28%
Marshall Islands	-	6	0	4	5	15	38%
Micronesia, Fed. Sts.	-	6	1	3	3	13	33%
Nauru	-	6	2	4	7	19	48%
New Caledonia	-	5	5	3	8	21	53%
Niue	-	8	7	4	11	30	75%
Norfolk Island	-	12	9	4	12	37	93%
Northern Mariana Islands	-	11	5	4	10	30	75%
Palau	-	7	1	3	6	17	43%
Papua New Guinea	-	2	0	2	3	7	18%
Pitcairn	-	12	9	4	12	37	93%
Samoa	-	3	0	3	2	8	20%

Table 23 Data gaps in indicators by dimension and across all indicators *(continued)*

Country	Regional Rank	Missing Indicators in each Dimension				Missing across all indicators	
		Efficient and sustainable resource use	Natural capital protection	Green economic opportunities	Social Inclusion	Number	Percent
Solomon Islands	-	3	0	2	3	8	20%
Tokelau	-	10	7	4	12	33	83%
Tuvalu	-	6	3	3	7	19	48%
United States Minor Outlying Islands	-	12	10	4	12	38	95%
Vanuatu	-	3	1	2	2	8	20%
Wallis and Futuna Islands	-	11	8	4	11	34	85%

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Annexes

Annex 1

Summary of Methods for the Green Growth Index[i]

A. Index Development Process

A.1 Iterative Approach

GGGI adopted a thorough process in designing the Green Growth Index through iterative activities including expert consultations, assessment of expert feedback, and quality improvements. GGGI pursued two complementary strategies to enhance the relevance and practicality of the Index in policy making:

- A stepwise scientific approach through rigorous research to understand the complexity and multi-dimensionality of green growth; and
- A consultative process involving experts and other stakeholders to determine the policy relevance of the indicators at the national and regional contexts.

A.2 Participatory Approach

The stakeholder engagement process was initiated in 2016 and completed in early 2019. The three main phases included:

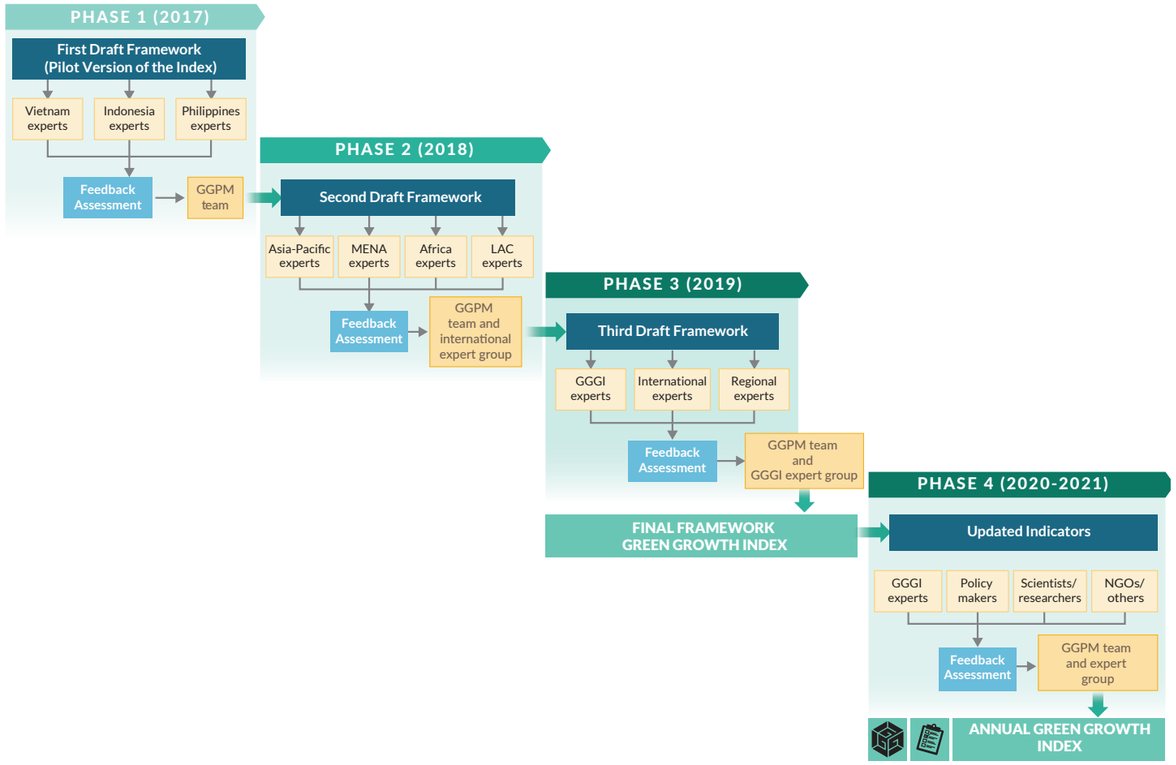
1. Phase 1 – Pilot: GGGI developed a pilot version of the Index covering 34 GGGI member and partner countries[ii]. The Index was presented in an international expert workshop at GGGI headquarters in Seoul, South Korea, three in-country stakeholder workshops (in Vietnam, Indonesia, and the Philippines), and an international stakeholder consultation during Global Green Growth Week 2017 in Addis Ababa, Ethiopia. These consultative activities aimed to inform GGGI member countries about the ongoing process of developing the Index and collect initial feedback.
2. Phase 2 – Regional Consultations: GGGI presented the revised framework incorporating the preliminary feedback in 2018 in four regional consultation workshops for the Asia-Pacific Region (Bangkok), Middle East (Dubai), Africa (Addis Ababa), and Latin America and the Caribbean (Mexico City), as well as an international expert meeting in Geneva. These workshops served as a platform for dialogue and interaction among the stakeholders to ensure a transparent process for improving the Index. Outcomes of the workshops were presented during an international expert meeting in Rome, Italy.
3. Phase 3 – Expert Consultations: The last phase of the Index development process involved the circulation of the draft technical report on the concept, methods, and applications of the Index to the internal and external experts for their review and feedback. GGGI collected expert feedback through an online survey. GGGI also conducted two additional expert consultations—the first with GGGI thematic experts to align the Index to the priority areas of the Institute and the second with selected research institutions and international organizations[iii] to validate the sustainability targets. These expert inputs from the online survey and consultations were used to finalize the Index.
4. Phase 4 – Annual Expert Consultations: The fourth phase of the Index development process is the expert consultations which are conducted every year to continuously improve the indicators of the Green Growth Index. As discussed in chapter 5.3 Next steps forward and as indicated in Table 4, missing green growth indicators will need to be included and proxy variables will still need to be replaced with more relevant indicators when data become available in the next years. Detailed description of this year's consultations is discussed in chapter 5 Expert consultations and Appendix 2.

[i] *Information in this Appendix was adapted from Acosta, L.A., C.O. Balmes, R.J. Mamiit, P. Maharjan, K. Hartman, O. Anastasia, and N.M. Puyo. (2019). Assessment and Main findings on the Green Growth Index, GGGI Insight Brief No. 3, Green Growth Performance Measurement, Global Green Growth Institute, Seoul, South Korea. http://greengrowthindex.gggi.org/wp-content/uploads/2020/04/GGGI-Insight-Brief-No.-3_Final.pdf*

[ii] *"Members" refer to countries that have submitted their instrument of accession to GGGI and formal membership has commenced while "partner countries" include countries where GGGI has operations and those that have formally communicated their intent to become a Member.*

[iii] *IASS, PIK, FAO, SDSN and OECD.*

Figure A.1 Process for developing the framework of the Green Growth Index



B. Analytical and Empirical Methods

B.1 Stepwise Analytical Approach

In building the Green Growth Index, GGGI applied a stepwise approach that conforms to "good practices" in developing composite indices[iv] (Figure B). A composite index combines a number of indicators into a single score, which facilitates the comparison, ranking, benchmarking, and monitoring of progress for multifaceted, complex phenomena.

The development of the Green Growth Index followed four key steps:

- Concept building entails defining the objectives of the Index, conceptualizing green growth, and identifying its dimensions and indicators;
- Empirical application requires addressing methodological issues such as indicator selection, data preparation (i.e., scaling, imputation, outliers, correlation), normalization, weights, and aggregation of indicators;
- Robustness check involves assessing the explanatory power of the Index through correlation analysis and changes in model inputs and its impacts on aggregation through sensitivity and uncertainty analyses; and
- Presentation focuses on communicating the results at the global, regional, and country scale using various diagrams and tables.

[iv] *Nardo, M., Saisana, M., Saltelli, A., & Tarantola, S. (2005). Tools for Composite Indicators Building. Ispra, Italy: European Commission Joint Research Centre: Institute for the Protection and Security of the Citizen Econometrics and Statistical Support to Antifraud Unit; OECD & JRC 2008, op. cit.*

Figure A.2 Stepwise approach for developing the Green Growth Index

B.2 Empirical Steps

The Green Growth Index was constructed through aggregation of the normalized indicators (metrics), indicator categories (pillars), and dimensions (goals) (Figure C). Prior to the aggregation, several steps were necessary to select, prepare, and validate the indicators included in constructing the Index:

1. Indicator selection: Several criteria were applied in the selection of indicators, including the relevance of the data to the green growth dimensions based on conceptual and empirical evidence, coverage of more than 140 countries (including most GGGI member and partner countries); availability of time-series data to allow updates of the Index on a regular interval; accessibility of the data to ensure replication of methods and credibility of their sources; and acceptable level of association with other indicators in the same dimension. In a few cases, however, the criteria for country coverage and time-series data were waived due to a significant lack of data. All data were collected from online sources, mainly published in the UNSTATS SDG database and databases from other international organizations (e.g. FAO, World Bank, WIPO, UN COMTRADE, etc.).
2. Data preparation: Scaling and imputation are the most important methods to prepare the data and improve the comparability of the indicators. Scaling the data with an appropriate denominator (e.g., GDP, land area, etc.) allows an objective comparison across small and large countries. Available data for all the indicators were scaled except for the GHG emissions, export of environmental goods, and patents of environmental technology. Imputing data based on the available time-series data helps improve the country coverage of the indicators. To minimize the effects of imputation on data uncertainty, the simple method of imputing data from the closest years was applied.
3. Data validation: The most important method to validate the statistical appropriateness of the indicator data is to check for outliers and correlation. Since outliers can distort statistical properties and normalized values of the indicators,[v] their values were capped using lower or upper fences based on the interquartile range from 75th and 25th percentiles. The aims of the correlation analysis are to identify redundant indicators with very strong correlation to improve the explanatory power of the indicators and verify whether indicators have acceptable levels of association in their respective dimensions. Indicators with very strong correlation were excluded from the framework and replaced with ones having acceptable levels of association.
4. Indicator weights: To reduce the larger impact of green economic opportunities, which have only four indicators as compared to twelve in other dimensions, weights were assigned at the dimension level. The weights were multiplied to the dimension scores as follows:

$$GGI = ((ESRU^{12})*(NCP^{12})*(GEO^{4})*(SI^{12}))^{1/40}$$

where GGI refers to the Green Growth Index
ESRU refers to efficient and sustainable resource use
NCP refers to natural capital protection
GEO refers to green economic opportunities
SI refers to social inclusion

5. Indicator normalization: To translate the indicators with different units into a common scale, it is necessary to apply a normalization method. Through normalization, the indicator values measured in different units can be adjusted to a single scale to make the data comparable across the indicators. The re-scaling method (min-max transformation) for normalization was applied for the following reasons: it is the simplest and most widely used method that will facilitate ease of comprehensibility and replication; the use of upper and lower bounds will reduce issues related to outliers; and the integration of the targets will allow benchmarking against sustainability targets.

