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GREEN AND BLUE ECONOMY SYNERGY- CONCEPTS AND METHODS FOR THE OECS GREEN-BLUE GROWTH INDEX

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23. Green and Blue Economy Synergy- Concepts and Methods for the OECS Green-Blue Growth Index, Lilibeth Acosta, et al., 2021.

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Green and Blue Economy Synergy- Concepts and Methods for the OECS Green-Blue Growth Index

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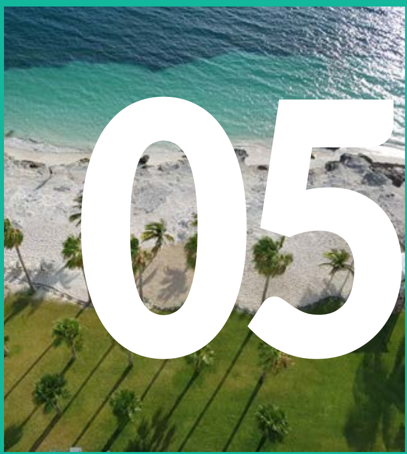
Contents

Results



Conclusions and Way Forward

Figures

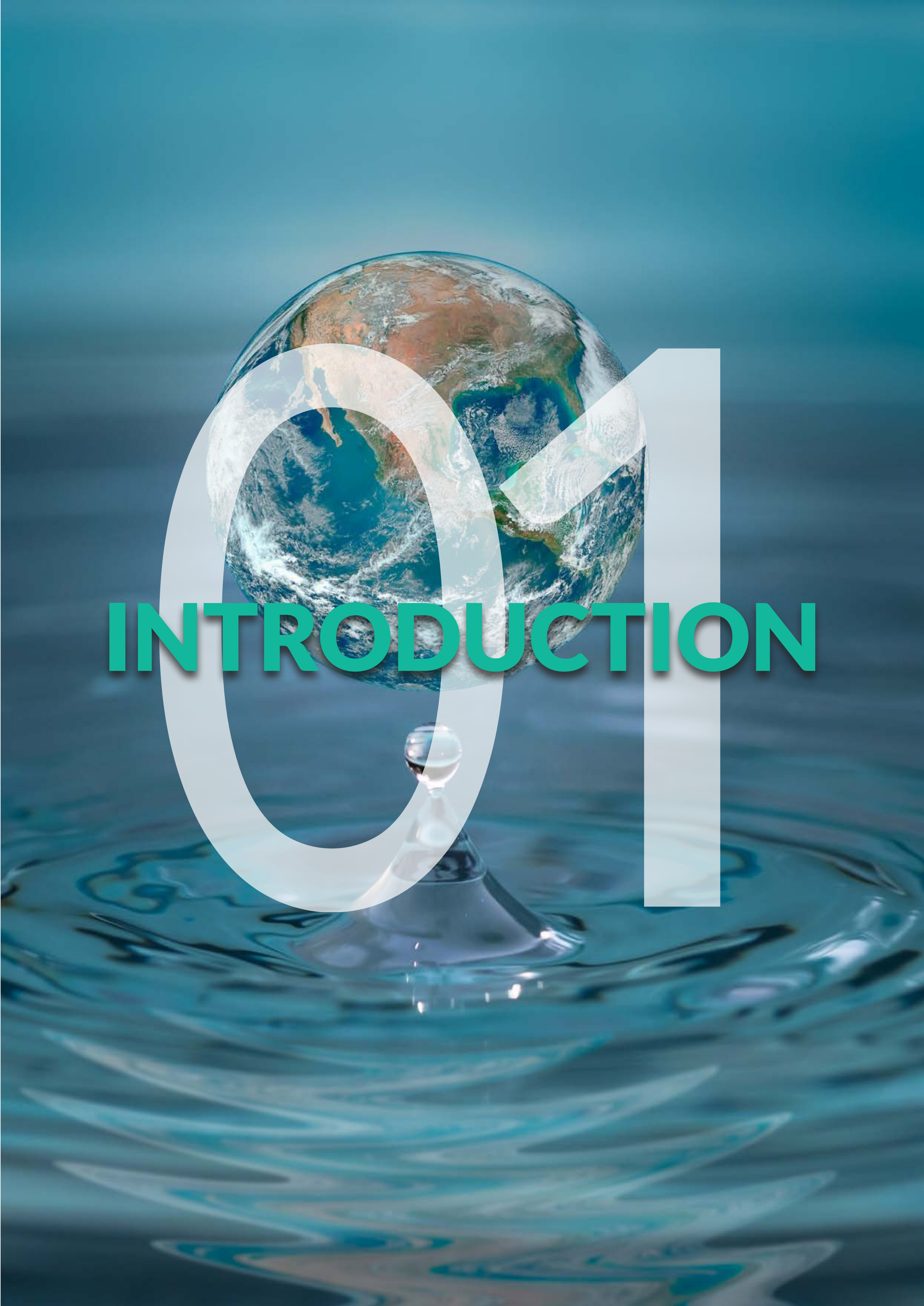
Tables

Acronyms and Abbreviations

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
BE	Biodiversity and Ecosystem Protection
CANARI	Caribbean Natural Resources Institute
CO_2	Carbon Dioxide
CV	Cultural and Social Value
DALY	Disability-Adjusted Life Year
DMC	Domestic Material Consumption
EE	Efficient and Sustainable Energy
EIU	Economist Intelligence Unit
EQ	Environmental Quality
ESRU	Efficient and Sustainable Resource Use
EU	European Union
EW	Efficient and Sustainable Water Use
FAO	Food and Agriculture Organization of the United Nations
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
GHG	Greenhouse Gas
GJ	Green Employment
GN	Green Innovation
GNI	Gross National Income
GT	Green Trade
GV	Green Investment
IGGI	Inclusive Green Growth Index
KBA	Key Biodiversity Areas
LUCF	Land-use Change and Forestry
M49	Standard Country or Area Codes for Statistical Use
ME	Material Use Efficiency
MF	Material Footprint
MJ	Megajoule
MSW	Municipal solid waste
$MtCO_2e$	Metric tons of carbon dioxide equivalent
N_2O	Nitrous Oxide
NCP	Natural Capital Protection

OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
PAGE	Partnership for Action on Green Economy
PM	Particulate matter
PM2.5	Particulate matter with a diameter of less than 2.5 micrometers
PPP	Purchasing power parity
R&D	Research and Development
SD	Sustainable Development
SDGs	Sustainable Development Goals
SE	Social Equity
SI	Social Inclusion
SIDS	Small Island Developing States
SL	Sustainable Land Use
SP	Social Protection
UHC	Universal Health Coverage
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UN ECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNEP	United Nations Environment Programme
UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNSTATS	United Nations Statistics Division
USD	United States Dollar
WB	World Bank

01 INTRODUCTION



The Green Growth Index is a composite index that measures global, regional, and country performance in four dimensions of green growth – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. Developed through the Green Growth Performance Measurement (GGPM) Program at the Global Green Growth Institute (GGGI), this Index is unique compared to other green growth related global indices by directly aligning to many global sustainability targets such as the Sustainable Development Goals (SDGs), Paris Climate Agreement, and Aichi Biodiversity Targets. This allows for benchmark analysis to easily measure green growth progress to globally recognized targets which are commonly integrated into national and international policy. The main defining feature of the Green Growth Index is the inclusion of the green economic opportunities dimension, which represents the impact of green strategies on creating new economic opportunities through innovation and investment aimed at supporting sustainable growth (Acosta et al., 2019). Among the four green growth dimensions, the indicators for green economic opportunities have been the most challenging in terms of data availability at the global level. The application of the Green Growth Index at the regional level offers an opportunity to review and update the indicators that consider specific social, economic, and environmental context in the region.

For the Eastern Caribbean region, for example, the crucial role of healthy ecosystems in economic development motivates the policymakers to give emphasis on 'blue' economy, which focuses on the economic contribution of sustainably managed ocean-based ecosystems. Ocean-based ecosystems provide essential ecosystem services such as oxygen production, climate regulation, and recreation and cultural services (Barbier, 2017) and support many different economic industries including aquaculture, energy production, and tourism (OECD, 2016). The edible Seamoss (Eucheuma cottonii) is currently being recognized due to its nutritional and health benefits (Abu Bakar et al., 2015). Its cultivation is incentivized in OECS Member States since it is a cash crop with low investment costs and environmental impact as compared to other forms of aquaculture (Williams, 2022; SusGren, 2021). The Organisation for Economic Co-operation and Development (OECD) estimated that the global ocean economy contributed USD 1.5 trillion to the global economy as well as 31 million direct full-time jobs in 2010 (OECD, 2016). While economic activity is predicted to continue expanding, an important constraint on the productivity of the ocean economy is its health. Historical and continued unregulated economic activities have stressed ocean environments through issues of over-pollution, over-exploitation of resources, and human-induced climate change (Bennett et al., 2019). Therefore, increasing awareness on ocean health, its co-benefits to human well-being, and potential to generate significant economic growth has helped to drive the concept of the 'blue economy'.

While there is no universal definition, the term 'blue economy' commonly includes themes of sustainable management of ocean (as well as coastal and inland water) ecosystems to support social well-being, equity, and economic development (Wenhai et al., 2019). Many international organizations such as United Nations Environment Programme (UNEP) further identify the blue economy as being part of the green economy or green growth due to the similarity in the concepts and definitions (Smith-Godfrey, 2016). Thereby, including both green-blue indicators can help capture the progress of sustainability issues in both land and water ecosystems (CANARI, 2019), strengthening index frameworks to become all-inclusive for measuring green growth progress. Specifically, the benefit of a synergy between green and blue indicators with the Green Growth Index is important for small island states and other developing nations where there is a high potential for the blue economy to create green economic opportunities due to their geographical proximity and historical dependence on marine resources (Patil et al., 2016). This report emphasizes that blue aspects of economic growth cannot be separated from green growth because health and productivity of water and land ecosystems are very much interlinked and interdependent. To differentiate from the global Green Growth Index, the Green-Blue Growth Index provides additional emphasis on blue economy indicators that are relevant to the green growth transition in economies that depend on marine resources as in the case of the Organisation of Eastern Caribbean States (OECS) region.

The GGGI and OECS Commission have collaborated to improve the Green Growth Index framework by strengthening the interlinkages for blue economy indicators. The collaboration aims to develop a Green-Blue Growth Index that can be used to measure country performance in the OECS region, which includes eleven Member States – Anguilla, Antigua and Barbuda, [British] Virgin Islands, the Commonwealth of Dominica, Grenada, Guadeloupe, Martinique, Montserrat, Saint Kitts and Nevis, Saint Lucia, and, Saint Vincent and the Grenadines. This report outlines the current Green-Blue Growth Index framework and provides recommendations on suitable blue economy indicators for the Green-Blue Growth Index. In this report, the framework was applied globally but excluded landlocked countries where marine resources do not play an important role. The global application allowed the assessment of OECS performance in green-blue growth relative to other subregions. Due to data constraints, however, the Green-Blue Growth Index was computed only for three OECS Member States- Grenada, Saint Lucia, and Saint Vincent and the Grenadines. But this report provides the groundwork for further developing the green-blue growth framework, improving data gaps for green and blue economy indicators, and applying to other OECS Member States in upcoming years.

The report is structured as follows: **Chapter 2** provides an overview of sustainable growth models, comparing the concepts for green and blue economy. It discusses green-blue growth synergy in the context of the Green Growth Index and based on the complementarities in green and blue economy concepts. **Chapter 3** discusses the methods for developing the Green-Blue Growth Index. **Chapter 4** discusses the results at the subregional[1], green growth dimension, and OECS Member Country levels. **Chapter 5** provides conclusions and steps forward to further develop the Green-Blue Growth Index for the OECS region.

[1] This classification is based on the M49 standard which is prepared by the Statistics Division of the United Nations Secretariat primarily for use in its publications and databases (UNSD, 2018).

02 CONCEPTS

2.1 Sustainability Growth Models

During the first Rio Summit in 1992, Sustainable Development (SD) became a priority item on the international sustainability agenda, discussing how to address economic, social, and environmental aspects of sustainable development. In 2012, two decades after identifying SD as a development approach that considers the environment (i.e., preventing degradation) and the present and future generations (i.e., continue to exist in the future), new growth models for sustainable development were recommended for discussion including green economy and blue economy. While both aim to achieve sustainable development, albeit in different ecosystems, the former has gained more political attention than the latter during and since the Rio +20 Summit. As a result, the green economy has gained more consideration in the national policy agenda and has been mainstreamed earlier in regional and national policy frameworks than the blue economy.

2.1.1 Green Economy

Green economy was first conceptualized few years before the 1992 Rio Summit, particularly as part of the Blueprint for a green economy for the United Kingdom's Department for the Environment in 1989 (Georgeson et al., 2017). Despite being a widely used concept, there is no universally accepted definition of Green Economy (Green Growth Knowledge Platform [GGKP] 2013; Schmalensee, 2012; United Nations Department of Economic and Social Affairs [UNDESA] 2012). The guidebook to Green Economy of the United Nations Department of Economic and Social Affairs (UNDESA, 2012) identifies as much as 13 different Green Economy definitions conceptualized by international actors and governments. One of the most internationally recognized definitions is from the (UNEP, 2011), which labels Green Economy as improving human well-being and equality while protecting the environment The Green Economy Coalition (2012) highlights the need to improve the quality of life considering the ecological limits to reach an inclusive green economy. Table 1 compares the different definitions for green economy.

Table 1. Differences in the concepts of the Green Growth and Green Economy Progress Indices

Source	Definition
OECS Commission and CANARI, 2019	Green economy is an economy which minimizes ecosystem degradation, and is low carbon, resource efficient and socially equitable.
UNEP, 2011 (p. 16)	Green Economy is an economy that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities.
Partnership for Action on Green Economy (PAGE, 2017: p. 6)	Inclusive Green Economy is a pathway designed to address three main global challenges, namely: (a) persistent poverty; (b) overstepped planetary boundaries; and (c) inequitable sharing of growing prosperity.
OECD, 2017 (p. 2)	Green growth is about fostering growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.
African Development Bank (AfDB, 2014: p. 1)	Green growth is the promotion and maximization of opportunities from economic growth through building resilience, managing natural assets efficiently and sustainably, including enhancing agricultural productivity, and promoting sustainable infrastructure.
Asian Development Bank (Jha et al., 2018: p.20)	Inclusive Green Growth Index (IGGI) was designed to measure progress on inclusive and environmentally sustainable growth at the national level.
United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP, 2013: p. 7)	Green growth, which is a prerequisite for building a green economy, is an approach to economic development that fosters environmentally sustainable, low carbon and socially-inclusive development.
World Bank, 2012 (p. 2)	Inclusive green growth aims to operationalize sustainable development by reconciling developing countries' urgent need for rapid growth and poverty alleviation with the need to avoid irreversible and costly environmental damage.

Green economy is often interchanged with green growth, which is being advocated by other international organizations. Green Growth is defined by the (World Bank, 2012) as a transition from the traditional growth model into a model which is resource-efficient, cleaner, and more resilient, but not weaker. The OECD (2011) lays emphasis on enhancing economic development without abating the environmental effectiveness in providing resources to humans. The GGGI defines green growth as a development approach that seeks to deliver economic growth that is both environmentally sustainable and socially inclusive. It also specifies the sectors where the economic expansion can be made greener, focusing on the instruments for achieving the stated objective: Green growth "*seeks opportunities for economic growth that are: low-carbon and climate resilient, prevent or remediate pollution, maintain healthy and productive* *ecosystems, create green jobs, reduce poverty, and enhance social inclusion"* (GGGI, 2017). The OECD Green Growth Report in 2017 asserts that *"Green growth is about fostering growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies"*.

While green growth can be considered as a "transition" to or "process" of achieving sustainable development, many describe green economy as a "state" of an economy (i.e., economic system) that is green. It presents:

- a system including the production, administration, and utilization activities in the economy that are linked to sustainability and a system associated eliminating the issues caused by economic growth (Dogaru, 2021)
- a framework producing a more resource efficient, lower carbon, less environmentally damaging, and more socially inclusive societies (Georgeson et al., 2017)
- a vision anchored from eco-friendly technologies and "a global policy network of private and public actors (Silver et al., 2015)

These align to the initial definition provided by UNEP (2011), one of the earliest proponents of green economy in the international arena, stating that Green Economy is *"an economy that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities"*. In its Green Economy Progress (GEP) Index, green economy is linked to social inclusion: *"an Inclusive Green Economy is a pathway designed to address three main global challenges, namely: (a) persistent poverty; (b) overstepped planetary boundaries; and (c) inequitable sharing of growing prosperity"* (PAGE, 2017). The GGGI and UNEP both clearly emphasize the necessity for countries to move to a different path directed toward a sustainable and inclusive growth. Unlike GGGI that highlights the policy instruments for moving towards that ideal path, UNEP highlights the threats to be avoided such as poverty, environment exploitation, and inequality. Thus, green economy's definition depends on the context of its use (e.g., progress measurement).

In green growth-related indices, "green" emphasizes the environmental sustainability for both land and water ecosystems. For example, UNEP's GEP Index includes an indicator on marine protected areas; Asian Development Bank's (ADB) IGGI includes indicators on renewable freshwater resources and water productivity; AfDB's Green Growth Index includes an indicator on water efficiency; and Dual Citizen LLC's Global Green Economy Index includes indicators on water and fisheries.

2.1.2 Blue Economy

Blue economy was first proposed by Pauli (2010) in his book *"The Blue Economy 10 years – 100 innovations – 100 million jobs"*. But the book was not referring to water bodies, but *"generally on [how] business model will shift society from scarcity to abundance [by using] what is locally available, by tackling issues that cause environmental and related problems in new ways"* (The Blue Economy, n.d.), which is very much aligned to the concept of green economy.

In the Rio +20 Summit in 2012, blue economy was introduced by Small Island Developing States (SIDS) as an economy for marine, coastal, and inland waters, where "blue" represents the color of ocean water (Ertör & Hadjimichael, 2020; Voyer et al., 2018). Interestingly, according to Ababouch (2015: p. 2), blue economy is also referred to as "Blue Green Economy" or "Blue Growth, the new maritime Green Economy (EU, 2012)", "Green Economy in a Blue World (UNEP et al., 2012)", "Blue Growth (FAO, 2013)"or "Green Growth in Fisheries and Aquaculture (OECD, 2015)" to represent *"an emerging paradigm for the sustainable management of natural marine and freshwater resources"*. Most of the definitions also speak of the green economy, implicitly as in Table 2, or explicitly as follows:

1. As a concept it attempts to embrace the opportunities associated with the ocean, while recognizing, accounting for and, in some cases, addressing its threats. In this respect, it follows its precursor of the 'Green Economy' in its attempts to use capitalist markets to address environmental threats (Voyer et al., 2018: p. 596).
2. One governance approach … is the 'blue economy', which is increasingly being used to discuss and reimagine the institutional frameworks governing growing ocean use — based on concept of the 'green economy' on land (Golden et al., 2017: p. 1).
3. [A] key concept … [that] seeks to stem biodiversity loss whilst stimulating economic development, thereby integrating both environmental and economic interests, [b]uilding on the Green Economy concept (Schutter & Hicks, 2019: p. 426).
4. The green economy is very much a blue economy … Green economy tools and policies, in the context of a blue world, can address many of the structural issues at the heart of the challenges (UN ESCAP, 2012: p. iii-iv).
5. Similar to the Green Economy, the Blue Economy emphasizes social outcomes – improved human well-being, improved livelihoods and social inclusion and equity (Solomon, 2020).

Table 2. Selected definitions of blue economy

Source	Definition
OECS Commission and CANARI, 2019	Blue economy focuses specifically on coastal and marine resources.
UNEP et al., 2012 (p.7)	Creating a green economy in the blue world that "improves human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" means creating sustainable jobs, lasting economic value, and increased social equity.
UNCTAD, 2014 (p. 2)	The concept of an ocean's economy (also referred to as the blue economy) embodies economic and trade activities that integrate the conservation and sustainable use and management of biodiversity, including maritime ecosystems, and genetic resources.
World Wildlife Fund (WWF, 2015:p. 4)	A sustainable blue economy is a marine-based economy that restores, protects, and maintains the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems – the natural capital upon which its prosperity depends.
Economist Intelligence Unit (EIU, 2015: p. 7)	A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy.
World Bank & UN DESA, 2017 (p. vi)	The "blue economy" concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas.
Wenhai et al., 2019 (p. 3)	Blue economy is sustainable productive, service and all other related activities using and protecting coastal and marine resources.

Although some talk about blue economy as a paradigm shift, this does not imply shifting from green to blue economy. It is about emphasizing or redefining the role of water resources at par with land resources – i.e. "*using the oceans in all of the ways we have historically used the land*" (Golden et al., 2017: p. 1). For example, it has been suggested to focus on ocean natural resources as a valuable sector for innovation, investment, employment, and growth (Saavedra & Alleng, 2020). The ocean should not be solely considered for protein and waterways, but also as a source for many more aspects of increasingly industrialized society (Golden et al., 2017). Also, it should be managed across sectors, geographical scales, and land, creating an ocean interface for an integrated management (Voyer et al., 2018). Thus, the issue is what kind of and how much contributions green and blue economy provide to the economy and, ultimately, society (particularly to vulnerable and poor). For developing and small island states, blue economy means providing ocean ecosystem services and developing new industries in aquaculture, sustainable tourism, marine biotechnology, seabed mining, and other growth sectors (Rustomjee, 2016). For advanced countries where oceans have been serving as growth sectors, blue economy is a way to improve the environmental performance of existing 'traditional' offshore activities (e.g. oil and gas development, ports, shipping, fisheries, marine tourism and other marine industries) and, at the same time, encourage emerging industries of aquaculture, carbon sequestration (or blue carbon), and renewable energy production such as wind, wave, and tidal energy (Ocean Governance, n.d.).

Like green economy, there is no 'one size fits all' approach for blue economy. The policies must be adapted to the context and make an impact (UN ESCAP, 2012). Voyer et al. (2018) suggested that the inherent ambiguities in blue economy concept can be taken as an "*opportunity for flexibility and adaptability*". What is important is to avoid carrying over the flaws of green economy to blue economy. For example, land grabbing which affects the vulnerable and poor are shifted to oceans (ocean grabbing) under the guise of conservation (Schutter & Hicks, 2019). Saavedra & Alleng (2020) emphasized existing complementary approaches such as circular economy and climate resilience to blue economy, which will ensure environmental sustainability, climate change mitigation and adaptation, social inclusion, diversity, equity, and good governance.

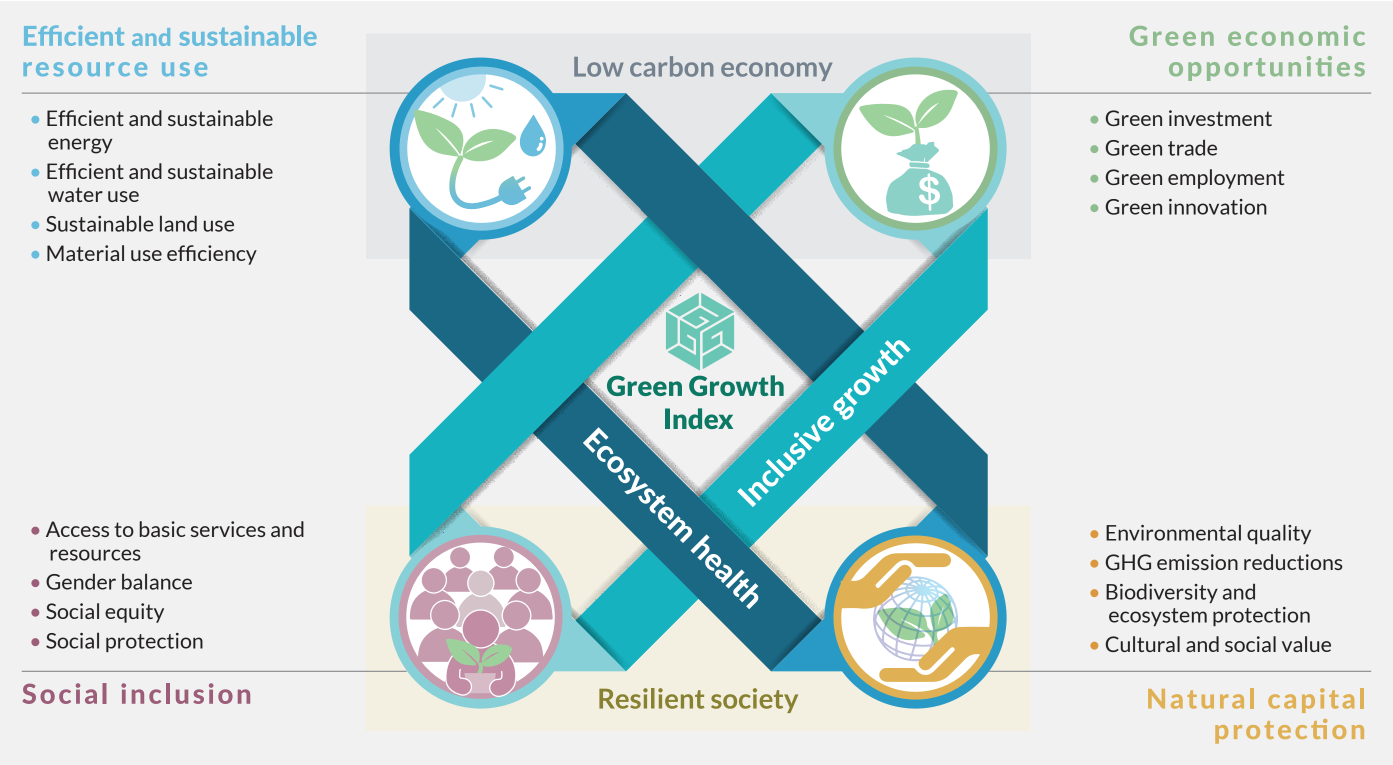
2.2 Green Growth – A Green-Blue Growth Synergy