The normalized indicators were used as inputs to the aggregation model (i.e., level 1) as presented. The two most common and simple methods of aggregation include linear aggregation using arithmetic mean and geometric aggregation using geometric mean. These two methods have different underlying assumptions. Linear aggregation allows full and constant compensability, i.e. low values in one indicator can be traded off (substituted) by high values in another. On the other hand, geometric aggregation allows only partial compensability, limiting the ability of the indicators with very low scores to be fully compensated by indicators with high scores. The two methods were applied in the different aggregation models so that, as the level of aggregation increases, the level of substitutability decreases:

1. Level 1: Arithmetic mean was applied to linearly aggregate the normalized indicators, allowing compensability of the individual indicators in each indicator category. Moreover, at Level 1 of aggregation, countries with more than 25% missing values were dropped.
2. Level 2: Geometric aggregation was applied to the indicator categories to allow only partial compensability between indicators in each dimension. Like in Level 1, the 25% rule on

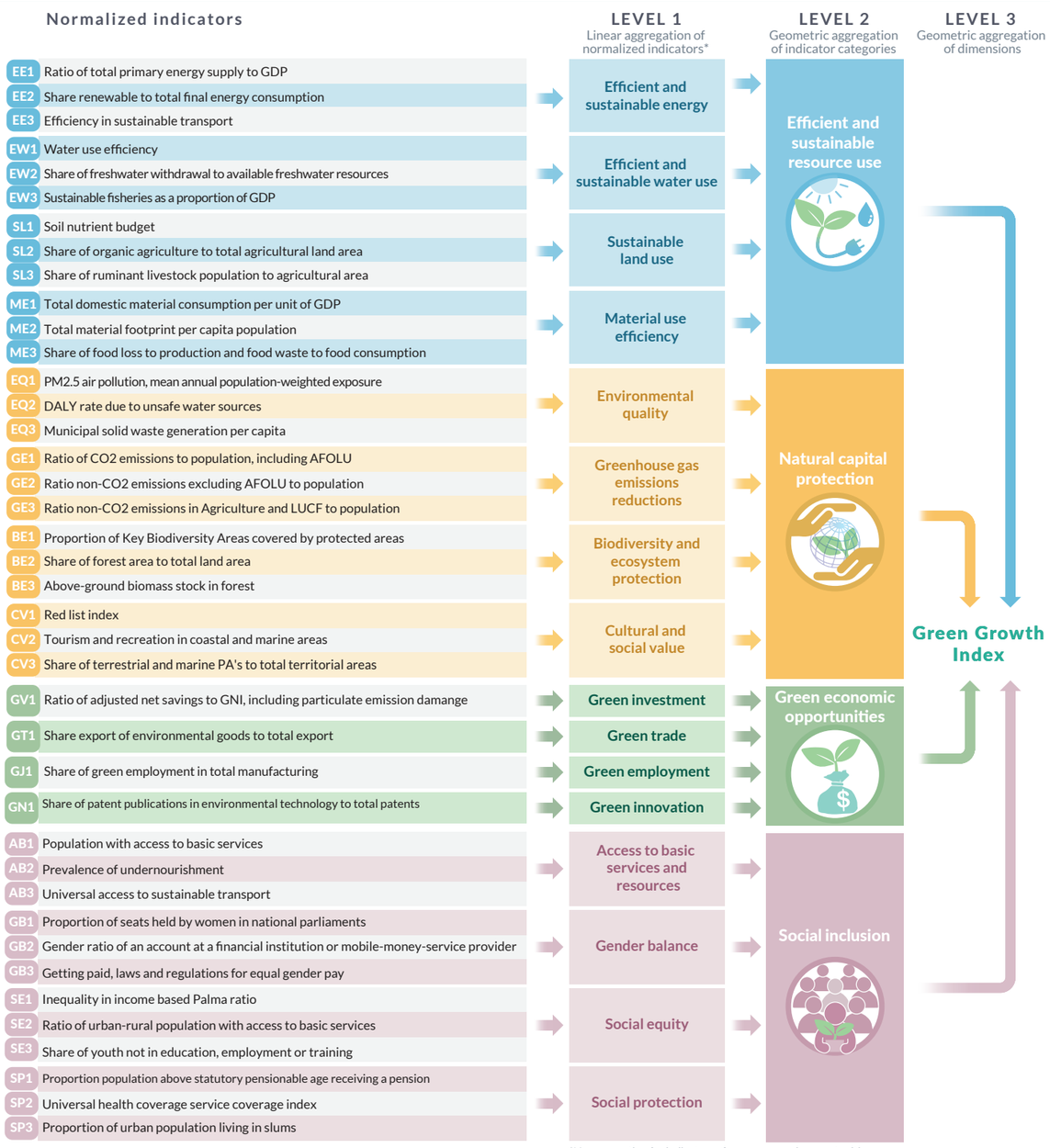
[v] *Mishra, S. K. (2008). Construction of Composite Indices in Presence of Outliers. SSRN Electronic Journal, 1–5. https://doi.org/10.2139/ssrn.1137644; OECD & JRC 2008, op. cit.; Ibid.*

missing values was applied to the dimensions with more than four indicator categories, i.e., resource efficiency and green economic opportunities.

3. Level 3: Geometric aggregation was applied on the dimensions and the 25% rule on missing values was not applied. At this level of aggregation, no dimension was allowed to easily substitute the other dimensions to improve the Green Growth Index.

Python software was used to conduct all the analysis described above, except for the correlation analysis which was done in Prism (GraphPad Software). Detailed discussion on the steps involved in constructing the Green Growth Index is provided in chapter 5 of GGGI Technical Report Number 5, Green Growth Index: Concepts, Methods, Applications (Acosta et al. 2019).

Figure A.3 Methods of aggregation at the indicator, indicator category, and dimension levels



*No aggregation for indicators of green economic opportunities

Annex 2

Divergences in databases between 2021 and 2022

The raw data of all indicators for the 2021 and 2022 Green Growth Index were compared to identify any divergence that will affect the scores. Generally, there are divergence on the data reported in the online databased between 2021 and 2022. The diagrams below show indicators with significant divergences between databases for selected countries. Overall, 19 indicators out of 40 represent data divergence for some countries. Except for the total domestic material consumption per unit of GDP (ME1) and share of patent publications in environmental technology to total patents (GN1), the data sources of indicators were the same for 2021 and 2022. The OECD and WB were the sources of data ME1 indicator in 2021. In 2022, however, the UNSTAT database was used as the data source for this indicator to increase the number of countries covered by data. The WIPO was used as a data source for GN1 in 2021. In 2022, the OECD database for green growth indicators was the data source for this indicator because it has more data coverage than WIPO.

Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries

EE1: Energy intensity level of primary energy (MJ per $2011 PPP GDP)

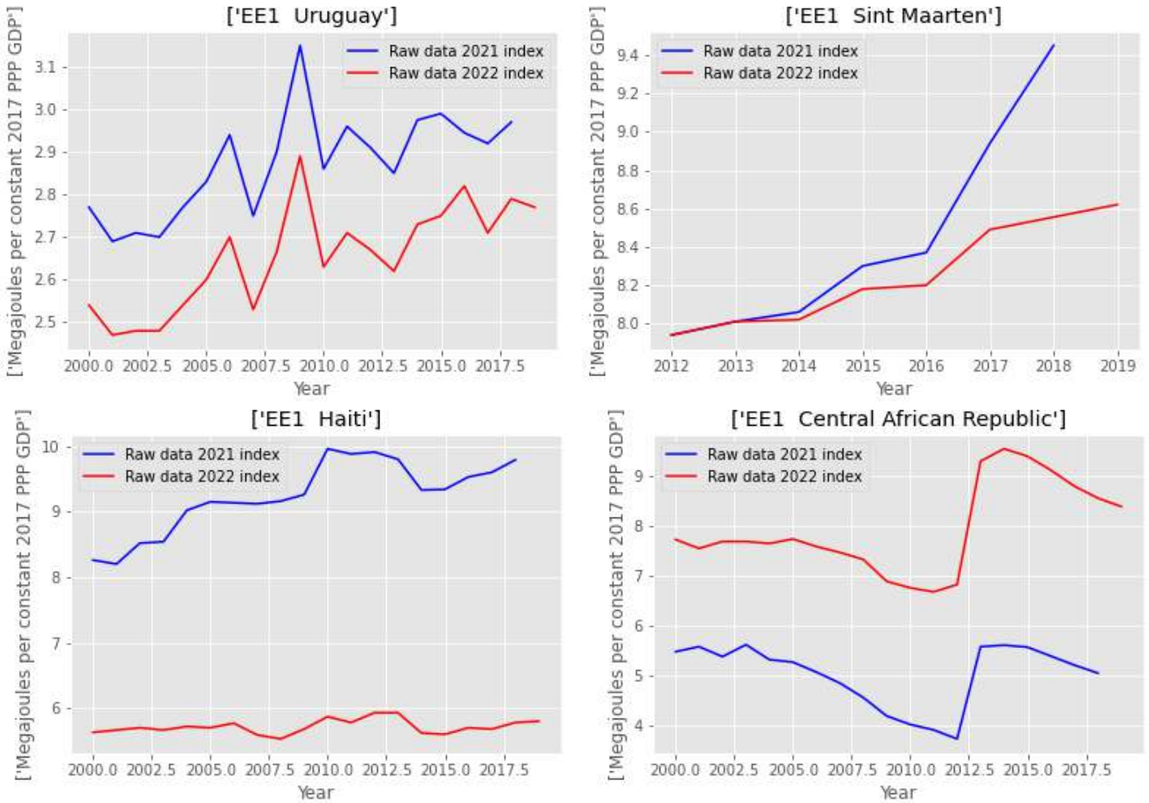
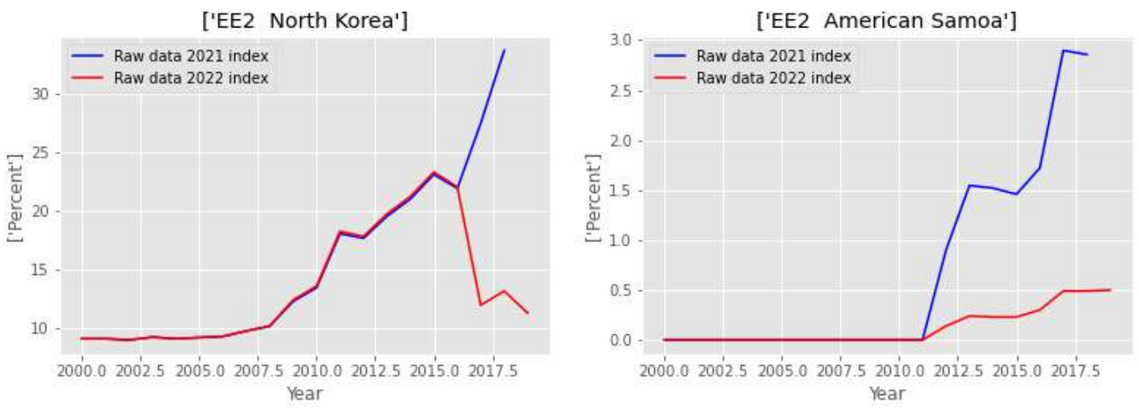


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

EE2: Share renewable to total final energy consumption (Percent)



EW1: Water use efficiency (USD per m3)

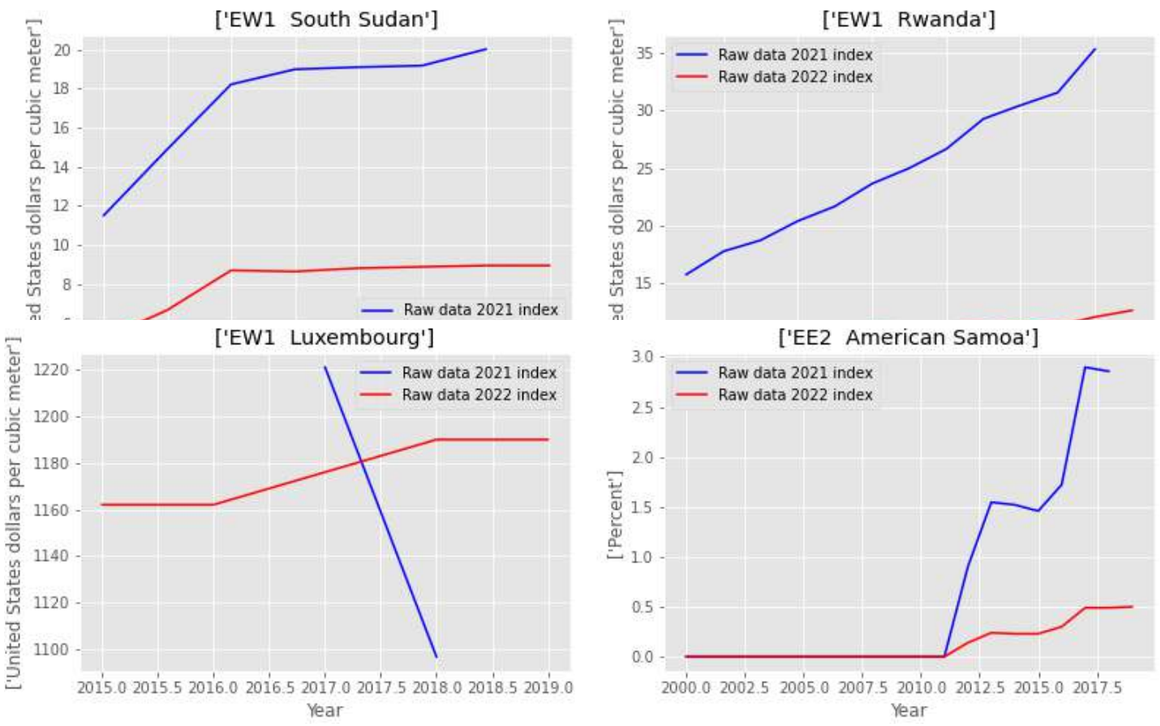
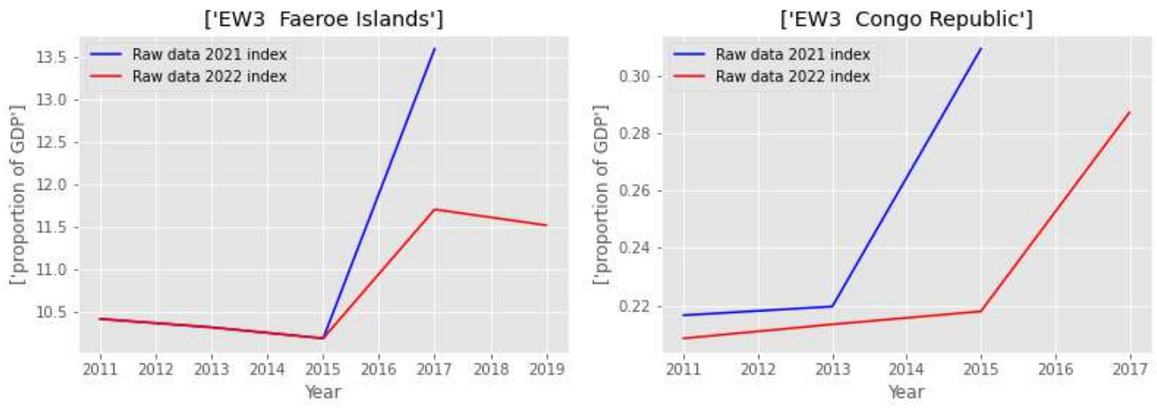


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

EW3: Sustainable fisheries as a proportion of GDP (Percent)



SL3: Share of ruminant livestock population to the agricultural area (Percent)

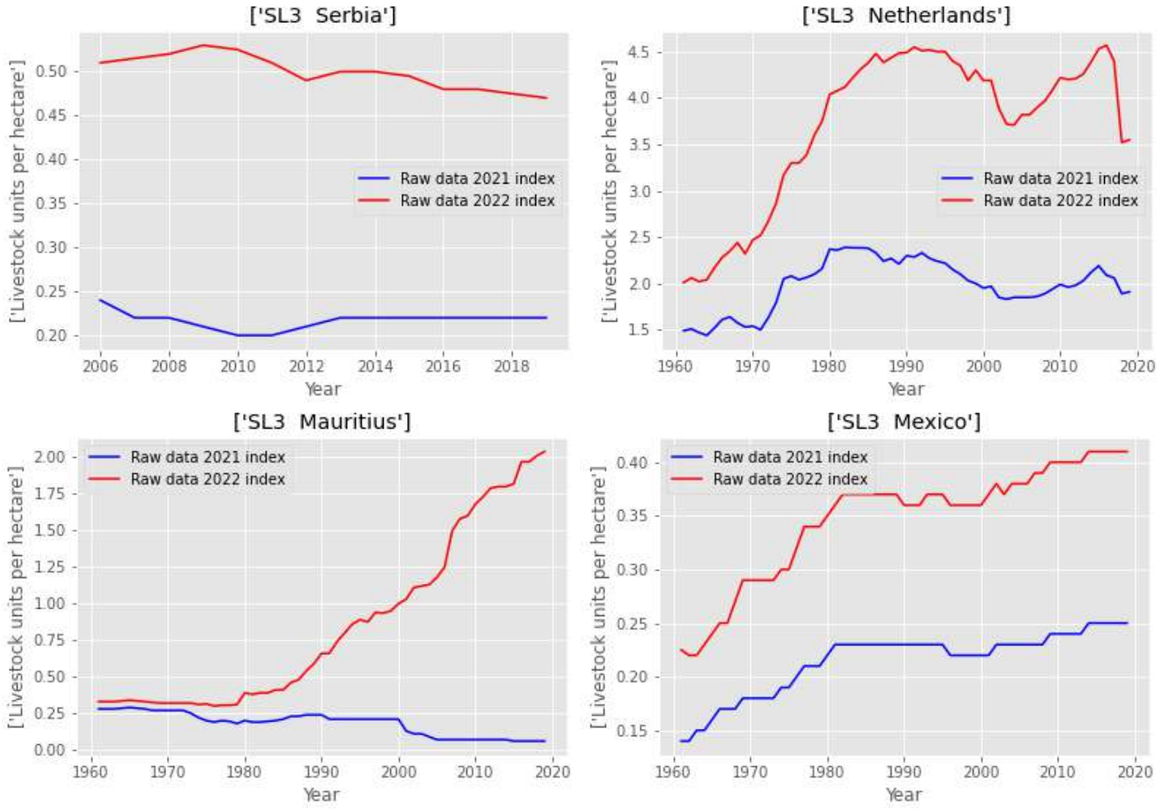
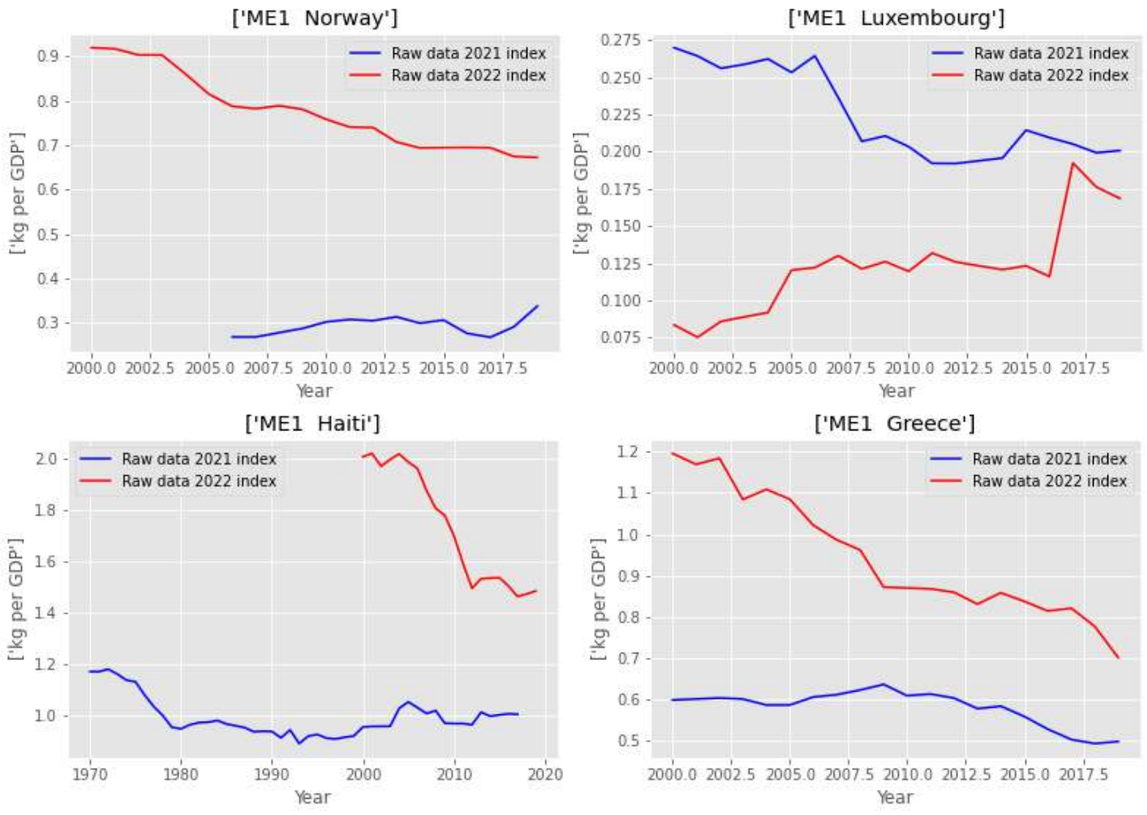


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

ME1: Domestic material consumption per unit of GDP, by type of raw material



ME2: Total material footprint (MF) per capita population (Tons per capita)

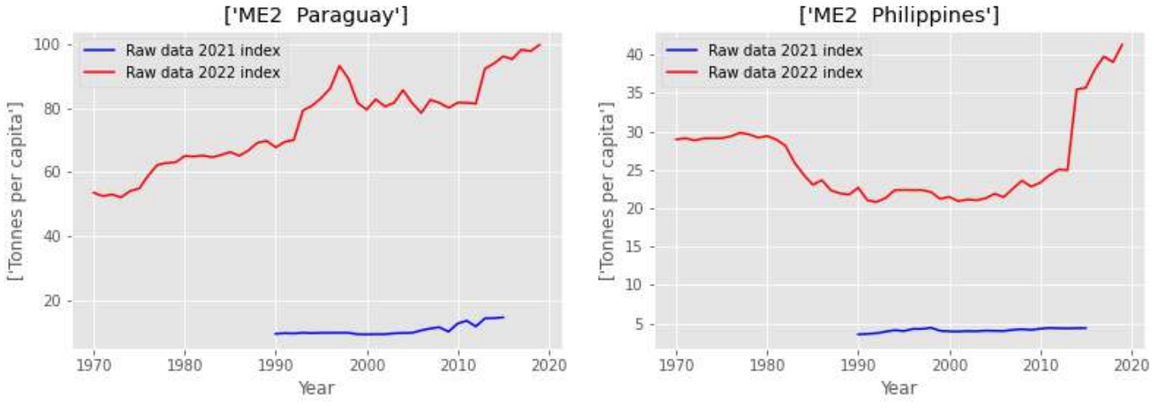
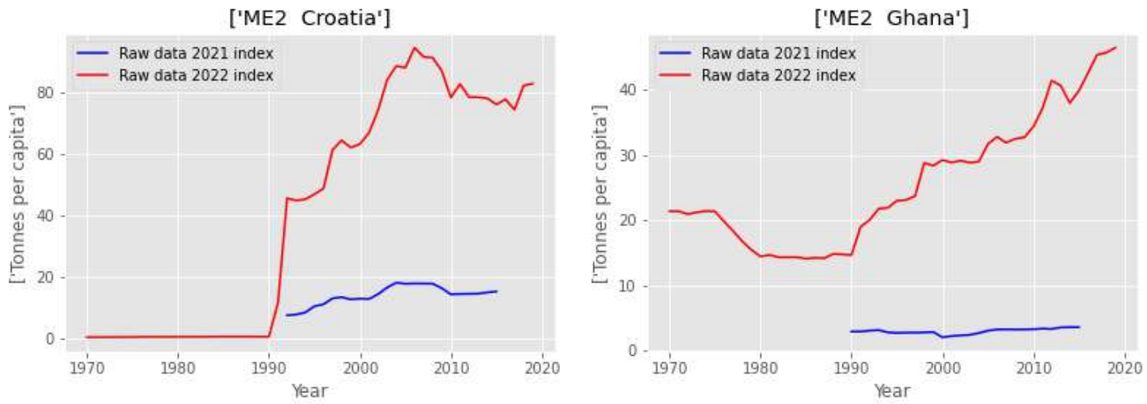


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

ME2: Total material footprint (MF) per capita population (Tons per capita) (continued)



BE1: PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m3)

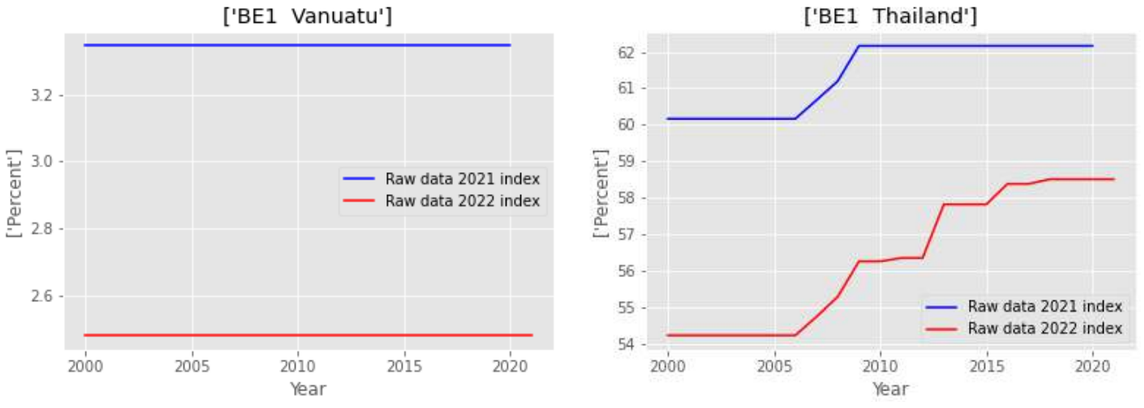
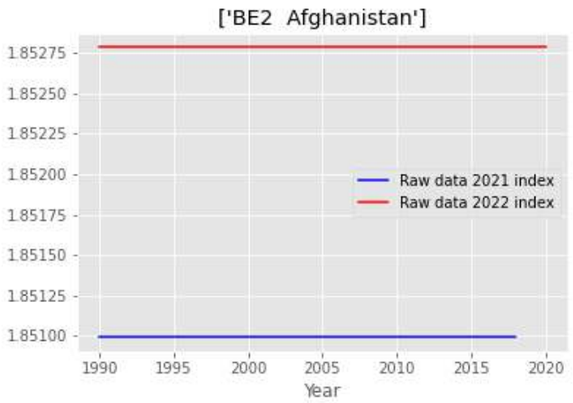
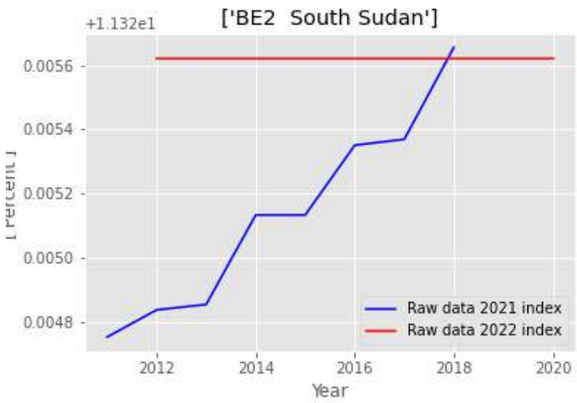
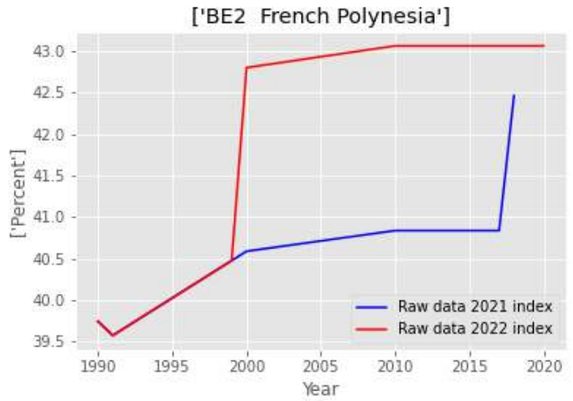