2.2.1 Green Growth Index

Green Growth is increasingly linked to the concepts on "blue-green growth" and "blue-green economy" (Dornan et al., 2018). During the Rio +20 Summit, the OECD (2012) promoted green growth as a means of "*fostering economic growth and development while ensuring that natural assets [land and water] continue to provide the resources and environmental services on which our well-being relies*". Supporting the views of SIDS, the Food and Agriculture Organization (FAO) emphasized that blue growth requires a healthy ocean ecosystem providing sustainable fishing and farming (Eikeset et al., 2018: p. 178). Regardless of color (blue, green, or, if combined, aqua), the new vision of economic growth for the Caribbean will be environmentally sustainable, inclusive, build resilience, and grounded in good governance by and for Caribbean people (CANARI, n.d.). In the European Union, blue growth, which is accompanied by the fundamental principles of green growth seeking to invigorate inclusive and sustainable growth of the economic activities, was launched to stimulate economic growth in European seas and extend land-based policy strategy (Soma et al., 2018: p. 363). Thus, green growth can capture sustainability issues in both land and water ecosystems, which should be seen as coupled systems to ensure "green-blue growth synergy". For example, on the one hand, mangrove deforestation increases vulnerability to floods and storm surges, reducing farm productivity along the coastal areas. On the other hand, municipal solid waste from land can pollute freshwater and ocean systems, reducing the productivity of the fish industry. In defining transformative actions for the Eastern Caribbean Region, the OECS Commission refers to "transition to a blue-green-circular economy" in its St. George's Declaration 2040. In the OECS Green-Blue Economy Strategy and Action Plan, Green-blue economy emphasizes growth in employment and income levels, which is driven by investment into economic activities, assets and natural infrastructure which conserve biodiversity and ecosystem services that are critical to OECS Member States and territories (OECS Commission and CANARI, 2020).

Green growth as conceptualized in the Green Growth Index consists of four interlinked dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion (Figure 1). Through their interlinkages, the Green Growth Index systematically integrates different ecosystems (e.g., terrestrial, mountain, coastal, marine, atmosphere, etc.), sectors (e.g., agriculture, forest, energy, transport, water, etc.), and population groups (e.g., urban and rural, young and old, vulnerable and resilient, male and female). As such, it represents the environmental, economic, and social sustainability issues of different countries, including those large landlocked and coastal nations. On the one hand, landlocked nations with limited freshwater resources are confronted by their ability to efficiently use available water resources to provide access to water for municipal and agriculture use. On the other hand, coastal nations, particularly small island states, with limited land resources are confronted by material use efficiency to properly dispose or recycle solid waste to prevent coastal pollution and biodiversity loss.

Figure 1. Conceptual framework of the Green Growth Index



2.2.2 Opportunities from Blue Economy

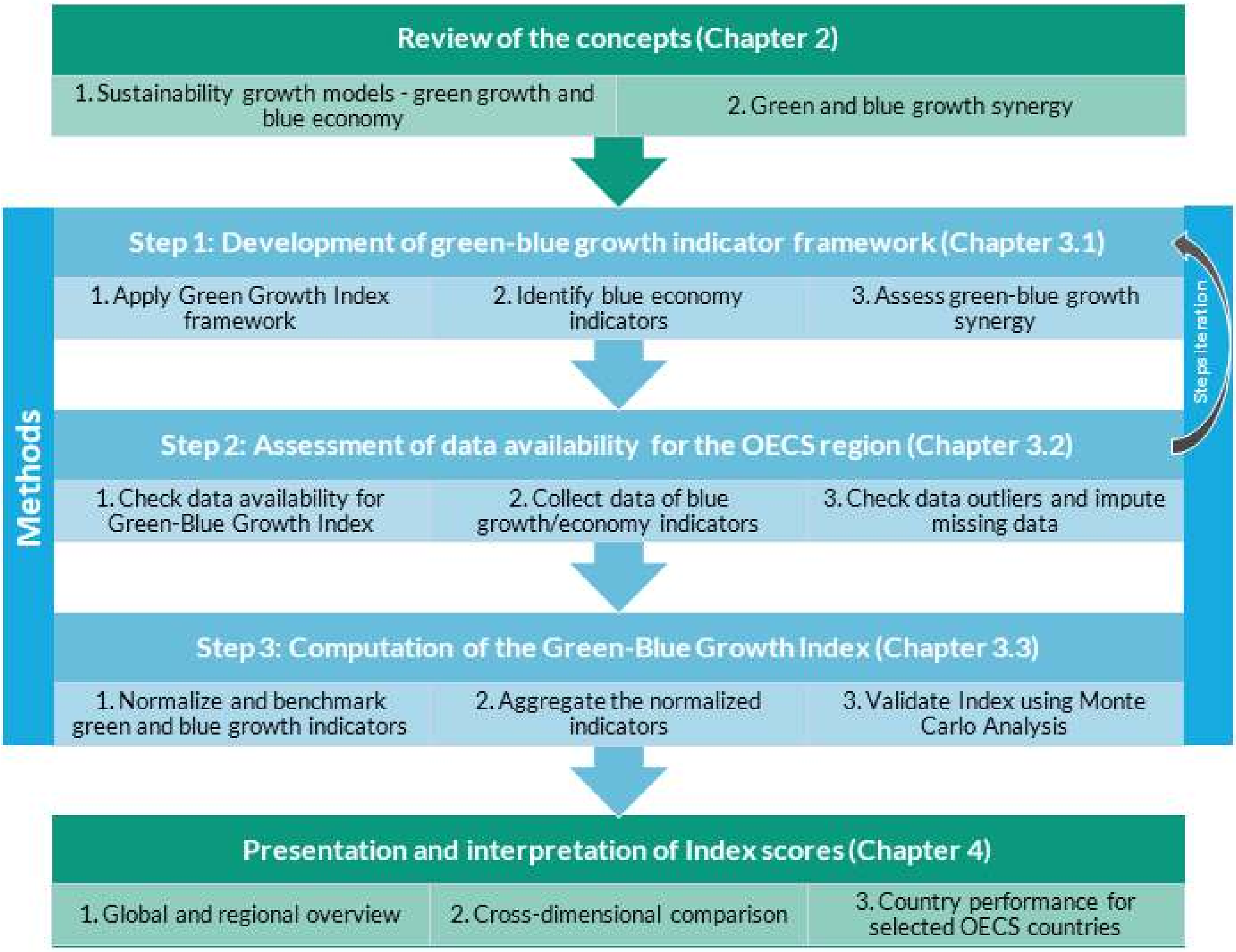
As discussed in the previous section, blue economy emphasizes the new economic opportunities from untapped resources or innovations from marine and coastal resources. But since economic opportunities should remain environmentally (ecosystem health) and socially (i.e., inclusive growth) sustainable, they should focus on green economic opportunities. Thus, the economic opportunities from ocean "blue" resources should be green. Oceans are seen as vulnerable and threatened and at the same time as areas for growth and development (Voyer et al., 2018: p. 596). Protection of marine capital is indispensable due to its ecosystem services including habitat for marine life, carbon sequestration, coastal protection, waste recycling and storing, and processes that influence climate change and biodiversity. Emerging and innovative sectors including marine renewable energy (i.e., ocean energy, floating solar energy, and offshore hydrogen generation), blue bioeconomy and biotechnology, marine minerals, desalination, maritime defense, and submarine cables (European Comission, 2020), if sustainably developed, could pose danger to marine life. In case of small island and coastal communities, blue economy innovations may not necessarily start huge. They can start to improve sectors they already know (e.g., fisheries, aquaculture, and tourism), while developing innovative technologies (e.g., renewable energy and biotechnology) (Saavedra & Alleng, 2020). For many developing countries, including small island states in the Caribbean region, improving current and developing innovative sectors will both require creating an enabling environment. Creating economic opportunities from not only both green and blue economies but also green-blue growth synergies are relatively new concepts. Assessment of their impacts on economy and society using measurable indicators remains a challenge. This is the case not only for the Green Growth Index but also a Green-Blue Growth Index, which will be emphasized in the next chapter.

03

METHODS

The review of the concepts of green growth and blue economy in Chapter 2 revealed that they are highly interlinked. Thus, the development of the Green-Blue Growth Index involved the assessment of the green growth indicators in the Green Growth Index as a first step and identification of gaps on blue economy indicators as a second step. These two steps were iterative until complete sets of indicators with sufficient data could be built. The final step dealt with the computation of the Index based on the available data of the indicators. The detailed steps are presented in Figure 2, which are further described in detail in the three sections of this chapter. The presentation and interpretation of the scores for the Green-Blue Growth Index are in Chapter 4.

Figure 2. Steps to develop the Green-Blue Growth Index



These steps have been accompanied by series of expert consultations to raise awareness among and gain support from policymakers and practitioners in the OECS region. The development of the Green-Blue Growth Index was first introduced to the OECS Members during the Meeting of Senior Technical Officers on "Unlocking a Green, Resilient and Inclusive future for Eastern Caribbean SIDS" on May 6, 2021. During the Eighth Meeting of the OECS Council of Ministers on "Environmental Sustainability" on May 20, 2021, the OECS Commission and GGGI submitted the Paper No. OECS/COMES/21/05/5.1D with the following recommendations to the Council of Ministers:

- Note the utility of the Green Growth Index [as a tool] for measuring sustainability targets, and the efforts to adapt it for the OECS region to assess green-blue growth performance.
- Encourage Member States to participate in the advancement of the OECS Green-Blue Growth Index and its application.

Webinar series was also conducted in 2021 to inform and update the OECS Member States on the development of the Green-Blue Growth Index. The OECS Commission and GGGI co-organized the first webinar on the 22nd of June to explain the concepts and methods for developing the Green-Blue Growth Index. The second webinar was co-organized by the OECS Commission, GGGI and United Nations Economic Commission for Latin America and the Caribbean (UN ECLAC) on the 24th of August to inform the OECS Member States on the challenges for developing the Green-Blue Growth Index for the region due to lack of data for many green and blue economy indicators, including those for SDGs. The third webinar was co-organized by the OECS Commission and GGGI on the 15th of December to present the results from assessing Green-Blue Economy Synergies in the OECS region and explain the next steps forward. The results of the Green-Blue Growth Index are discussed in this technical report and available on interactive webpage in https://greenblueindex.herokuapp.com/.

3.1 Development of Green-Blue Growth Indicator Framework

Step 1 consists of three activities including the application of the conceptual framework of the Green Growth Index, assessment of the green growth indicators, and identification of blue economy indicators which were not included in the Green Growth Index (Figure 2).

3.1.1 Application of the Green Growth Index Framework

Figure 1 shows the different indicator categories that define the four green growth dimensions. The dimension on efficient and sustainable resource use represents four major economic sectors including energy, water, land, and materials (or waste). The manner in which the resources are used in these sectors directly affects the condition of the natural capital (or resources). When these resources are used efficiently and sustainably, they can be protected and preserved for the current and future generation. The natural resources are important capital to generate economic opportunities in the form of investment, trade, employment, and (technological) innovation. On the one hand, green economic opportunities will allow different parts of the society including the poor and vulnerable to contribute to and benefit from creating these opportunities. However, social inclusion will require providing critical basic services and ensuring equity to different parts of the society (i.e., male and female, young and old, rural and urban, poor and rich).