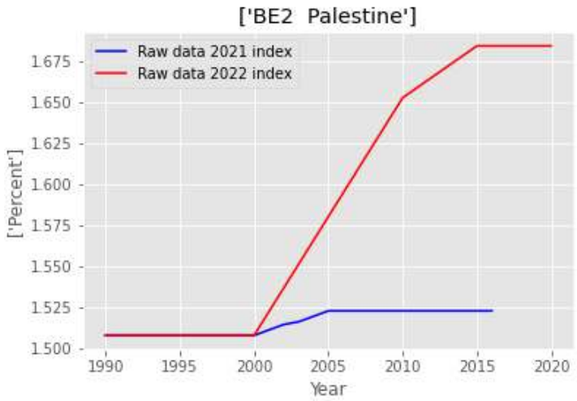
Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

BE2: Share Forest area to total land area (Percent)

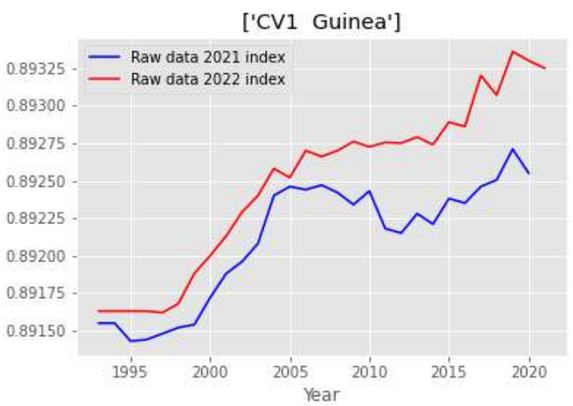








CV1: Red list index (Index)



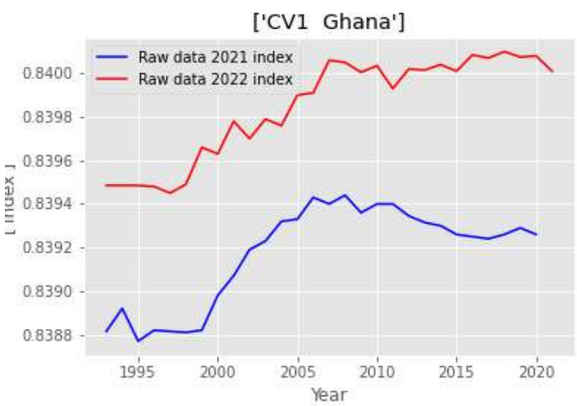
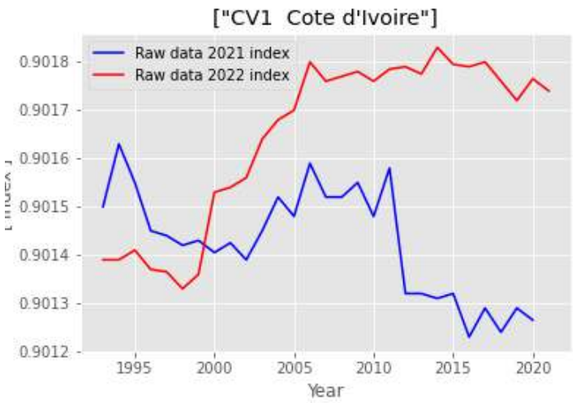
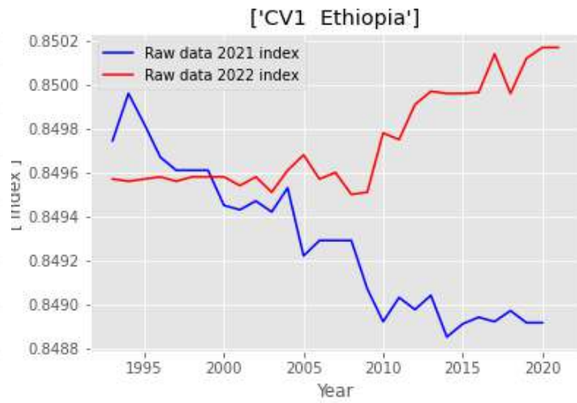


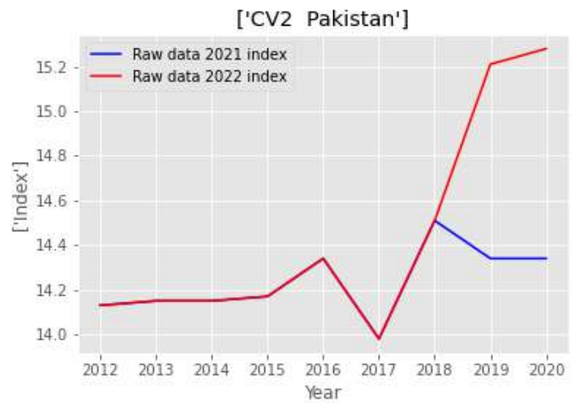
Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

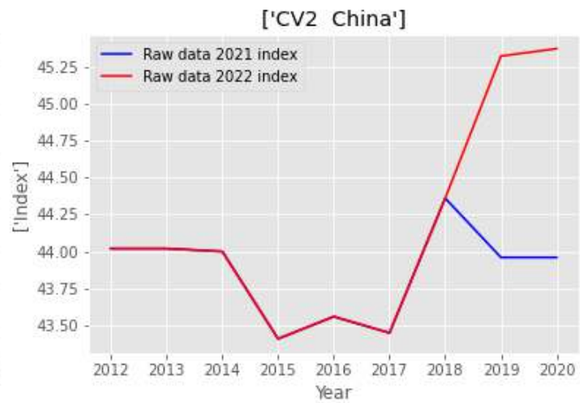
CV1: Red list index (Index) (continued)

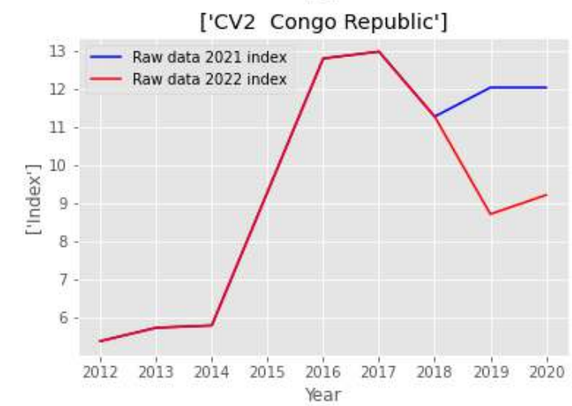




CV2: Tourism and recreation in coastal and marine areas (Score)







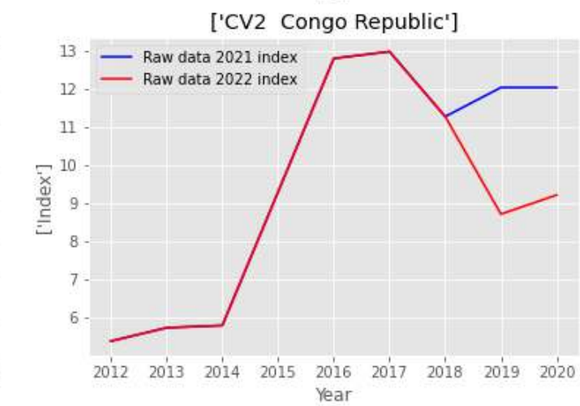
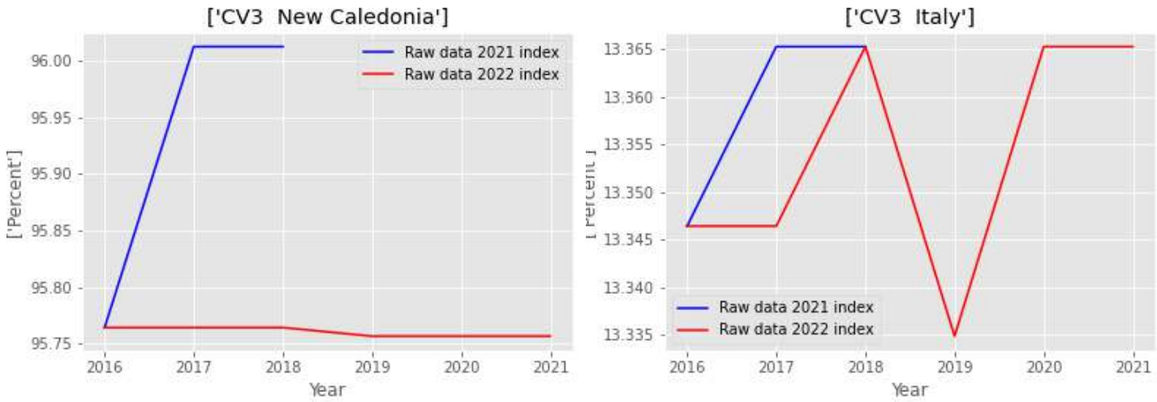


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

CV3: Share of terrestrial and marine protected areas to total territorial areas (Percent)



GV1: Ratio of adjusted net savings to GNI, including particulate emission damage (5 yrs moving average)

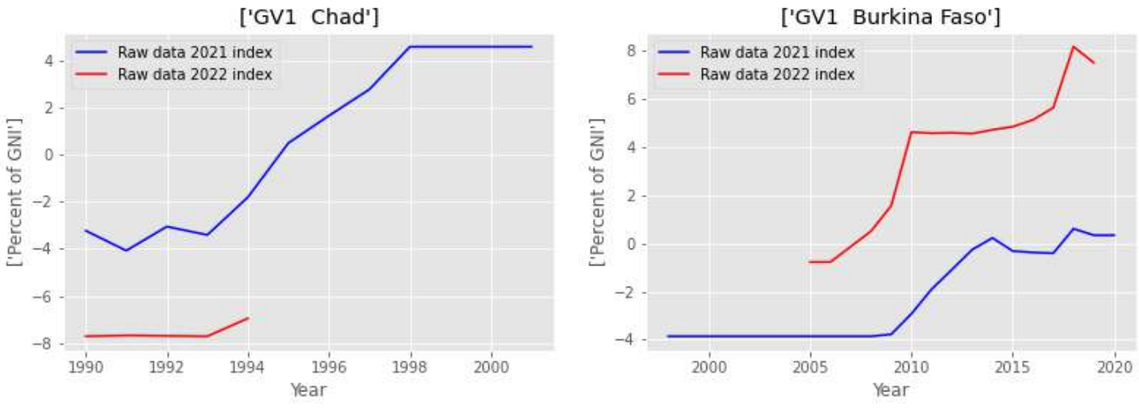
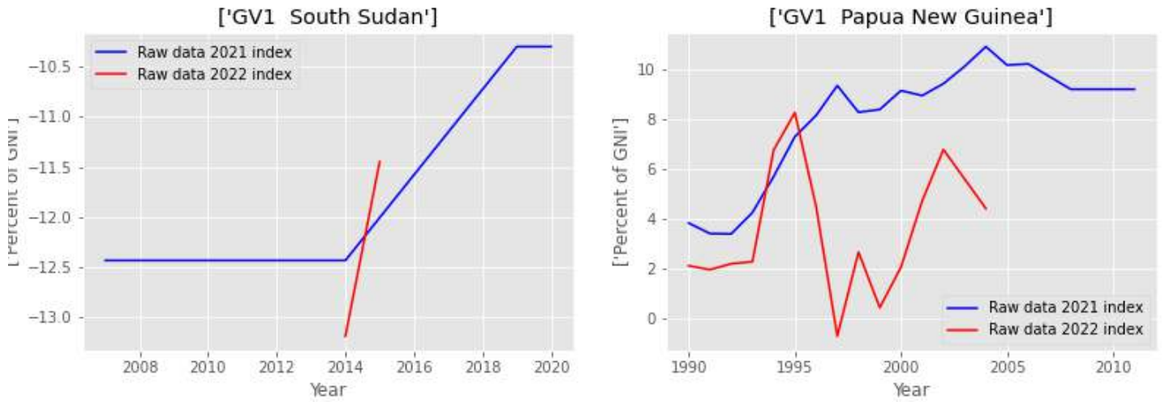


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

GV1: Ratio of adjusted net savings to GNI, including particulate emission damage (5 yrs moving average) (continued)



GN1: 7 Years rolling average Patents on environment technologies

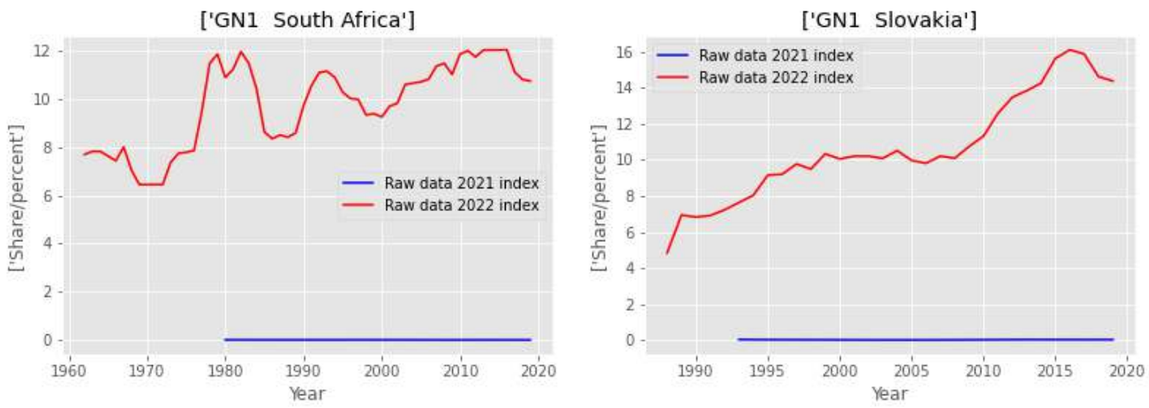
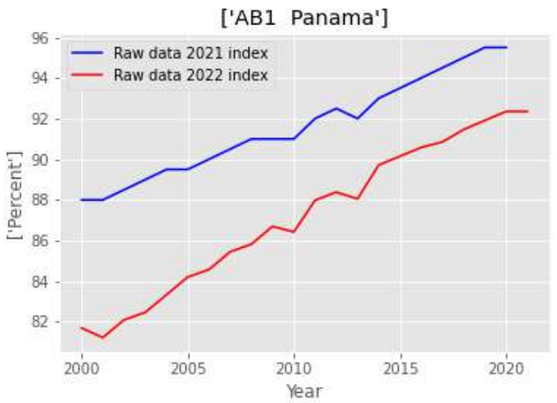
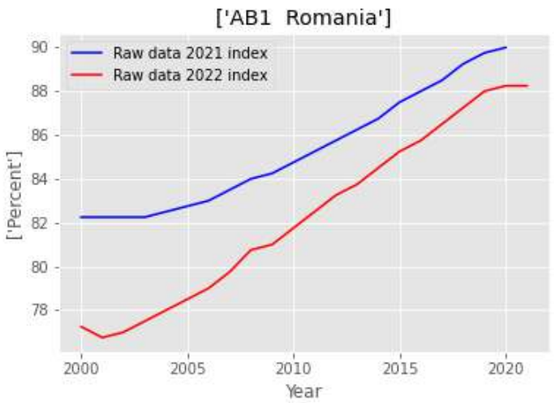
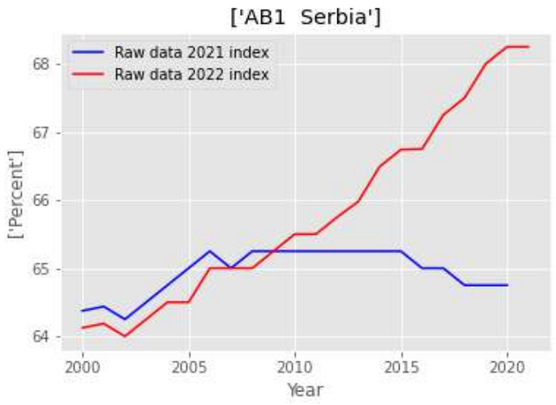


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

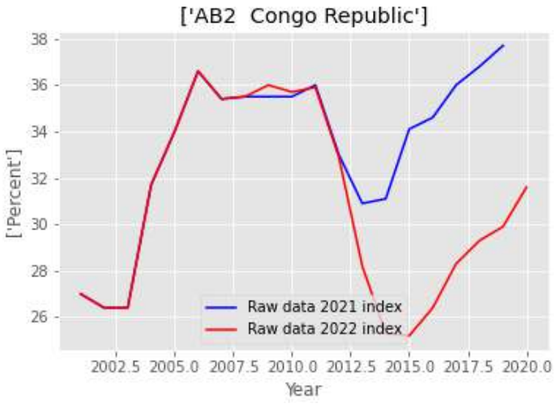
AB1: Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels (Percent)

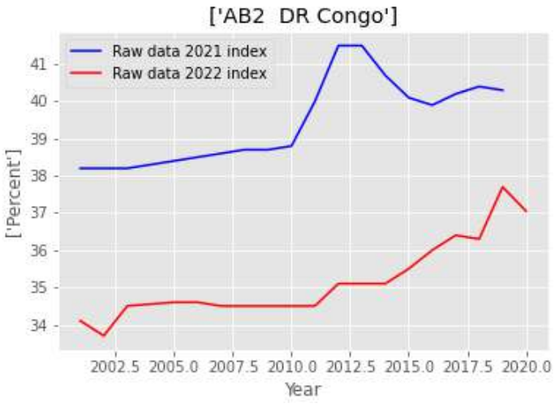




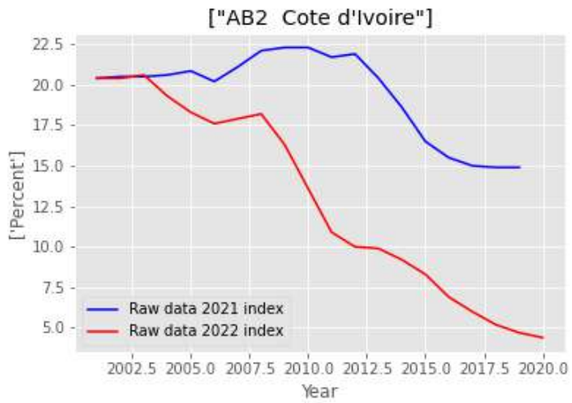


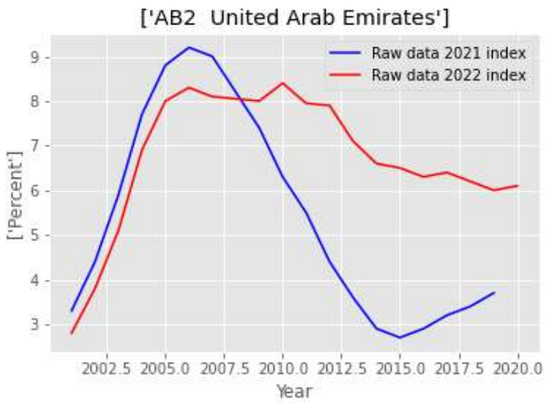
AB2: Prevalence of undernourishment (Percent)



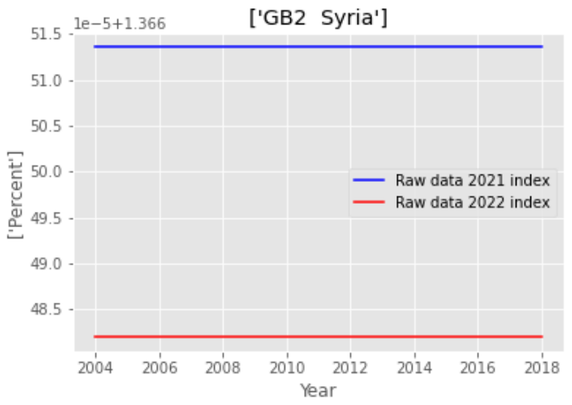


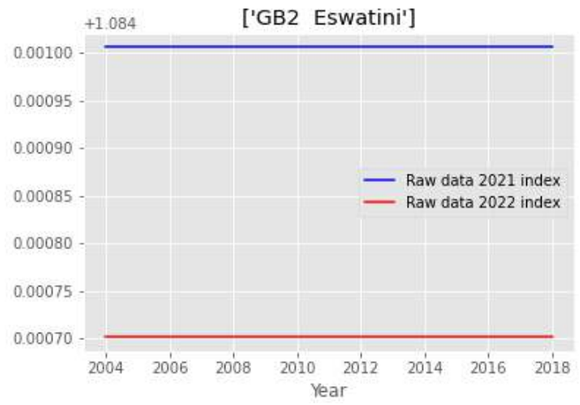
AB2: Prevalence of undernourishment (Percent)(continued)

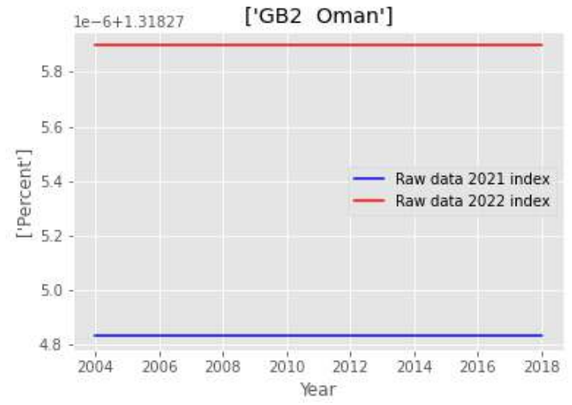




GB2: Share of adults (15 years and older) with an account at a financial institution or mobile-money-service provider (Percent)







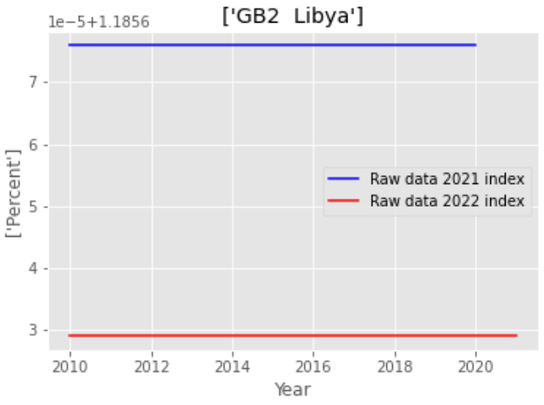


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

SE3: Share of youth (aged 15-24 years) not in education, employment, or training (Percent)