In the first activity of developing the green-blue growth indicator framework, the indicator categories in the Green Growth Index framework were used to guide the selection of the indicators to ensure that different dimensions of green growth are represented in the Green-Blue Growth Index.

3.1.2 Identification of Blue Economy Indicators

The second activity in Step 1 involved the assessment of the blue growth indicators in the green growth indicator framework. Figure 3 presents the list of indicators used for the 2020 Green Growth Index. In the efficient and sustainable resource use dimension, two indicators are directly related to terrestrial and water resources, namely, water use efficiency (EW1) and freshwater withdrawal (EW2). The indicators referring to freshwater and marine resources are available in the natural capital protection dimension, particularly the Disability-Adjusted Life Year (DALY) rate due to unsafe water resources (EQ2), key biodiversity areas (BE1) which include freshwater and marine areas, tourism in coastal and marine areas (CV2), and marine protected areas (CV3). Currently, there are only four indicators for the green economic opportunities dimension and none of them are linked to water. In the social inclusion dimension, an indicator that has direct link to water is access to safely managed water services (AB1). Altogether, there are seven (or 19%) of the 36 green growth indicators that represent blue economy perspectives. Except for water use efficiency where available data for the OECS Member States were only for the service sector, all other six indicators were used for the Green-Blue Growth Index.

While there are sufficient blue economy indicators in the natural capital protection dimension, the efficient and sustainable resource use and green economic opportunities dimensions would need to be enhanced relevant to blue economy. For efficient and sustainable resource use, SDG indicators such as sustainable fisheries as a proportion of gross domestic product (GDP) (SDG 14.7.1) and proportion of safely treated domestic wastewater flows (SDG 6.3.1) were identified as useful but data availability check (Step 2.1) showed that these are not available for OECS Member States. However, data for the ratio of total agricultural water managed area and total agricultural area are available for a few countries in the region and could be included as an additional blue economy indicator for this dimension.

The potential for blue economy to create green economic opportunities are high. Currently, however, there are limited indicators available for this dimension in the Green Growth Index due to lack of data (Table 3). If data can be collected for the OECS Member States, it will be a good opportunity to enhance blue economy perspectives of the Green-Blue Growth Index considering that the future for blue economy relies on creating green employment (i.e. sustainable tourism), innovation (i.e. marine biotechnology, marine resources rehabilitation, ocean pollutant abatement), investment (i.e. floating solar energy, offshore hydrogen generation), and production/trade (i.e. aquaculture, marine minerals) (e.g., Ababouch, 2015; European Comission, 2020; Rustomjee, 2016). This builds on the blue economy paradigm shift, which according to Saavedra & Alleng (2020) entails a change in focus from land resources to ocean resources as an important sector for growth, employment, innovation, and investment. An important element to the blue economy is identifying new potential areas to invest in ocean economy that can provide new jobs and businesses and at the same time improve livelihoods (Leiva, 2020). Globally, the ocean economy contributes around $3.6 trillion a year and more than 150 million jobs, according to Andrew Hudson, head of the water and ocean governance programme at the UN Development Programme (Leiva, 2020). Table 3 presents the blue economy indicators that were identified for green economic opportunities. However, except for share of fish exports to domestic consumption, after going through Step 2.1 (Figure 2), none of the blue economy indicators listed in the table can be included as indicators for green-blue economic opportunities due to lack of data. When data become available for these indicators in the future, their inclusion will improve the Green-Blue Growth Index.

Figure 3. Indicator Framework for the Green Growth Index*

	Dimensions [Goals]	Indicator categories [Pillars]	Indicators [metrics]	
Green Growth Index	Efficient and sustainable resource use 	Efficient and sustainable energy	EE1	Ratio of total primary energy supply to GDP (MJ per $2011 PPP GDP)
			EE2	Share of renewable to total final energy consumption (Percent)
		Efficient and sustainable water use	EW1	Water use efficiency (USD per m^3)
			EW2	Share of freshwater withdrawal to available freshwater resources (Percent)
		Sustainable land use	SL1	Soil nutrient budget (Nitrogen kilogram per hectare)
			SL2	Share of organic agriculture to total agricultural land area (Percent)
		Material use efficiency	ME1	Total domestic material consumption (DMC) per unit of GDP (Kilogram per GDP)
			ME2	Total material footprint (MF) per capita (Tons per capita)
	Natural capital protection 	Environmental quality	EQ1	PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m^3)
			EQ2	DALY rate 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 of non-CO_2 emissions to population, excluding AFOLU (CO_2e per capita)
			GE3	Ratio of non-CO_2 emissions in agriculture 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 of 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 (Index)
			CV2	Tourism and recreation in coastal and marine areas (Score)
			CV3	Share of terrestrial and marine protected areas to total territorial areas (Percent)
	Green economic opportunities 	Green investment	GV1	Adjusted net savings, including particulate emission damage (Percent GNI)
		Green trade	GT1	Share of export of environmental goods (OECD and APEC class.) to total export (Percent)
		Green employment	GJ1	Share of green employment in total manufacturing employment (Percent)
		Green innovation	GN1	Share of patent publications in environmental technology to total patents (7 yrs moving ave.)
	Social inclusion 	Access to basic services and resources	AB1	Population with access to safely managed water and sanitation (Percent)
			AB2	Population with access to electricity and clean fuels/technology (Percent)
			AB3	Fixed Internet broadband and mobile cellular subscriptions (Number per 100 people)
		Gender balance	GB1	Proportion of seats held by women in national parliaments (Percent)
			GB2	Gender ratio of account at a financial institution or mobile-money-service provider (Ratio)
			GB3	Getting paid, covering laws and regulations for equal gender pay (Score)
		Social equity	SE1	Inequality in income based on Palma ratio (Ratio)
			SE2	Ratio of urban-rural access to basic services, i.e. electricity (Ratio)
			SE3	Share of youth (aged 15–24 years) not in education, employment, or training (Percent)
		Social protection	SP1	Proportion of population above statutory pensionable age receiving pension (Percent)
			SP2	Universal health coverage (UHC) service coverage index (Index)
			SP3	Proportion of urban population living in slums (Percent)

** The indicators in the Green Growth Index are reviewed annually and those referred to in this table are from 2020 (Acosta et al., 2020).*

Table 3. Blue economy indicators identified for green economic opportunities

Code	Indicators	Relevance to blue economy
Green investment		
GV2	Investment in marine renewable energy	If data is available, the indicator can be added to represent blue economy.
GV3	Investment in conservation of coastal and marine resources	-same as above-
Green trade		
GT2	Share of export of certified sustainable fish and seafood products	If data is available, the indicator can be added to represent blue economy.
GT3*	Share of fish exports to domestic consumption	An indicator of blue economy because of the importance of fisheries in island and costal states.
Green employment		
GJ2	Share of employment in sustainable eco-tourism	If data is available, the indicator can be added to represent blue economy.
GJ3	Share of employment in marine renewable energy	-same as above-
Green innovation		
GN2	Innovation in marine biotechnology and bioprospecting	If data is available, the indicator can be added to represent blue economy.
GN3	Innovation to conserve or rehabilitate coral reefs, or ocean pollutant abatement	-same as above-

**Data are available for many OECS Member States*

3.1.3 Assessment of the Green-Blue Growth Synergy

After several iterations in Step 1 (i.e., identifying blue economy indicators) and Step 2 (checking data availability), the final list of indicators was created. This list combines the green and blue growth indicators, and their synergies are discussed in this section.

Efficient and Sustainable Resource Use

The indicators for efficient and sustainable use of resources cover energy, water, land, and materials (Table 4). The two indicators for efficient and sustainable water use included in the Green-Blue Growth Index are service water use efficiency (EW1) and share of freshwater withdrawal (EW2). As previously mentioned, both directly contribute to blue economy. Freshwater resources, especially in blue economies, are crucial for economic activities, agricultural production, human health, and essential ecosystem services (Gleick & Palaniappan, 2010). Also, both indicators are SDG indicators 7.3.1 (EW1) and 6.4.2 (EW2). With respect to efficient and sustainable energy, the indicators on primary energy intensity (EE1) and renewable energy consumption (EE2) are directly related to blue economy if countries have renewable energy sources from the coastal or marine sector. Experts predict that ocean energy, which is still in its early stages of development, could be a key for meeting the world's energy demands, including aquatic biofuels and marine renewable energies (Ababouch, 2015). In some countries, wind energy is already built on coastal or marine areas and contributes to renewable energy sources. Energy intensity is relevant for green-blue growth as it is one of the most important drivers for economic development (Reddy & Mehra, 2017).

The indicators for sustainable land use that are used in the Green-Blue Growth Index are soil nutrient budget (SL1) and density of ruminant livestock (SL2). Both indicators have direct impacts on water resources in terms of water quality and conservation as well as greenhouse gas (GHG) emissions. The high density of livestock is linked to blue economy because it leads to environmental degradation based on intense manure productions, causing nutrient leaching in rivers and coastal areas (Eurostat, n.d.). Moreover, the intensive use of inorganic fertilizers and chemicals in agriculture will cause pollution in water systems when carried over through erosion or floods.

The efficient use of materials is another essential part of blue economy. The indicators for this category include the ratio of agricultural water managed areas (ME1) and the share of food waste (ME2). The inefficient use and wastefulness of resources is especially problematic on island states, which are heavily reliant on food imports as domestic food self-sufficiency is difficult to achieve. Next to the moral objections of wasting food, especially in developing countries, food waste can lead to environmental and sanitation problems which need to be minimized (Thi et

Table 4. Green and blue growth indicators for efficient and sustainable resource use

Code	Indicators	Relevance to blue economy
EE1	Energy intensity level of primary energy (MJ per GDP)	The indicator is relevant for economic development and growth.
EE2	Share renewable to total final energy consumption (Percent)	The indicator includes all types of renewables, including renewable marine energy.
EW1	Services water use efficiency (USD/m^3)	An indicator of blue economy, referring to use of freshwater resources.
EW2	Share freshwater withdrawal to available freshwater resources (Percent)	An indicator of blue economy, referring to use of freshwater resources and can include water from desalination technology, if available.
SL1	Soil nutrient budget (Kilogram nitrogen per hectare)	The indicator is linked to blue economy, where high use of nitrogen fertilizer can impact water quality in rivers and coasts
SL2	Ruminant livestock number to total agricultural area, density (Percent)	The indicator is linked to blue economy, where high livestock density can impact water and air quality.
ME1	Ratio total agricultural water managed area and total agricultural area (Ratio)	An indicator of blue economy, linked to water quality and conservation.
ME2	Share food waste to total food consumption (Share)	The indicator is linked to blue economy, where food waste can impact the environment.

Natural Capital Protection

Natural capital stock can be defined as "*the stock of all environmental and natural resource assets, from oil in the ground to the quality of soil and groundwater, from the stock of fish in the ocean to the capacity of the globe to recycle and absorb carbon,*" (Pearce and Turner 1990, as cited in Saavedra & Alleng, 2020: p. 54). The indicators for natural capital protection in the Green-Blue Growth Index cover both land and water resources, with the latter representing many blue economy indicators (Table 5). Out of the three indicators of environmental quality, one is an indicator of blue economy, i.e., DALY rate due to unsafe water sources (EQ2). The other two indicators, i.e., particulate matter (PM)2.5 air pollution (EQ1) and municipal solid waste (MSW) generation (EQ3), are both directly linked to blue economy due to their pollution impacts on water bodies.

The category for GHG emissions reductions includes the ratio of carbon dioxide (CO_2) emissions (GE1) and ratios for non-CO_2 emissions excluding AFOLU (GE2) and non-CO_2 emissions for AFOLU only (GE3). The indicators on GHG emissions have all direct impacts on blue economy as they contribute to global warming, which causes increases in sea temperature and level and a reduction of sea-ice. The rise in water temperature in the ocean is causing the destruction of corals, which are habitats for fish species. Aquatic ecosystems contribute to climate change mitigation by providing (Ababouch, 2015): (i) an important reservoir for inorganic carbon with the oceans storing roughly 50 times more CO_2 than the atmosphere; (ii) most efficient ecosystems in sequestering CO_2 in the form of 'blue carbon' sinks, particularly mangroves, seagrasses, and inland waters; (iii) sequestration up to five times the amounts of carbon absorbed by tropical forests.