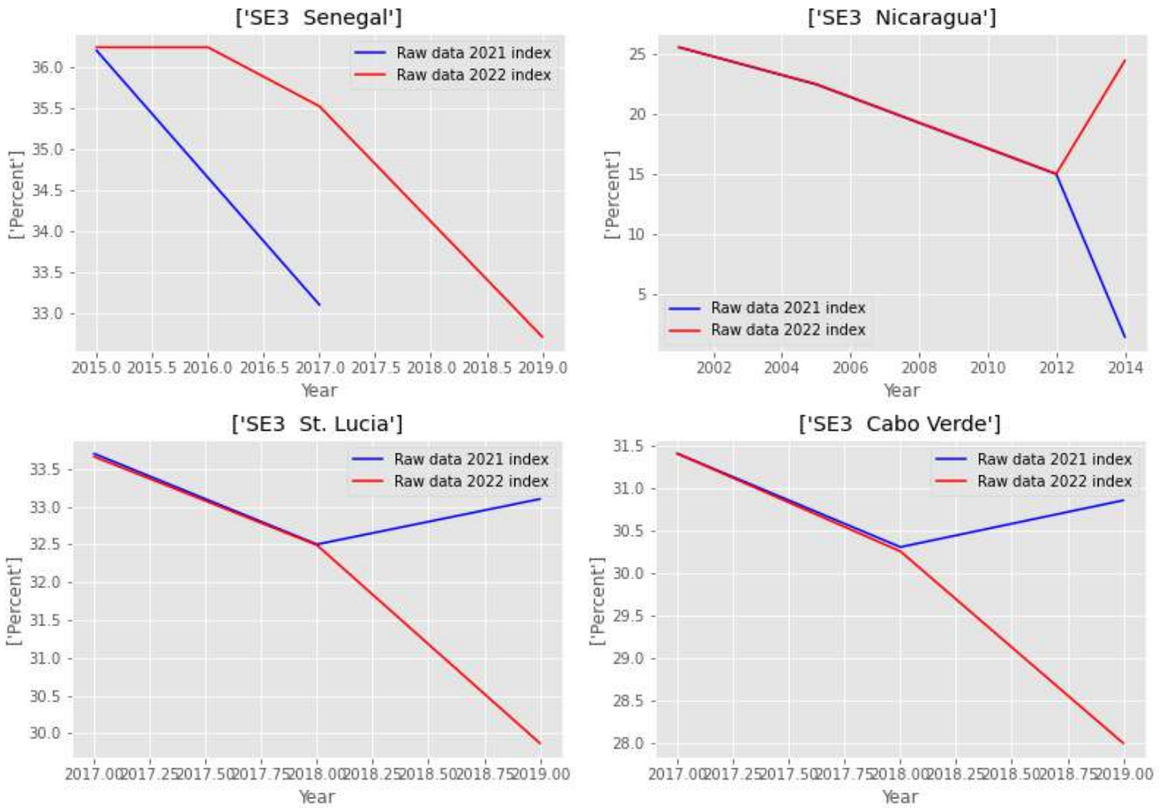
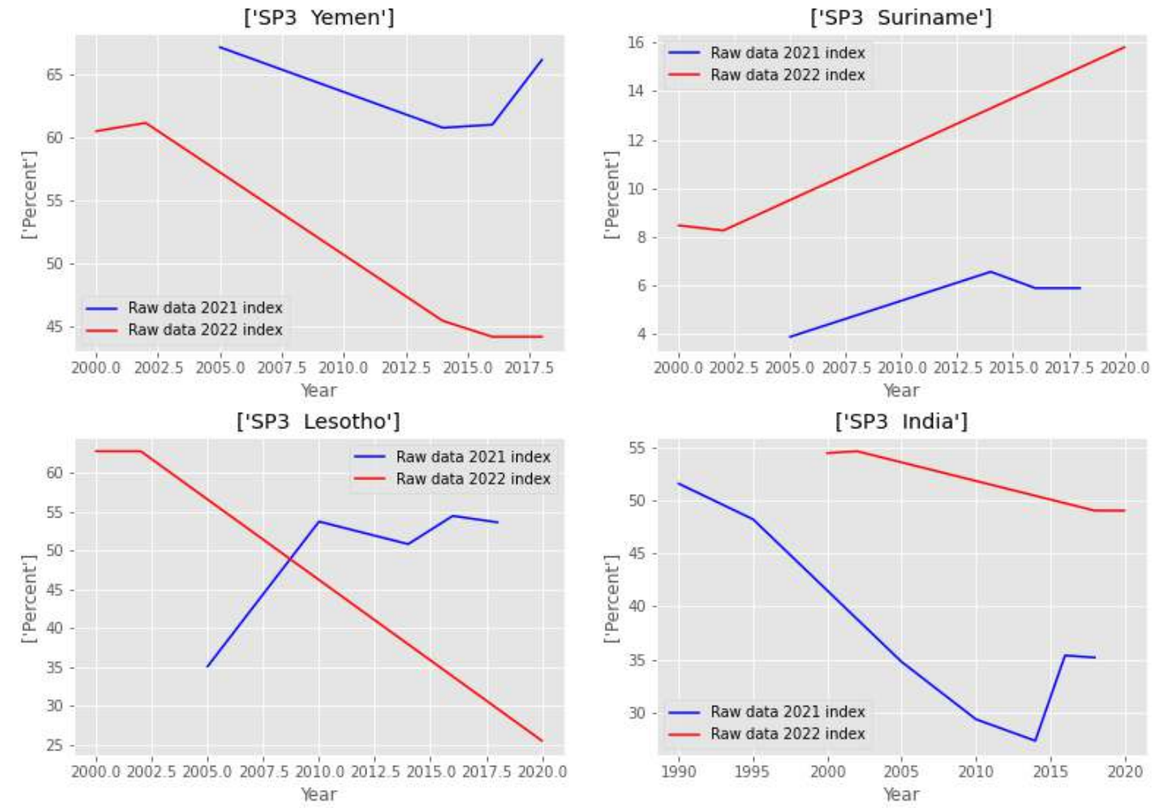


Figure A.4 Divergences in databases between 2021 and 2022 for selected indicators and countries *(continued)*

SP3: Proportion of urban population living in slums (Percent)



Annex 3

Data availability and sources of the indicators and targets for the Zambia Green Growth Index

Table A.1 Data availability and sources of the green growth indicators

Indicator Code	Available years	Source of downloaded data	Relationship to green growth	Sustainability targets	Source of the targets
EFFICIENT AND SUSTAINABLE RESOURCE USE					
EE1*	2000-2019	UNSTATS database	negative	1.778	top 5 countries
EE2*	2000-2019	UNSTATS database	positive	91.3	top 5 countries
EE3	2010, 2014, 2016, 2018	WB Logistics Performance Index	positive	5	Highest score
EE4	2000-2020	Our World in Data	positive	100	top 5 countries
EE5	1995-2020	Our World in Data	negative	22.237	top 5 countries
EW1*	2000-2019	UNSTATS database	positive	110.35	top 5 countries
EW2*	2000-2019	UNSTATS database	negative	25-75	SDG target
EW3	1960-2021	WB Open Data	positive	1.30E-05	top 5 countries
EW4	1992-2019	FAO Aquastat	positive	5.81	top 5 countries
EW5	1961-2019	FAO Aquastat	positive	161071.1	top 5 countries
SL1	1961-2018	FAOSTAT	negative	0-5	Expert opinion
SL2	2005-2018	FAOSTAT	positive	10.39899	top 5 countries
SL3	1961-2020	WB Open Data	positive	10863.91	top 5 countries
SL4	2000-2020	FAOSTAT	positive	121637.9	top 5 countries
SL5	2000-2018	UNSTATS database	positive	100	SDG target
ME1*	2000-2019	WB Open Data and OECD database	negative	0.700729	top 5 countries
ME2*	1990-2015	UNEP Global Material Flows Database	negative	0.997	top 5 countries
ME3*	2014-2018	FAOSTAT	negative	10.063357	top 5 countries
ME4	2008-2021	Zambia National Water Supplyv and Sanitation Council	positive	100	National target
ME5	2000-2020	WASH Data	positive	100	top 5 countries
NATURAL CAPITAL PROTECTION					
EQ1*	1990-2017	WB Open Data	negative	10	SDG target
EQ2*	1990-2019	Institute for Health Metrics and Evaluation GHDx database	negative	0	SDG target
EQ3*	2018	WB What a Waste Global Database	negative	0.069	top 5 countries
EQ4	2000-2020	WB Open Data	negative	0	SDG target

Table A.1 Data availability and sources of the green growth indicators *(continued)*

Indicator Code	Available years	Source of downloaded data	Relationship to green growth	Sustainability targets	Source of the targets
EQ5	2008-2020	WB Open Data	positive	100	SDG target
GE1*	1990-2021	Climate Watch Data and WB Open Data	negative	0.06	top 5 countries
GE2*	1990-2021	Climate Watch Data and WB Open Data	negative	0.126	top 5 countries
GE3	1990-2018	Climate Watch Data and WB Open Data	negative	0	Expert opinion
GE4	1980-2019	Our World in Data	negative	0.36416	top 5 countries
GE5	2000-2020	Our World in Data	negative	19.07	top 5 countries
BE1*	2000-2021	UNSTATS database	positive	100	SDG target
BE2*	1990-2020	WB Open Data	positive	17	SDG target
BE3*	2000, 2010, 2015, 2016, 2017, 2018, 2019, 2020	UNSTATS database	positive	100	SDG target
BE4*	2010, 2020	UNSTATS database	positive	1.576466	top 5 countries
BE5*	2000-2021	UNSTATS database	positive	0.316194	top 5 countries
CV1*	1993-2021	UNSTATS database	positive	1	SDG target
CV2*	2016, 2017, 2018, 2019, 2020, 2021	WB Open Data	positive	17	SDG target
CV3	1995-2020	WB Open Data	positive	11.36	top 5 countries
CV4	1991-2019	WB Open Data	positive	77.58	top 5 countries
CV5	2013, 2014, 2015, 2016, 2017, 2018, 2019	UNESCO UIS Data	positive	5.85	top 5 countries
GREEN ECONOMIC OPPORTUNITIES					
GV1	2010-2020	WB Open Data	positive	24.8	top 5 countries
GV2*	2000-2020	UNSTATS database	positive	860.39	top 5 countries
GV3*	2002-2020	UNSTATS database	positive	192.7	top 5 countries
GV4*	2001-2020	UNSTATS database	positive	1.42682	top 5 countries
GV5	2000-2018	UNCTADSTAT	positive	100	Highest score
GT1	2000-2019	COMTRADE DATA	positive	7.89	top 5 countries
GT2	1966-2020	WB Open Data	negative	0.034056	top 5 countries
GT3	1990-2019	WB Open Data	positive	68.3123	top 5 countries
GT4	2006-2020	WB Open Data	positive	12.1	top 5 countries
GT5	1966-2020	WB Open Data	positive	85.2	top 5 countries
GJ1	2021	IRENA database	positive	340.23	top 5 countries
GJ2*	2000-2021	UNSTATS database	negative	0	SDG target
GJ3	1991-2019	WB Open Data	negative	0	top 5 countries
GJ4*	2008, 2017, 2018, 2019, 2020	WB Open Data	negative	0	SDG target
GJ5*	2006-2020	UNSTATS database	positive	15.47	top 5 countries

Table A.1 Data availability and sources of the green growth indicators *(continued)*

Indicator Code	Available years	Source of downloaded data	Relationship to green growth	Sustainability targets	Source of the targets
GN1	1997, 2009, 2015, 2017, 2018	IRENA database	positive	100	top 5 countries
GN2	2007-2017	WB GovData360	positive	7	Highest score
GN3	2006-2021	Zambia Minister of Finance and National Planning	positive	20	National target
GN4*	2000-2019	UNSTATS database	positive	37.96	top 5 countries
GN5	1960-2021	WB Open Data	negative	0.000742	top 5 countries
SOCIAL INCLUSION					
AB1*	2000-2021	UNSTATS database	positive	100	SDG target
AB2*	2000-2021	UNSTATS database	positive	100	SDG target
AB3	1992, 1995, 1996, 1999, 2002, 2007, 2013, 2018	WB Open Data	negative	0	Expert opinion
AB4	2011-2021	Zambia Information and Communications Technology Authority (ZICTA) Statistics	positive	100	National target
AB5	1995-2021	WB TCdata360	positive	100	Highest score
GB1*	2000-2021	UNSTATS database	positive	50	SDG target
GB2*	2000-2021	UNSTATS database	negative	1	SDG target
GB3	1971-2021	WB Women, Business and the Law	positive	100	Highest score
GB4*	2000-2017	UNSTATS database	negative	0	SDG target
GB5	1970-2017	WB Open Data	negative	1	Expert opinion
SE1	1984-2021	WB Open Data	negative	1.278115	top 5 countries
SE2*	2000-2021	UNSTATS database	negative	1	Top 5 countries
SE3*	2000-2021	UNSTATS database	negative	1	Expert opinion
SE4	2010-2021	ILOSTAT	negative	0	Expert opinion
SE5*	2000-2021	UNSTATS database	negative	1	SDG target
SP1*	2000, 2016, 2020	UNSTATS database	positive	100	SDG target
SP2*	2000, 2005, 2010, 2015, 2017, 2019	UNSTATS database	positive	100	SDG target

Table A.1 Data availability and sources of the green growth indicators *(continued)*

Indicator Code	Available years	Source of downloaded data	Relationship to green growth	Sustainability targets	Source of the targets
SP3*	(2000-2020), 2 Years range	UNSTATS database	negative	0	SDG target
SP4*	1990-2015	UNSTATS database	negative	0	SDG target
SP5	2008-2010, 2013-2015, 2017-2021	WB Open Data	negative	0	Expert opinion

Definitions of indicator codes:

Efficient and sustainable resource use

EE1 – energy intensity, EE2 – renewable energy share, EE3 – efficient transport, EE4 – low-carbon electricity, EE5 – per capita electricity consumption
EW1 – water use efficiency, EW2 – level of water stress, EW3 – capture fisheries, EW4 – agriculture water use efficiency, EW5 – renewable water resources per capita
SL1 – nutrient balance, SL2 – organic agriculture area, SL3 – cereal yield, SL4 – agricultural productivity, SL5 – natural capital productivity
ME1 – domestic material consumption, ME2 – material footprint, ME3 – food loss and food waste, ME4 – sanitation coverage, ME5 – sewer, septic and latrine coverage

Natural capital protection

EQ1 – PM2.5 air pollution, EQ2 – DALY rate from unsafe water, EQ3 – solid waste generation, EQ4 – urban people with open defecation, EQ5 – people with basic handwashing facilities
GE1 – CO2 emissions per capita, GE2 – Non- CO2 per capita, GE3 – CO2 emissions growth rate, GE4 – carbon intensity of energy production, GE – carbon intensity of electricity
BE1 – protected key biodiversity areas, BE2 – share of forest areas, BE3 – forest area with management plan, BE4 – annual forest area change, BE5 – change in extent of water ecosystems
CV1 – red list index, CV2 – terrestrial protected area, CV3 – international tourism arrivals, CV4 – share of employment in services, CV5 – share of exports of cultural goods

Green economic opportunities

GV1 – adjusted net savings, GV2 – renewable electricity capacity, GV3 – revenue from biodiversity economic instruments, GV4 – agriculture orientation index, GV5 – transport productive capacity
GT1 – exports of environmental goods, GT2 – ores and metals exports, GT3 – medium and high-tech exports, GT4 – new business density, GT5 – exports of manufactured goods
GJ1 – renewable energy employment, GJ2 – employed below poverty line, GJ3 – vulnerable employment, GJ4 – youth not in education, employment, training, GJ5 – ODA flows for scholarships
GN1 – environmental technologies, GN2 – collaboration in R&D, GN3 – share education expenditure, GN4 – medium/high-tech manufacturing value added, GN5 – intellectual property charges

Social inclusion

AB1 – access to safe water and sanitation, AB2 – access to electricity and clean fuels, AB3 – prevalence of children stunting, AB4 – mobile broadband penetration, AB5 – property rights
GB1 – women in national parliaments, GB2 – gender account in financial institution, GB3 – equal gender pay, GB4 – maternal mortality ratio, GB5 – school enrollment gender parity
SE1 – inequality in income, SE2 – rural/urban access to electricity, SE3 – youth unemployment disparity, SE4 – old people unemployment disparity, SE5 – unemployment disabled disparity
SP1 – share old people receiving pension , SP2 – universal health coverage, SP3 – population living in slums, SP4 – victims of intentional homicides, SP5 – displacement related to disasters

Annex 4
Robustness check

Composite indices often face criticism because they can be misleading if poorly constructed and interpreted.[i] Thus, the final critical step in developing a composite index is evaluating the confidence in the model and its underlying assumptions (i.e., robustness check). Two types of analyses were conducted to validate the robustness of the Green Growth Index: First, the sensitivity of the Green Growth Index to changes in the input variables of the aggregation model at Level 1 was analyzed. Second, using correlation and regression, the explanatory power of the scores was analyzed to check the ability of the indicators and their aggregated values (i.e., indicator categories and dimensions) to explain the structure of the Green Growth Index.