Out of the three indicators for biodiversity and ecosystem protection, the proportion of key biodiversity areas (KBAs) covered by protected areas (BE1) includes blue economy indicators on freshwater and marine KBAs. The two remaining indicators, i.e., the share of forest area (BE2) and above-ground biomass stocks in forests (BE3), have direct links to blue economy. Upland forests support watershed conservation, while mangrove forests provide fish habitat, in addition to providing storm surge protection to coastal people and their livelihoods. Soil biomass stock supports soil water dynamics because the former enhances soil organic carbon content, which in turn influences the water holding capacity of the soil. The capacity of soil to hold water particularly during heavy rains prevents flooding and reduces flow of wastes to water bodies.

The three indicators for cultural and social value all represent blue economy indicators. First, the indicator on the red list index (CV1) includes animal and plant species not only on land but also in water areas. Second, the indicator on tourism and recreation (CV2) is an indicator of blue economy since it represents coastal and marine areas. Maritime and coastal tourism is especially important for island states as they are often economically dependent on it. Third, the indicator on protected areas (CV3) includes terrestrial as well as marine areas, where the latter is an important factor for blue economy given its protective actions for coral reef recovery or overfishing.

Table 5. Green and blue growth indicators for natural capital protection

Code	Indicators	Relevance to blue economy
EQ1	PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m^3)	The indicator is linked to blue economy, where air pollution contaminates the precipitation that falls into water bodies and soils.
EQ2	DALY rate due to unsafe water sources (DALY lost per 100,000 persons)	An indicator of blue economy, referring to the quality of fresh-water resources.
EQ3	Municipal solid waste (MSW) generation per capita (Tons per year per capita)	The indicator is linked to blue economy, where waste can pollute inland and coastal waters.
GE1	Ratio CO_2 emissions incl LUCF to population ($MtCO_2e$ per capita)	The indicator is linked to blue economy, where GHG emissions contribute to global warming affecting ocean temperature and sea level rise.
GE2	Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population ($MtCO_2e$ per capita)	-same as above-
GE3	Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population ($MtCO_2e$ per capita)	-same as above-
BE1*	(a) Average proportion of Marine Key Biodiversity Areas covered by protected areas (Percent)	An indicator of blue economy because it covers terrestrial, freshwater, marine, and mountain KBAs.
	(b) Average proportion of Freshwater/Terrestrial Key Biodiversity Areas covered by protected areas (Percent)	
	(c) Average proportion of Mountain Key Biodiversity Areas covered by protected areas (Percent)	
BE2	Share forest area to total land area (Percent)	The indicator is linked to blue economy because upland forests conserve watersheds. If it includes mangrove forests, then it is an indicator of blue economy, providing habitat to fish species.
BE3	Above-ground biomass stock in forests (tonnes per hectare)	The indicator is linked to blue economy because it affects soil water dynamics.
CV1	Red list index (Score)	The indicator covers animal and plant species in land and water bodies.
CV2	Tourism and recreation in coastal and marine areas (Score)	An indicator of blue economy because it focuses on coastal and marine areas.
CV3	(a) Share of terrestrial protected areas to total territorial areas (Percent)	An indicator of blue economy because it includes marine areas.
	(b) Share of marine protected areas to total territorial areas (Percent)	

**Refers to the average values of the three indicators (a-c)*

Green-Blue Economic Opportunities

In the Green-Blue Growth Index, there are only two available indicators per category due to lack of data (Table 6). The two indicators representing green employment are unemployment with advanced education (GJ1) and vulnerable employment (GJ2). These employment indicators can be considered as proxy variables for this current version of the Index, which can be replaced when data for green employment becomes available for the OECS Member States. The linkages between the green and blue economy, with the broad sectors of coastal and maritime-centered careers and employment opportunities, require investments in regional knowledge hubs and higher education given the need for technologically advanced knowledge and capacity (Ram & Kaidou-Jeffrey, 2020). Vulnerable employment relates to the creation of decent employment from green-blue economic opportunities, which remains an important social issue in many developing and least developed countries. The category for green innovation includes indicators for green mobility (GN1) and renewable energy-generating capacity (GN2). As mentioned earlier, renewable energy such as ocean energy is still in its early stages, which requires investments in research and development (R&D) to deliver innovative solutions.

Another category for green-blue economic opportunities is green investment. The indicators in this category include international financial flows to support clean R&D for developing countries (GV1a), the share of R&D expenditures for developed countries (GV1b), and 2G coverage (GV2). The lack of data led to the assumption that the former represents green investment indicator in developing countries, while the latter in developed countries. The mobile network coverage is a key facilitator of digital information access and communication, which is especially vital for rural population with low income and literacy because of its mobility and affordable costs (Ronquillo & Currie, 2012).

Lastly, the two indicators for green trade included in the Green-Blue Growth Index are the share of environmental goods exported (GT1) and the share of fish exports (GT2). Environmental goods from developing countries, especially from Asia-Pacific and the Caribbean, present a valuable trade opportunity for exports and imports with significant growth potential (Jacob & Moller, 2017). Green trade is an important element to the blue economy since identifying new potential areas to invest in ocean economy that can provide new jobs and businesses and at the same time improve the livelihoods is crucial for achieving the green-blue targets (Leiva, 2020). The share of fish exports not only emphasizes the importance of marine resources in economic growth but also the degree of economic exploitation of these resources at the expense of the environment.

Table 6. Green and blue growth indicators for green-blue economic opportunities

Code	Indicators	Relevance to blue economy
GJ1	Unemployment with advanced education (% of total labor force with advanced education)	The indicator covers all types of employment on land and water.
GJ2	Vulnerable employment, total (% of total employment)	-same as above-
GN1	Green Mobility in sustainable transport	The indicator includes all types of transport, i.e., land, water, and air.
GN2	Installed renewable electricity-generating capacity (watts per capita)	The indicator includes all types of renewables, including renewable oceanic energy.
GT1	Share export of environmental goods (OECD and APEC class.) to total export (Percent)	The indicator is linked to blue economy given their prevalence and growth potential in the Caribbean and Asia Pacific region.
GT2	Share of fish exports to domestic consumption (higher value less sustainable)	An indicator of blue economy because of the importance of fisheries in island and costal states.
GV1*	(a) International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems (millions of constant USD) [Note: for developing countries] (b) Research and development expenditure as a proportion of GDP (Percent) [Note: for developed countries]	The indicator is linked to blue economy because of high investments needs of maritime and oceanic energy potential.
GV2	Proportion of population covered by at least a 2G mobile network (%)	The indicator represents key facilitator of digital information access and communication

Social Inclusion

In the context of the Caribbean region, the blue economy concept is a "*lens by which to view and develop policy agendas that simultaneously enhance ocean health and economic growth, in a manner consistent with principles of social equity and inclusion*", aligned with the SDG goals (Patil et al., 2016). Out of the 12 indicators for social inclusion in the Green Growth Index, ten are SDG indicators (Table 7). Because all the social inclusion indicators are relevant to populations living in landlocked or island states, or in upland or coastal areas, they are relevant to blue economy. Both green and blue economy emphasize social inclusion and equity and improved human well-being and livelihoods (Solomon, 2020).

The indicators measuring access to basic services and resources include the universal access to sustainable transport (AB2) and the usage of and access to drinking water service (AB1a), basic sanitation services (AB1b), electricity (AB1c), and clean fuels or technologies (AB1d). Access to these basic services and resources is the foundation of socio-economic development, health, and human welfare (Anthonj et al., 2018). In the Green Growth index, safely managed water and sanitation services are used as indicators instead of basic services, but data for the former are not available for the OECS Member States.

The two indicators representing gender balance in the Green-Blue Growth Index are the political representation of women in parliament (GB1) and equal gender pay (GB2). The inclusion and involvement of women in politics are essential in advancing a country's democracy. Fair and equal pay for women is another crucial step towards gender equality, as women's labor force participation is rising globally (World Bank, 2019). The only indicator that is not in the list of SDG indicators is GB2, which is an important indicator for measuring equal pay between males and females .

Social equity is represented by two indicators, namely, gross national income (GNI) per capita (SE1) and the proportions of electricity access in urban and rural areas (SE2). The difference between urban and rural access to basic services such as electricity can be striking, where the rural population is often disadvantaged. The indicator on inequality in income based on the Palma ratio is expected to be included as an SDG indicator in the next [few] years. Lastly, the social protection category is depicted by universal health coverage (UHC) (SP2) and the share of the urban population living in slums (SP3). The availability of and access to universal health coverage have contributed to overall population health improvement and significantly decreased amenable mortality (Barber et al., 2017).

Table 7. Green and blue growth indicators for social inclusion

Code	Indicators
AB1*	(a) Proportion of population using basic drinking water services (Percent) (b) Proportion of population using basic sanitation services (Percent) (c) Population with access to electricity (Percent) (d) Population with access to clean fuels/technology (Percent)
AB2	Universal access - sustainable transport (Score)
GB1	Proportion of seats held by women in national parliaments (Percent)
GB2	Getting paid, laws and regulations for equal gender pay (Score)
SE1	GNI per capita, PPP (current international $)
SE2	Proportion of population with access to electricity, by urban/rural (Percent)
SP2	Universal health coverage (UHC) service coverage index (Score)
SP3	Proportion of urban population living in slums (Percent)

**Refers to the average values of the four indicators (a-d)*

3.2 Assessment of Data Availability for OECS Member States

3.2.1 Checking of Data Availability

Table 8 presents the available data for the green and blue economy indicators identified for the Green-Blue Growth Index. Despite several iterations of finding suitable indicators with sufficient data availability, only three OECS Member States were able to meet the required data for the Index to be computed. These countries include Grenada, Saint Lucia, and Saint Vincent and the Grenadines. Although the methods for aggregation of the indicators allow 25% missing values (Chapter 3.3.2 Aggregation of normalized indicators), the Index for Antigua and Barbuda as well as Dominica, with data availability of 86%, cannot be completed because the data gaps caused a score for one of the four green growth dimensions to be lacking. Dominica lacks score for social dimension, while Antigua and Barbuda lack scores for both social inclusion and green-blue economic opportunities. It is assumed that all four dimensions are equally important to achieve green growth. So as a rule, the Green Growth Index is only computed if scores for all dimensions are complete. Lack of data for green employment is common among the OECS Member States. The data for this indicator category have been collected from government agencies in Saint Lucia and Saint Vincent and the Grenadines but not for other countries due to lack of resources in this pilot project to develop the Green-Blue Growth Index for the OECS regions. This project revealed that as there is limited data not only for the green employment but also for many other green growth indicators, the base data will need to be produced by the applicable government agencies. It is important to mention that for many countries globally, the data for these indicators are available and downloaded from online databases of international organizations (e.g., World Bank, United Nations Statistics Division [UNSTATS], etc.).

Table 8. Data availability for the OECS Member States

Indicator codes	Anguilla	Antigua and Barbuda	British Virgin Islands	Dominica	Grenada	Guadeloupe	Martinique	Montserrat	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines	Total OECS region
EFFICIENT AND SUSTAINABLE RESOURCE USE												
EE1		+		+	+				+	+	+	6
EE2	+	+	+	+	+	+	+	+	+	+	+	11
EW1		+		+	+				+	+	+	6
EW2		+		+	+				+	+	+	6
SL1		+		+	+	+	+		+	+	+	8
SL2		+		+	+				+	+	+	6
ME1		+		+	+				+	+	+	6
ME2		+		+	+				+	+	+	6
NATURAL CAPITAL PROTECTION												
EQ1		+		+	+					+	+	5
EQ2		+		+	+				+	+	+	6
EQ3		+	+	+	+				+	+	+	7
GE1		+		+	+				+	+	+	6
GE2		+		+	+				+	+	+	6
GE3		+		+	+				+	+	+	6
BE1	+	+	+	+	+	+	+	+	+	+	+	11
BE2		+	+	+	+				+	+	+	7
BE3	+	+	+		+	+	+		+	+	+	9
CV1	+	+	+	+	+	+	+	+	+	+	+	11
CV2	+	+	+	+	+			+	+	+	+	9
CV3		+	+	+	+				+	+	+	7
GREEN ECONOMIC OPPORTUNITIES												
GV1		+		+	+				+	+	+	6
GV2	+	+	+	+	+				+	+	+	8
GT1		+		+	+			+	+	+	+	7
GT2		+		+	+				+	+	+	6
GJ1					+					+	+	3
GJ2					+					+	+	3
GN1				+	+					+	+	4
GN2		+	+	+	+				+	+	+	7

Table 8. Data availability for the OECS Member States (continued)

Indicator codes	Anguilla	Antigua and Barbuda	British Virgin Islands	Dominica	Grenada	Guadeloupe	Martinique	Montserrat	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines	Total OECS region
SOCIAL INCLUSION												
AB1	+	+	+	+	+	+	+	+	+	+	+	11
AB2					+					+	+	3
GB1		+		+	+				+	+	+	6
GB2		+		+	+				+	+	+	6
SE1		+		+	+				+	+	+	6
SE2	+	+	+	+	+				+	+	+	8
SP1		+		+	+					+	+	5
SP2					+	+				+	+	4
Total OECS Member States	8	31	12	31	36	7	6	6	29	36	36	238
Data availability	22%	86%	33%	86%	100%	19%	17%	17%	81%	100%	100%	60%

Note: A + sign refers to available data.

Legend:

EE1 - Energy intensity level of primary energy (MJ per GDP); EE2 - Share renewable to total final energy consumption (Percent); EW1 - Services water use efficiency (U$/m³); EW2 - Share freshwater withdrawal to available freshwater resources (Percent); SL1 - Soil nutrient budget (Kilogram nitrogen per hectare); SL2 - Ruminant livestock number to total agricultural area, density (Percent); ME1 - Ratio total agricultural water managed area and total agricultural area (Ratio); ME2 - Share food waste to total food consumption (Share)

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); GE1 - Ratio CO_2 emissions incl. LUCF to population (Tons per capita); GE2 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population (CO_2e Tons per capita); GE3 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population (CO_2e Tons per capita); BE1 - Average proportion of Marine, Freshwater/Terrestrial, and Mountain 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); 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)

GJ1 - Unemployment with advanced education (% of total labor force with advanced education); GJ2 - Vulnerable employment, total (% of total employment); GN1 - Green Mobility in sustainable transport (Score); GN2 - Installed renewable electricity-generating capacity (watts per capita); GT1 - Share export of environmental goods (OECD and APEC class.) to total export (Percent); GT2 - Share of fish exports to domestic consumption (higher value less sustainable); GV1 - (a) International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems (millions of constant United States dollars) [Note: only for developing countries] and (b) Research and development expenditure as a proportion of GDP (Percent) [Note: only for developed countries]; GV2 - Proportion of population covered by at least a 2G mobile network (%)

AB1 - Proportion of population using basic drinking water services, basic sanitation services, and with access to electricity and clean fuels/technology (Percent); AB2 - Universal access - sustainable transport (Score); GB1 - Proportion of seats held by women in national parliaments (Percent); GB2 - Getting paid, laws and regulations for equal gender pay (Score); SE1 - GNI per capita, PPP (current international $); SE2 - Proportion of population with access to electricity, by urban/rural (Percent); SP2 - Universal health coverage (UHC) service coverage index (Index); SP3 - Proportion of urban population living in slums (Percent)

3.2.2 Collection of Data to Construct the Indicators

As mentioned above, the data for almost all indicators were collected from online databases of international organizations. Twenty-seven (75%) of the 36 indicators are SDG indicators and mainly downloaded from UNSTATS SDG database (UNSTATS, n.d.). The details on the indicators including the sources are presented in Appendix 1. Figure 4 provides a summary of the data collected for each indicator category of the Green-Blue Growth Index for Grenada, Saint Lucia, and Saint Vincent and the Grenadines for the period 2015-2020. Complete data were collected for the indicators on gender balance for all three countries during this period. The data for other indicators were not collected for all the years. Data on employment were not available from international online sources for any years and collected from websites of national agencies as follows: Central Statistics Office of Grenada (Central Statistics Office of Grenada, n.d.), Central Statistical Office of Saint Lucia (UN ECLAC-CELADE, n.d.), and Statistical Office of Saint Vincent and the Grenadines (Statistical Office of St. Vincent and the Grenadines, n.d.-a, n.d.-b).

Figure 4. Data collected for selected OECS Member States, 2015-2020

Legend:

Efficient and sustainable energy (EE), efficient and sustainable water use (EW), sustainable land use (SL), material use efficiency (ME), environmental quality (EQ), GHG emissions reduction (GE), biodiversity & ecosystem protection (BE), cultural and social value (CV), green investment (GV), green trade (GT), green jobs (GJ), green innovation (GN), access to basic services and resources (AB), gender balance (GB), social equity (SE), and social protection (SP).

3.2.3 Checking for Outliers and Imputation of Data

The last activity in Step 2 involves checking for outliers and imputing data. The boxplots in Appendix 2 show the outliers for the different indicators. Outliers can distort statistical properties and normalized values of the indicators (Mishra, 2008; OECD & JRC, 2008), so their values were capped using lower or upper fences based on the interquartile range from 75th and 25th percentiles (see Acosta et al., 2019 for details on methods for capping). Several indicators appeared to have outliers (Appendix 2), which values have been capped to adjust at an acceptable range. Except for data on ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population (GE2) for Grenada and Saint Lucia, all three OECS Member States were not affected by outliers in the indicators. For indicators with data gaps (Figure 4), imputation was conducted to fill in data for missing years. For example, universal health coverage index (SP1) and proportion of urban population living in slums (SP2) are indicators for which data are reported only every five years. The available data were assumed to be for the period 2015-2016. Indicators for which most recent data are only available for 2018 and 2019, their data were assumed to continue to hold until 2020.

3.3 Computation of Green-Blue Growth Index

After assessing the availability and validity of data, the third and final step is to compute the Green-Blue Growth Index from the collected and imputed data. The details on the computation methods are available in the report by Acosta et al. (2019) (Acosta et al., 2019)and a summary is provided below.

3.3.1 Normalization and Benchmarking of Indicators

The first activity in Step 3 is the normalization and benchmarking of the indicators. 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 targets for the SDG indicators were used to benchmark these indicators. Where sustainability targets were not available, the mean values of the indicators of the top five country performers were used as targets. Benchmarking allows the measurement of distance to these targets, i.e., a score of 100 implies that the target was achieved.

3.3.2 Aggregation of normalized indicators

The normalized indicators from the previous activity in Step 3 were used as inputs to the aggregation model (i.e., level 1). 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 indicator. 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. Below are the levels of aggregation:

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, the countries with more than 25% missing values were dropped.

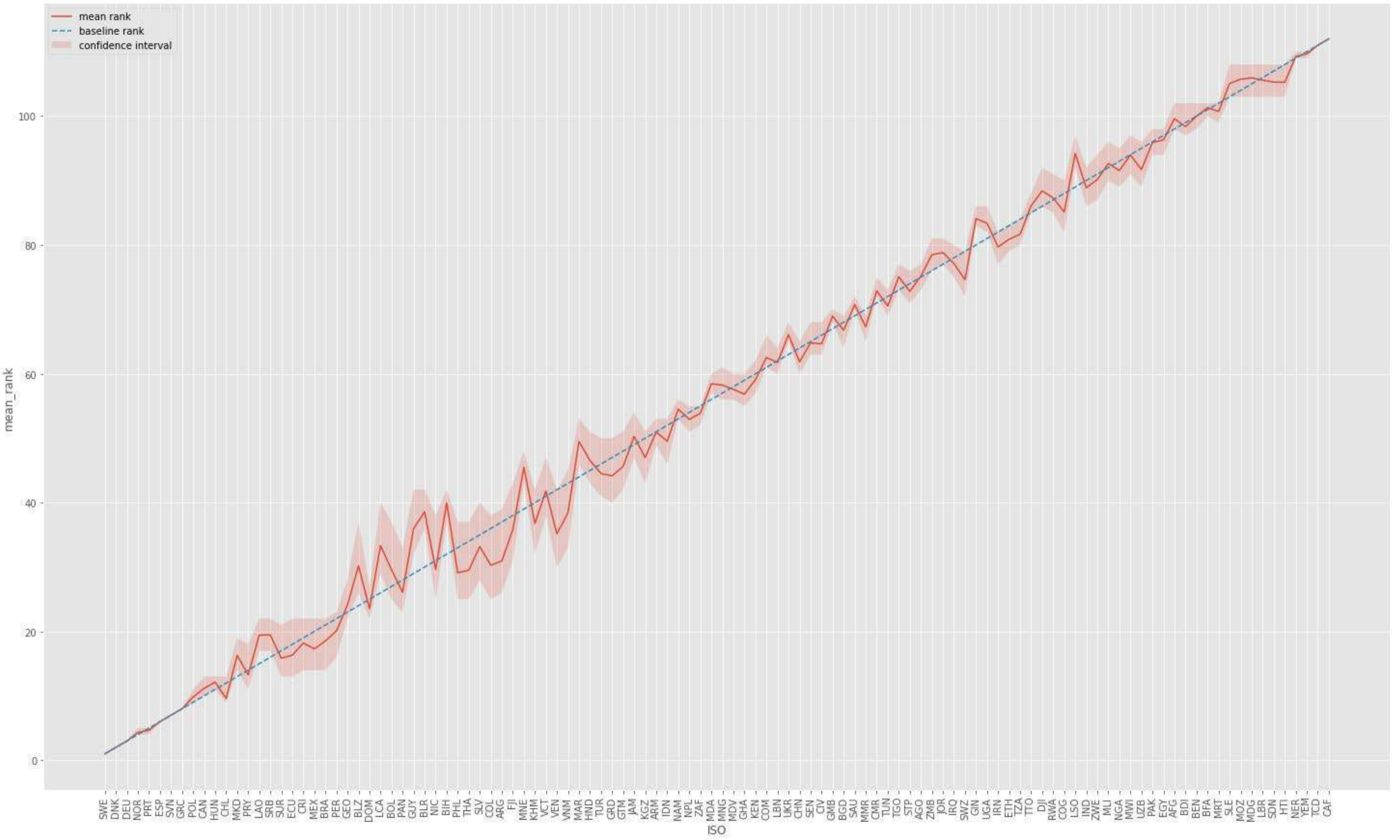
Level 2: Geometric aggregation was applied to the indicator categories to allow only partial compensability between indicators in each dimension. Like in Level 1, the 25% rule on missing values was applied to the dimensions with more than four indicator categories, i.e., resource efficiency and green economic opportunities.

Level 3: Geometric aggregation was applied to 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-Blue Growth Index.

3.3.3 Validation of the Green-Blue Growth Index

Monte Carlo analysis was conducted to check the sensitivity of the Green-Blue Growth Index to the changes in the values of the indicators, where the change was sampled from a gaussian distribution. In each simulation, modifications were made in the raw data of the 36 indicators. The modifications were made as follows: First, perturbations were sampled from a gaussian distribution for each indicator, where the distribution has zero mean and standard deviation equals to ±10% of the measured value. Second, these perturbations were then added to the indicators. And third, a new index was computed using this perturbed data. These steps were repeated 1000 times to compute the indices. Figure 5 shows the average rank and 95% of confidence interval for the 1000 simulation runs. The blue line refers to the ranks of the countries for the Green-Blue Growth Index in 2020, while the red line refers to the mean values of the ranks for the 1000 simulation runs. While there are deviations between the baseline and mean ranks particularly in the upper mid-levels of the ranks, the mean ranks generally gather around the baseline. This indicates that the Index is relatively robust to perturbation in raw data, which can be caused by, for example, error in data entries, uncertainty from imputed data, and adjustments from data capping.

Figure 5. Monte Carlo Analysis on the changes in values of the indicators (±10%)



04 RESULTS

The results for the Green-Blue Growth Index are discussed in this chapter. Chapter 4.1 provides a global overview of the Index and analyses some overall results as well as subregional comparisons of scores for the Index and its four dimensions. Chapter 4.2 further examines the performance of countries by subregion for each dimension. Chapter 4.3 analyzes the performance of OECS Member States with specific emphasis on Grenada, Saint Lucia, and Saint Vincent and the Grenadines. Table 9 presents the complete list of indicators for the Green-Blue Growth Index discussed in the next sections below. caused by, for example, error in data entries, uncertainty from imputed data, and adjustments from data capping.