1. Sensitivity analysis

Monte Carlo methods are an easy and efficient class of algorithms often used for sensitivity analysis because they can simulate many experiments to obtain quantities of the objects being tested.[ii] In this analysis, we simulate perturbations to the 2022 Green Growth Index to estimate its sensitivity to the changes in the values and missing values of the indicators. Each simulation is run 1000 times, and each run's number was determined empirically. For checking the sensitivity to the changes in the values of the indicators, the change was sampled from a gaussian distribution. For checking sensitivity to missing data in indicators, random "nans" were added to the values of the indicators. This provided a stable estimate for each of the properties tested. The impact on the Index scores and ranks was analyzed in the simulation runs.

1.1 Changes in values of indicators

The sensitivity analysis checks for perturbations in the raw data of the indicators. This experiment aims to understand how the Index scores and the resulting ranks react to changes in the indicator values. In each simulation, modifications were made to the raw data of the indicators. As the first step, perturbations were sampled from a gaussian distribution for each indicator. The distribution has a mean of zero; its standard deviation equals 10 percent of the measured value. As the second step, these perturbations were used in the values of the indicators. As the final step, a new Green Growth Index was computed using the perturbed data. These steps were repeated 1000 times to calculate many slightly different scores for the Green Growth Index. *Figure A.5* presents the results from these steps, showing the average rank and 95 percent of the confidence interval for 1000 runs. The mean rank in red deviates slightly from the baseline rank dotted in blue. There is close to no deviation for countries at the top and bottom of the ranking. For countries in the middle, the average deviation ranges from none to 3 ranks. The confidence interval for those countries is also wider ranging from around +5 to −5 ranks. These results indicate that the Green Growth Index is relatively robust to the changes in the values of the indicators.

1.2. Missing values

The sensitivity analysis also checks for the impacts of missing values on the ranks. Recall from the aggregation methods that categories with three indicators can still be computed if a single indicator is missing (Annex 1). While this method may cause distortions, it also vastly improves the global coverage of the Green Growth Index. To measure the potential distortions caused by data gaps, values were removed randomly by 5 percent of the available data points. A distinct set of values was removed for each run before calculating a new Green Growth Index. The simulation run results are presented in *Figure A.6*, showing that uncertainty on the ranks grows as a country's rank increases. The confidence interval for the top 20 countries is centered around the baseline values. The scores range between +5 and −5 ranks at most. As the rank goes beyond 50, the average rank diverges from the baseline rank by around five ranks. Nonetheless, the relative ranks are mostly preserved. The average rank across simulations can vary by up to 10 ranks. The confidence interval for countries with a rank higher than 50 is wider. It can go as high as 15 ranks.

These results indicate that the impact on the ranks of missing data is more significant than the changes in the values of the indicators. For this reason, improving data availability is a crucial step towards a more representative Green Growth Index. Simple imputation of missing data provides temporary solution to this problem, as long as the confidence level based on the data availability is informed to guide the interpretation of the scores and ranks. Overall, the sensitivity analysis confirms that policymakers can confidently interpret the Green Growth Index.

[i] *Saisana, M., & Tarantola, S. (2002). State-of-the-art report on current methodologies and practices for composite indicator development. European Commission, pp. 1–72. https://doi.org/10.13140/RG.2.1.1505.1762*
[ii] *Burhene (2013) Monte Carlo Based Uncertainty and Sensitivity Analysis for Building Performance Simulation https://www.reiner-lemoine-stiftung.de/en/pdf/dissertationen/Dissertation-Sebastian_Burhenne.pdf*

Figure A.5 Effect of changing values of indicators on the Green Growth Index ranks

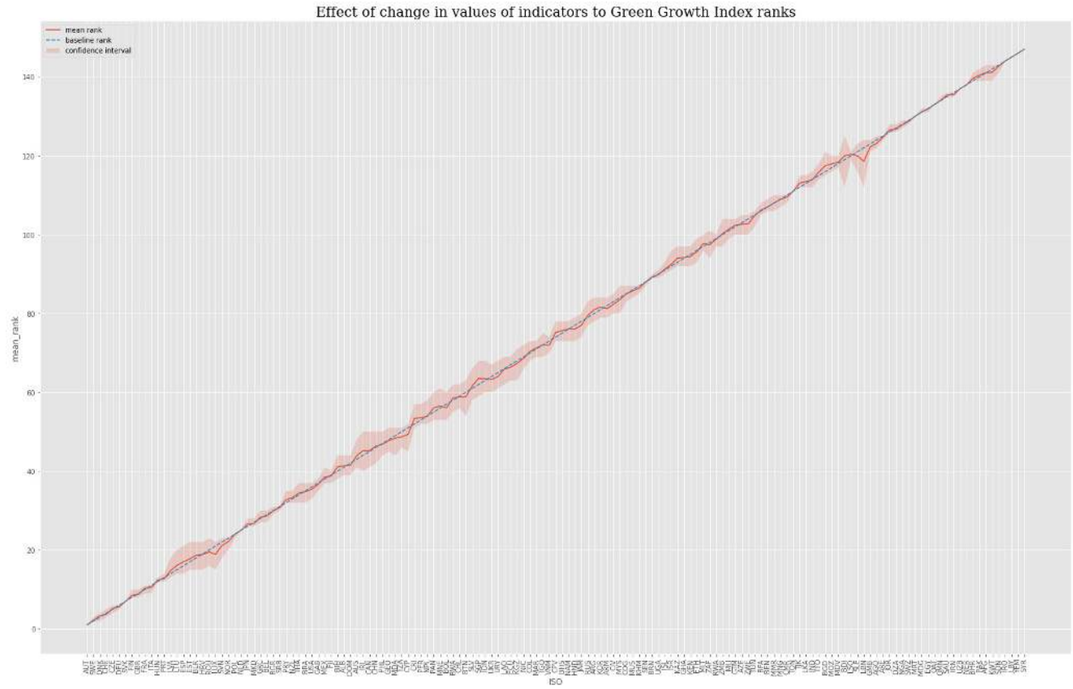
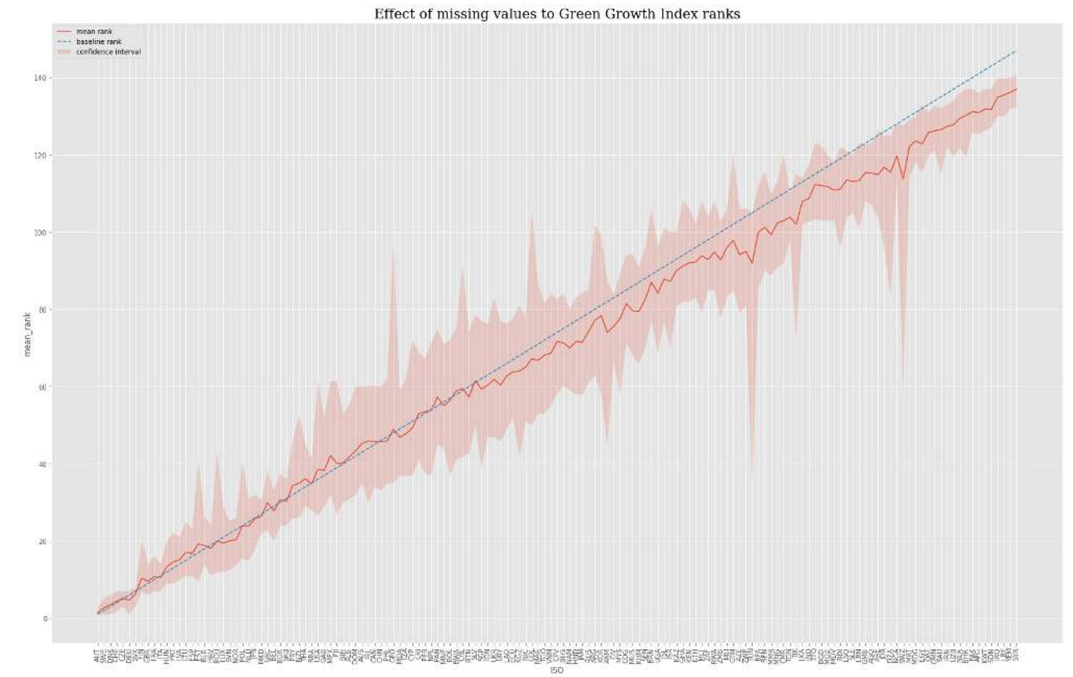


Figure A.6 Effect of missing values of the indicators on the Green Growth Index ranks



2. Analysis of explanatory power

2.1.Correlation analysis

The correlation analysis was conducted to check the strength of the relationship between the different indicators. It also aimed to identify the strength of the relationship between independent variables (green growth indicators) and the dependent variables (Green Growth Index scores). Correlation analysis determines whether indicators have acceptable levels of association in their respective dimensions. Analysis was made on the cross-sectional and longitudinal data of 40 green growth indicators from 2010 to 2021 for 147 countries with Green Growth Index scores. Figure A.7 shows the correlation between normalized indicators and scores. The color intensity in red indicates a high positive correlation between the indicators and, in blue, a high negative correlation. In general, neither extremely positive nor extremely negatively correlated green growth indicators are visible on the correlation heatmap. The absence of a strong correlation between indicators ensures that the changes in one indicator are not associated with shifts in another.

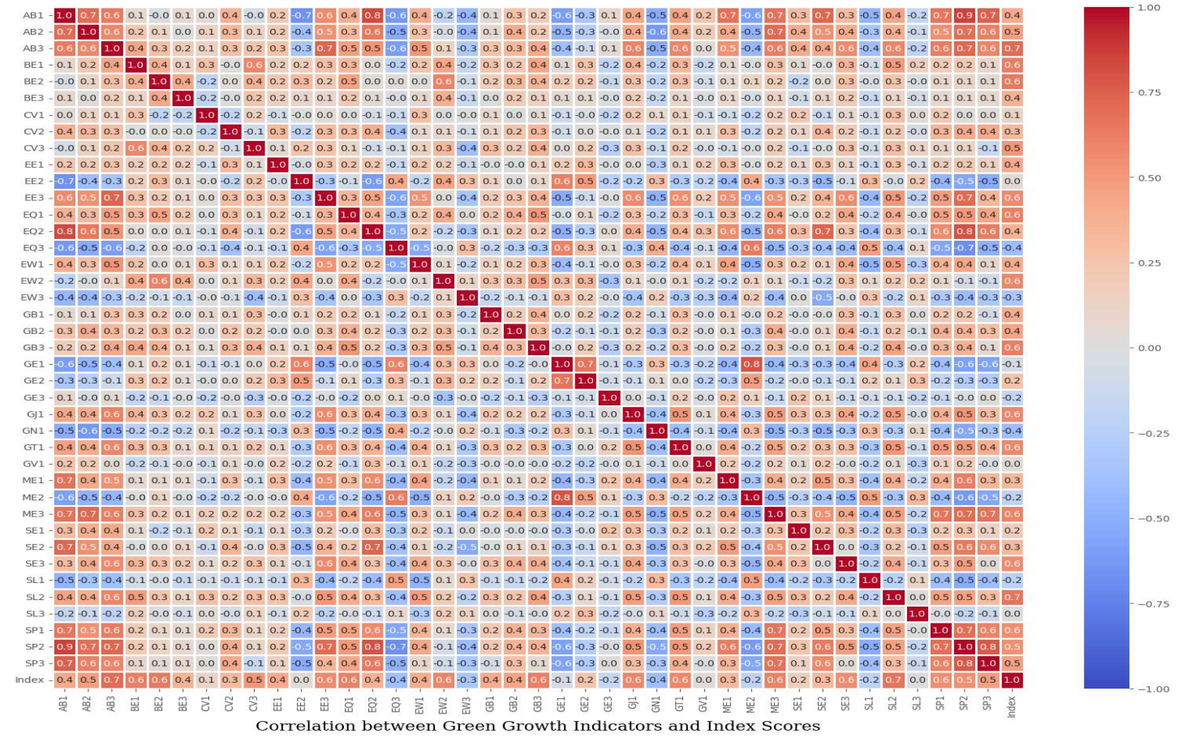
2.2. Regression analysis

The regression analysis was conducted to identify the extent to which the indicators' variance explains the Green Growth Index scores. Panel data analysis was performed on the indicators' cross-sectional and longitudinal global data from 2010 to 2021. A regression analysis is run over these two-dimensional data to identify the variance in the green growth index (Table A.2) and the feature importance of green growth indicators (Figure A.8). The overall regression was statistically significant with an R-squared of 0.997, indicating a very good fitness of the dataset. The adjusted R-squared is 0.996, with very minimal variation from the R-squared, meaning there is no overfitting, and the correlation is credible. The results show that 99 percent of the variance in the dependent variable (Green Growth Index) can be explained by the variance in the independent variables (green growth Indicators). Table A.2 presents the P-value statics from the regression analysis, where a P-value of less than 0.05 shows that the indicator is statistically significant. Overall, most green growth indicators have P-values less than 0.05, which implies a high statical significance to the Green Growth Index scores. Only very few indicators show otherwise, including AB2 (0.386), BE1 (0.071), EQ3 (0.083), EW3 (0.172), GE1 (0.112), and SP3 (0.380).