Table 9. List of the indicators included in the Green-Blue Growth Index by dimensions and categories

Indicator category	Indicator codes	Name of indicators	Unit of measurement
EFFICIENT AND SUSTAINABLE RESOURCE USE			
Efficient and Sustainable Energy	EE1	EE1 - Energy intensity level of primary energy	MJ per GDP
	EE2	EE2 - Share renewable to total final energy consumption	Percent
Efficient and Sustainable Water Use	EW1	EW1 - Services water use efficiency	U$/$m^3$
	EW2	EW2 - Share freshwater withdrawal to available freshwater resources	Percent
Sustainable Land Use	SL1	SL1 - Soil nutrient budget	Kilogram nitrogen per hectare
	SL2	SL2 - Ruminant livestock number to total agricultural area, density	Percent
Material Use Efficiency	ME1	ME1 - Ratio total agricultural water managed area and total agricultural area	Ratio
	ME2	ME2 - Share food waste to total food consumption	Share
NATURAL CAPITAL PROTECTION			
Environmental Quality	EQ1	EQ1 - PM2.5 air pollution, mean annual population-weighted exposure	Micrograms per m^3
	EQ2	EQ2 - DALY rate due to unsafe water sources	DALY lost per 100,000 persons
	EQ3	EQ3 - Municipal solid waste (MSW) generation per capita	Tons per year per capita
GHG Emissions Reduction	GE1	GE1 - Ratio CO_2 emissions incl LUCF to population	Tons per capita
	GE2	GE2 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population	CO_2e Tons per capita
	GE3	GE3 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population	CO_2e Tons per capita
Biodiversity and Ecosystem Protection	BE1	BE1 - Average proportion of Marine, Freshwater, Terrestrial, and Mountain Key Biodiversity Areas covered by protected areas	Percent
	BE2	BE2 – Share of forest area to total land area	Percent
	BE3	BE3 - Above-ground biomass stock in forest	Tons per hectare
Cultural and Social Value	CV1	CV1 - Red list index	Score
	CV2	CV2 - Tourism and recreation in coastal and marine areas	Score
	CV3	CV3 - Share of terrestrial and marine protected areas to total territorial areas	Percent

Table 9 List of the indicators included in the Green-Blue Growth Index by dimensions and categories (continued)

Indicator category	Indicator codes	Name of indicators	Unit of measurement
GREEN ECONOMIC OPPORTUNITIES			
Green Investment	GV1*	GV1 - (a) International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems	Millions of constant United States dollars
	GV2	GV2 - Proportion of population covered by at least a 2G mobile network	Percent
Green Trade	GT1	GT1 - Share export of environmental goods (OECD and APEC class.) to total export	Percent
	GT2	GT2 - Share of fish exports to domestic consumption (higher value less sustainable)	Ratio
Green Employment	GJ1	GJ1 - Unemployment with advanced education (% of total labor force with advanced education)	Percent
	GJ2	GJ2 – Share of vulnerable employment to total employment	Percent
Green Innovation	GN1	GN1 - Green Mobility in sustainable transport	Score
	GN2	GN2 - Installed renewable electricity-generating capacity	watts per capita
SOCIAL INCLUSION			
Access to Basic services	AB1	AB1 - Proportion of population using basic drinking water services, basic sanitation services, and with access to electricity and clean fuels/ technology	Percent
	AB2	AB2 - Universal access - sustainable transport	Score
Gender Balance	GB1	GB1 - Proportion of seats held by women in national parliaments	Percent
	GB2	GB2 - Getting paid, laws and regulations for equal gender pay	Score
Social Equity	SE1	SE1 - GNI per capita, PPP	current international $
	SE2	SE2 - Proportion of population with access to electricity, by urban/rural	Percent
Social Protection	SP1	SP2 - Universal health coverage (UHC) service coverage index	Index
	SP2	SP3 - Proportion of urban population living in slums	Percent

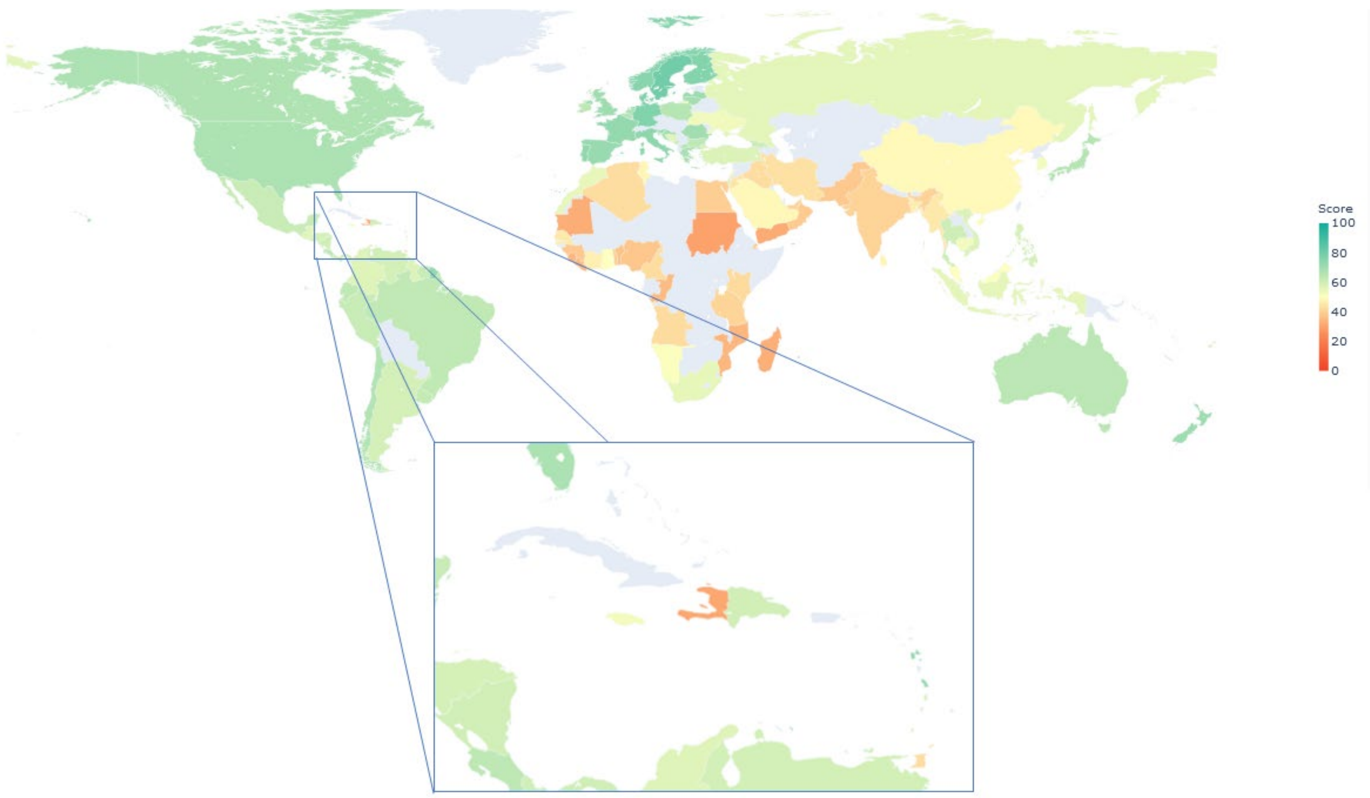
*Note: *The indicator is available only for developing countries. The indicator for research and development expenditure as a proportion of GDP (Percent) is used as alternative for developed countries.*

4.1 Green-Blue Growth Index

4.1.1 Global Overview

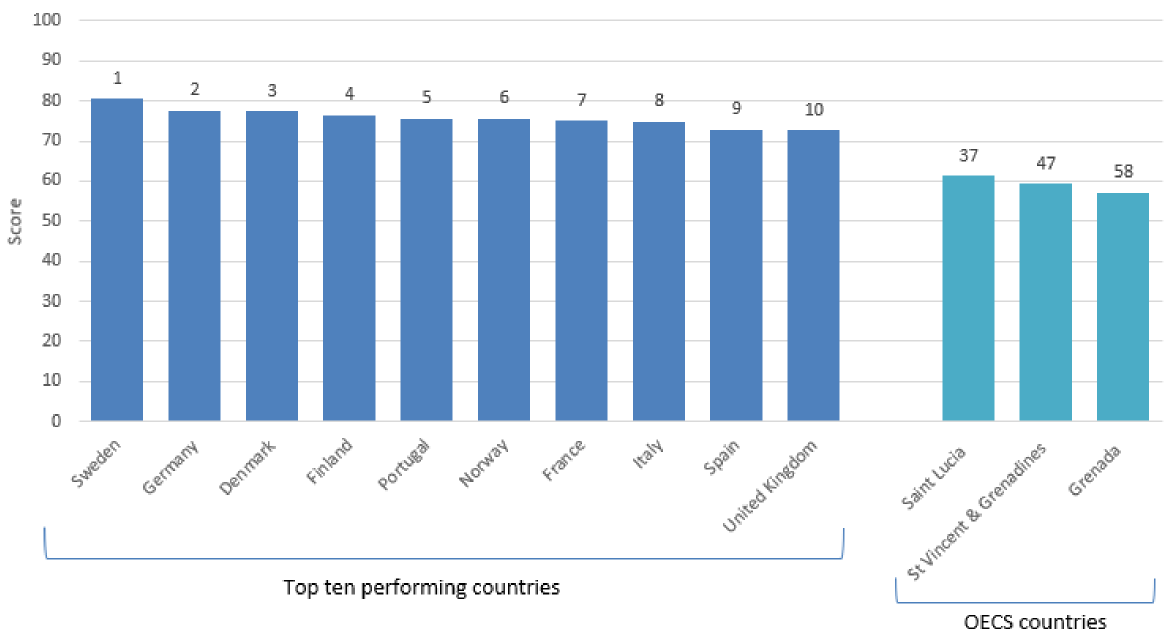
Figure 6 presents the maps of scores for the Green-Blue Growth Index in 2020, with a special focus on the Caribbean. There are 111 countries with Index scores, seven of them are in the Caribbean including the Dominican Republic, Haiti, Jamaica, Trinidad and Tobago, Saint Lucia, Grenada, and Saint Vincent and the Grenadines. Globally, Europe is the best performing region in the Green-Blue Growth Index, particularly Western and Northern Europe. With scores ranging from 75-80, countries such as Scandinavia, Germany, Portugal, France, Spain, Italy, and the United Kingdom are the top 10 highest performing countries in the Index (Figure 7). Overall, Sweden is the best performing country with a score of 80.49. Next to Europe, the Americas and Oceania are the regions with high scores, where Chile, Australia, and New Zealand are best performing countries. On the lower end of the Index scale are regions such as Africa (except South Africa), South-East Asia, Northern Africa, and Western Asia. Taking a closer look at the Caribbean, mixed score values can be observed. Haiti is the underperformer in the subregion with an Index score of 30. Within the OECS region, Saint Lucia, Grenada, and Saint Vincent and the Grenadines all have moderate scores, with values of 61, 56, and 59, respectively. Other countries in the region lack data to compute the Green-Blue Growth Index.

Figure 6. Global map for Green-Blue Growth Index, 2020 (excluding landlocked countries)



Note: Grey colors refer to countries that are either landlocked or lacking data.

Figure 7. Index scores and ranks of top 10 countries and three OECS Member States, 2020



4.1.2 Regional Outlook

Figure 8 shows the regional trends in the Green-Blue Growth Index between the years 2015 and 2020. The Caribbean is positioned amongst the moderately well-performing subregions. The subregion outperforms Central, West, and South Asia as well as all of Africa. With the fifth-highest average score at 52.47 in 2020, the Caribbean closely follows the performance of the Eastern and South-Eastern Asia region. The global top performers are in Europe and Northern America with an average index score of 69.77. Looking at the green growth trends over time, an upward trend can be seen across all regions except for the Sub-Saharan Africa with average score slightly decreasing from 41.07 in 2015 to 40.20 in 2020. Figure 9 shows the trends in the four green growth dimensions over time across the eight subregions. Performance of each dimension varies across subregions. Natural capital protection is, by far, the highest-scoring dimension in five of the regions including Latin America, Sub-Saharan Africa, the Caribbean, Central and South as well as East Asia. Noteworthy is the role of social inclusion in the overall best performers in Europe and North America, which dominates the score among the four dimensions. Likewise, the performance in social inclusion is highest in Oceania, including Australia and New Zealand. Social inclusion in the Caribbean accounts for the second-best dimension, but performance is only moderate with an average score of 51 from 2015 to 2020. A preliminary conclusion for developed countries is that the social inclusion dimension takes on a more dominant role in [the] Green-Blue Growth Index. This can be confirmed by the fact that the average score for social inclusion is lowest in Sub-Saharan and Eastern Africa, Latin America, and Central and Southern Asia where there are many developing and least developed countries. Performance in green-blue economic opportunities globally is relatively moderate but with increasing trend over time. However, in the Caribbean, green-blue economic opportunities is not only the lowest performing dimension, but it also showed a slight decreasing trend from 2016. For sustainable and efficient resource use, countries in Europe and Northern America as well as Northern Africa and Western Asia perform relatively poor. The rest of the subregions including the Caribbean perform moderately well in this dimension.