To determine the green growth indicators having the most significant impact on the Green Growth Index score, the Random Forest Regressor (RFR)[iii], a supervised learning regression algorithm, was applied. The RFR is a decision tree algorithm ensemble, employing walk-forward validation by randomizing the considered features at each decision tree split. This allows consideration of each feature in the dataset while identifying the most important independent variables in the regression model. The feature selection technique computes the scores of all independent indicators and ranks their importance using the Gini reduction criteria. The independent indicators were normalized and permuted into the decision trees. Figure A.7 presents the results of this regression analysis. The results confirm that the green growth indicators explain the variations in the Green Growth Index. Among the 40 indicators, GB1, GE1, and GE3 are green growth indicators with remarkable importance on the Green Growth Index with at least a 10 percent impact. These indicators have the highest scores in frequency and range of 80, 90, and 100.

[iii] *Breiman, L. Random forests. Machine Learning, 45(1):5–32, 2001. https://www.stat.berkeley.edu/~breiman/randomforest2001.pdf*

Figure A.7 Green Growth Index correlation heatmap for Green Growth indicators, 2010-2021



Correlation between Green Growth Indicators and Index Scores

Indicators:

AB1 - Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels; AB2 - Prevalence of undernourishment; AB3 - Universal access to sustainable transport; BE1 - Average proportion of Key Biodiversity Areas covered by protected areas; BE2 - Share of forest area to total land area; BE3 - Above-ground biomass stock in forest; CV1 - Red list index; CV2 - Tourism and recreation in coastal and marine areas; CV3 - Share of terrestrial and marine protected areas to total territorial areas; EE1 - Ratio of total primary energy supply to GDP; EE2 - Share renewable to total final energy consumption; EE3 - Efficiency in sustainable transport; EQ1 - PM2.5 air pollution, mean annual population-weighted exposure; EQ2 - DALY rate due to unsafe water sources; EQ3 - Municipal solid waste (MSW) generation per capita; EW1 - Water use efficiency; EW2 - Share of freshwater withdrawal to available freshwater resources; EW3 - Sustainable fisheries as a proportion of GDP; GB1 - Proportion of seats held by women in national parliaments; GB2 - Gender ratio of an account at a financial institution or mobile-money-service provider; GB3 - Getting paid, laws and regulations for equal gender pay; GE1 - Ratio of CO2 emissions to population, including AFOLU; GE2 - Ratio non-CO2 emissions (CH4, N2O and F-gas) excluding AFOLU to population; GE3 - Ratio non-CO2 emissions (CH4 , N2O and F-gas) in Agriculture and LUCF to population; GJ1 - Share of green employment in total manufacturing employment; GN1 - Share of patent publications in environmental technology to total patents; GT1 - Share export of environmental goods (OECD and APEC class.) to total export; GV1 - Ratio of adjusted net savings to GNI, including particulate emission damage; ME1 - Total domestic material consumption per unit of GDP; ME2 - Total material footprint per capita population; ME3 - Share of food loss to production and food waste to food consumption; SE1 - Inequality in income based on Palma ratio; SE2 - Population with access to basic services by urban/rural, i.e. electricity; SE3 - Share of youth (aged 15-24 years) not in education, employment or training; SL1 - Soil nutrient budget; SL2 - Share agriculture organic to total agriculture land area; SL3 - Share of ruminant livestock population to agricultural area; SP1 - Proportion population above statutory pensionable age receiving a pension; SP2 - Universal health coverage (UHC) service coverage index; SP3 - Proportion of urban population living in slums

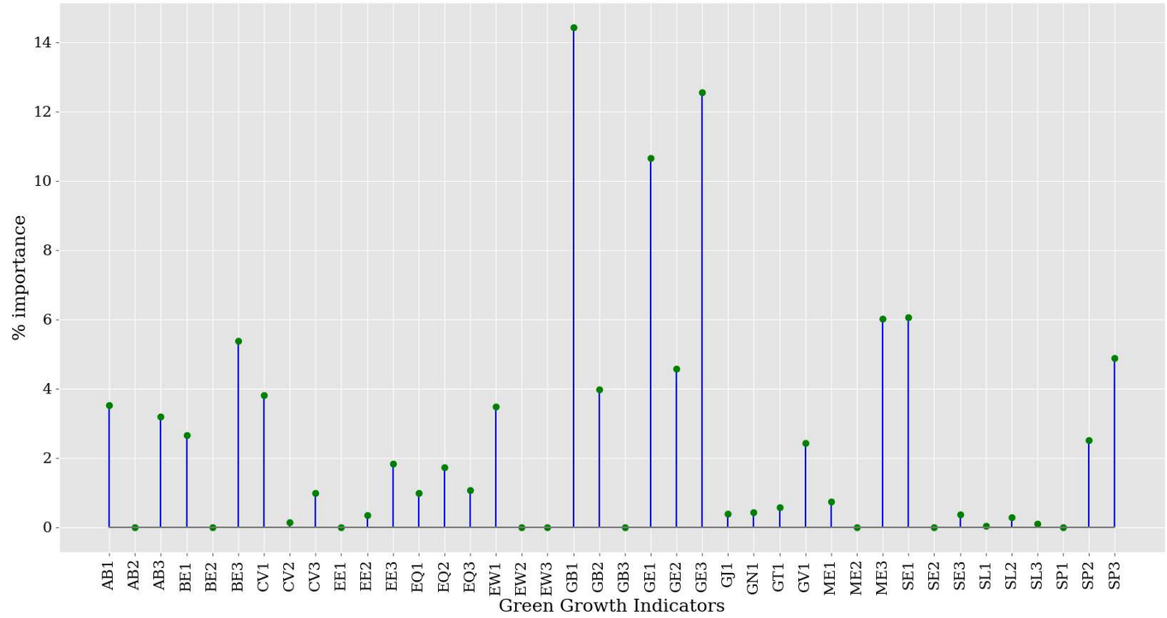
Table A.2 Effect of green growth indicators on Green Growth Index scores, 2010-2021

Indicator code	Indicator names	Coefficient	Standard error	P-value
Constant	-	-57.601	9.984	0.000
AB1	Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels	0.024	0.010	0.013
AB2	Prevalence of undernourishment	-0.007	0.008	0.386
AB3	Universal access to sustainable transport	-0.023	0.008	0.005
BE1	Average proportion of Key Biodiversity Areas covered by protected areas	-0.015	0.008	0.071
BE2	Share forest area to total land area	0.029	0.007	0.000
BE3	Above-ground biomass stock in forest	0.066	0.005	0.000
CV1	Red list index	0.120	0.010	0.000
CV2	Tourism and recreation in coastal and marine areas	0.057	0.004	0.000
CV3	Share of terrestrial and marine protected areas to total territorial areas	0.033	0.002	0.000
EE1	Ratio of total primary energy supply to GDP	0.090	0.016	0.000
EE2	Share renewable to total final energy consumption	0.034	0.006	0.000
EE3	Efficiency in sustainable transport	0.037	0.006	0.000
EQ1	PM2.5 air pollution, mean annual population-weighted exposure	0.011	0.006	0.049
EQ2	DALY rate due to unsafe water sources	0.036	0.007	0.000
EQ3	Municipal solid waste (MSW) generation per capita	-0.050	0.029	0.083
EW1	Water use efficiency	0.068	0.010	0.000
EW2	Share of freshwater withdrawal to available freshwater resources	0.084	0.004	0.000
EW3	Sustainable fisheries as a proportion of GDP	-0.022	0.016	0.172
GB1	Proportion of seats held by women in national parliaments	0.021	0.003	0.000
GB2	Gender ratio of an account at a financial institution or mobile-money-service provider	0.055	0.005	0.000
GB3	Getting paid, laws and regulations for equal gender pay	0.023	0.003	0.000
GE1	Ratio of CO2 emissions to population, including AFOLU	-0.057	0.036	0.112
GE2	Ratio non-CO2 emissions (CH4, N2O and F-gas) excluding AFOLU to population	0.024	0.007	0.002
GE3	Ratio non-CO2 emissions (CH4 , N2O and F-gas) in Agriculture and LUCF to population	0.051	0.005	0.000
GJ1	Share of green employment in total manufacturing employment	0.073	0.004	0.000
GN1	Share of patent publications in environmental technology to total patents	0.077	0.009	0.000
GT1	Share export of environmental goods (OECD and APEC class.) to total export	0.095	0.009	0.000
GV1	Ratio of adjusted net savings to GNI, including particulate emission damage	0.031	0.005	0.000
ME1	Total domestic material consumption per unit of GDP	-0.080	0.036	0.025
ME2	Total material footprint per capita population	0.079	0.012	0.000
ME3	Share of food loss to production and food waste to food consumption	0.069	0.013	0.000
SE1	Inequality in income based on Palma ratio	0.024	0.006	0.000
SE2	Population with access to basic services by urban/rural, i.e. electricity	0.039	0.006	0.000
SE3	Share of youth (aged 15-24 years) not in education, employment, or training	0.026	0.008	0.002
SL1	Soil nutrient budget	0.024	0.004	0.000
SL2	Share agriculture organic to total agriculture land area	0.021	0.005	0.000

Table A.2 Effect of green growth indicators on Green Growth Index scores, 2010-2021

Indicator code	Indicator names	Coefficient	Standard error	P-value
SL3	Share of ruminant livestock population to agricultural area	0.487	0.090	0.000
SP1	Proportion population above statutory pensionable age receiving a pension	0.008	0.003	0.027
SP2	Universal health coverage (UHC) service coverage index	0.026	0.008	0.002
SP3	Proportion of urban population living in slums	0.006	0.007	0.380

Figure A.8 Feature importance of the green growth indicators to the Green Growth Index scores, 2010-2021



Indicators:

AB1 - Population with access to basic services, i.e. Water, sanitation, electricity, and clean fuels; AB2 - Prevalence of undernourishment; AB3 - Universal access to sustainable transport; BE1 - Average proportion of Key Biodiversity Areas covered by protected areas; BE2 - Share of forest area to total land area; BE3 - Above-ground biomass stock in forest; CV1 - Red list index; CV2 - Tourism and recreation in coastal and marine areas; CV3 - Share of terrestrial and marine protected areas to total territorial areas; EE1 - Ratio of total primary energy supply to GDP; EE2 - Share renewable to total final energy consumption; EE3 - Efficiency in sustainable transport; EQ1 - PM2.5 air pollution, mean annual population-weighted exposure; EQ2 - DALY rate due to unsafe water sources; EQ3 - Municipal solid waste (MSW) generation per capita; EW1 - Water use efficiency; EW2 - Share of freshwater withdrawal to available freshwater resources; EW3 - Sustainable fisheries as a proportion of GDP; GB1 - Proportion of seats held by women in national parliaments; GB2 - Gender ratio of an account at a financial institution or mobile-money-service provider; GB3 - Getting paid, laws and regulations for equal gender pay; GE1 - Ratio of CO2 emissions to population, including AFOLU; GE2 - Ratio non-CO2 emissions (CH4, N2O and F-gas) excluding AFOLU to population; GE3 - Ratio non-CO2 emissions (CH4 , N2O and F-gas) in Agriculture and LUCF to population; GJ1 - Share of green¬ employment in total manufacturing employment; GN1 - Share of patent publications in environmental technology to total patents; GT1 - Share export of environmental goods (OECD and APEC class.) to total export; GV1 - Ratio of adjusted net savings to GNI, including particulate emission damage; ME1 - Total domestic material consumption per unit of GDP; ME2 - Total material footprint per capita population; ME3 - Share of food loss to production and food waste to food consumption; SE1 - Inequality in income based on Palma ratio; SE2 - Population with access to basic services by urban/rural, i.e. electricity; SE3 - Share of youth (aged 15-24 years) not in education, employment or training; SL1 - Soil nutrient budget; SL2 - Share agriculture organic to total agriculture land area; SL3 - Share of ruminant livestock population to agricultural area; SP1 - Proportion population above statutory pensionable age receiving a pension; SP2 - Universal health coverage (UHC) service coverage index; SP3 - Proportion of urban population living in slums

Annex 5

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