Figure 8. Trends in Green-Blue Growth Index by subregion, 2015-2020

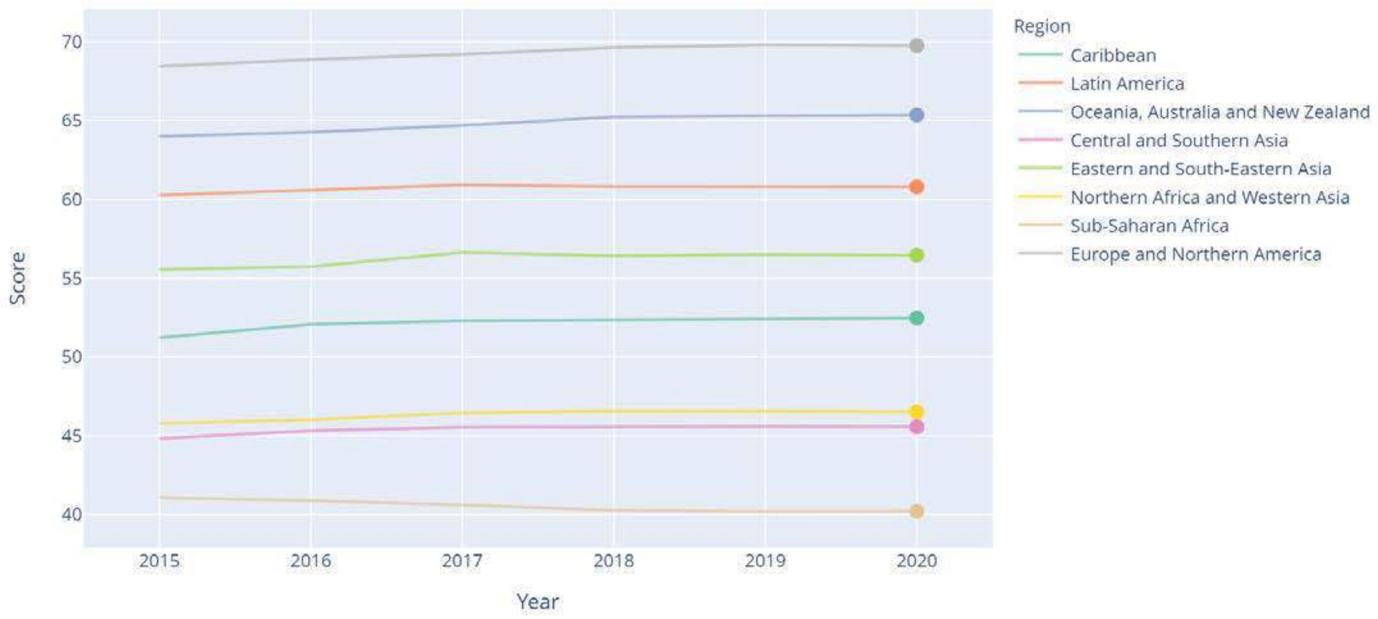
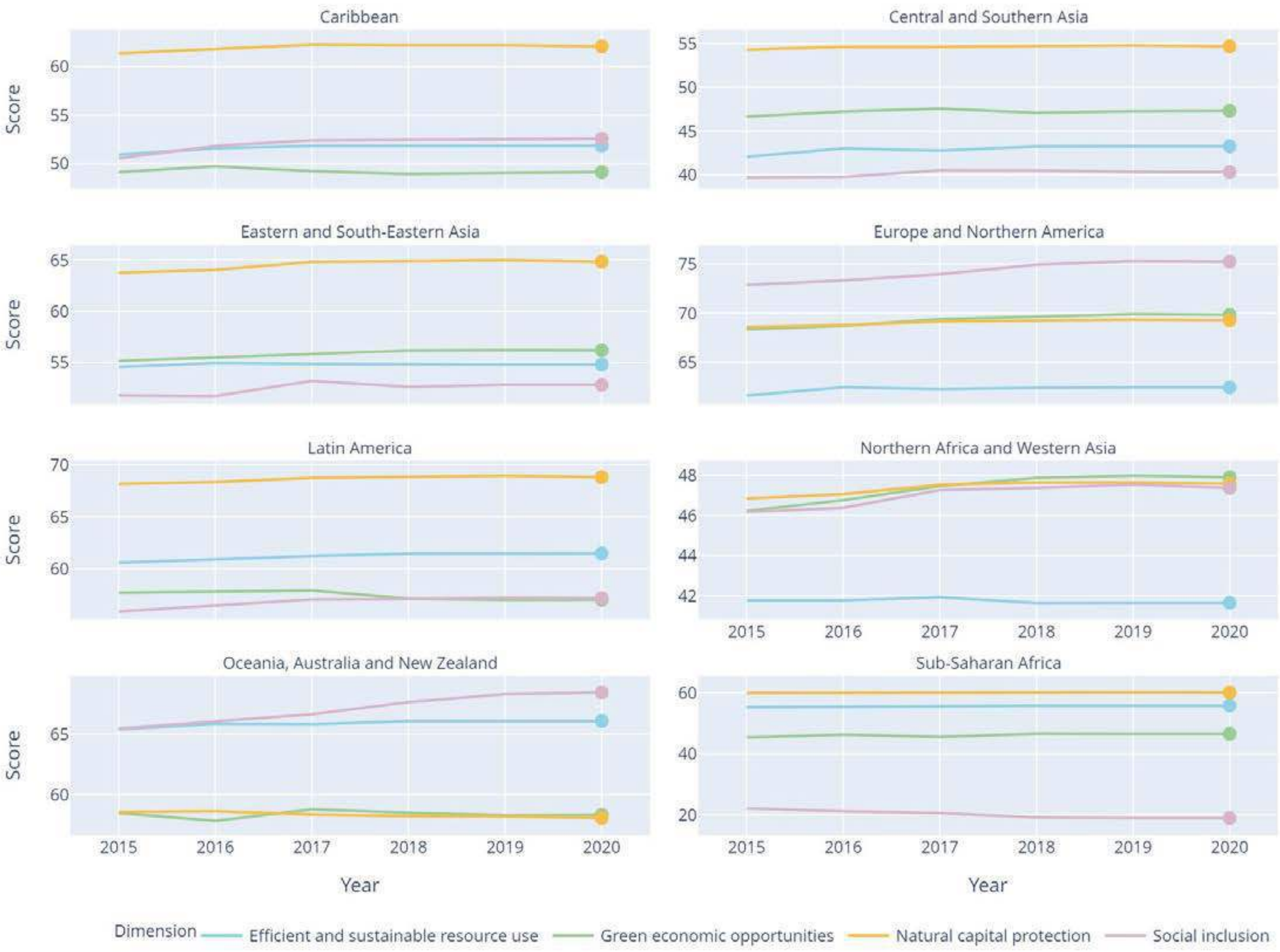


Figure 9. Trends in green growth dimensions by subregions, 2015-2020

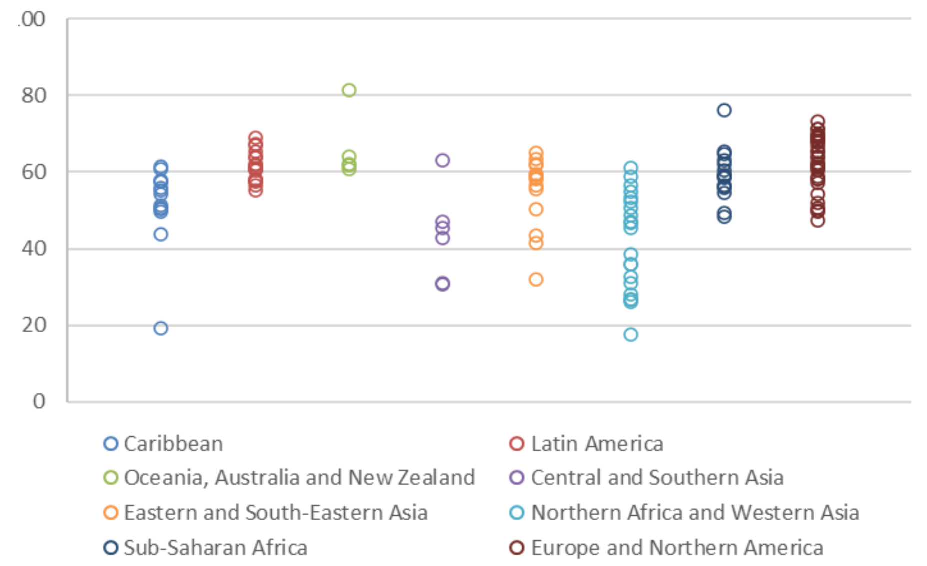


4.2 Green-Blue Growth Dimensions

4.2.1 Efficient and Sustainable Resource Use

Figure 10 presents the scatter diagram for efficient and sustainable resource use across the eight subregions, where the circles represent individual countries within each region. The scores of the countries in Latin America are least scattered, ranging from 50 to 70. While the scores in other subregions are also not widely scattered, few countries appear to be outliers with scores far from the rest of the subregion. These include, for example, Trinidad and Tobago with lowest score of 19 in the Caribbean, New Zealand with highest score of 81 in Oceania, and Equatorial Guinea with highest score of 76 in Sub-Saharan Africa. Equatorial Guinea is the best-performing country not only in Sub-Sahara but also in Africa and the second-best performer globally, having reached its sustainability target for all four efficient water and land use indicators. New Zealand has the highest score for this dimension globally, which is attributed to its scores of 100 for three indicators on efficient and sustainable use of water and material resources and relatively high scores for other remaining indicators in energy and land. The countries in the Caribbean subregion have mostly moderate scores between 40 and 60. In contrast to other Caribbean counties, the poor performance in Trinidad and Tobago is predominately attributed to high primary energy intensity, low renewable energy share, and poor land nutrient balance. The OECS Member States in the Caribbean subregion perform well with scores between 40 and 60. Saint Kitts and Nevis, with a score of 43, is the lowest performer which is mostly due to the country's low share of renewable energy and agricultural water managed area.

Figure 10. Distribution of scores for efficient and sustainable resource use by subregions, 2020



Note: Each circle on the scatter diagram represents a country in the respective subregions.

4.2.2 Natural Capital Protection

Figure 11 shows the distribution of scores for natural capital protection by subregions in 2020. The top performing countries for this dimension are in Europe and Northern America, but it has also one of the least performing countries which is Monaco. The very low score of 16 in Monaco is due to its very low performance in biodiversity and ecosystem protection. With similar score to Monaco, Guam is the other least performing country in Oceania due to very low performance in social and cultural value. When countries with extreme low scores are excluded, the scores for natural capital protection in Northern and Western Africa are the most widely distributed with scores from 20 to 70. In contrast, other subregions including the Caribbean have scores ranging from 40 to 80. With scores above 60, the OECS Member States perform well relative to other Caribbean countries. Saint Lucia has the highest score of 72 among the OECS Member States due to very high scores in environmental quality and GHG emission reductions.

Figure 11. Distribution of scores for natural capital protection by subregions, 2020

Note: Each circle on the scatter diagram represents a country in the respective subregions.

4.2.3 Green-Blue Economic Opportunities

The scatter diagram in Figure 12 shows the distribution of scores for green-blue economic opportunities in different subregions in 2020. Europe and Northern America are the global leads in this dimension with several countries having a very high score of more than 80. One country in Eastern and South-Eastern Asia has also recorded a very high score. This country is Japan with very high performance in green employment and green innovation. In contrast, the lowest score of 18 in green-blue economic opportunities was recorded in Democratic Republic of the Congo in Sub-Saharan Africa. This poor performance is mostly driven by the lack of green investments and green trade. The Caribbean scores gather around moderate values between 40 and 60 except for Haiti with a score of about 23. Haiti performs very low in green employment and green innovation. The OECS is presented by Grenada, Dominica, Saint Lucia, and Saint Vincent and the Grenadines, which all perform moderately well with scores between 40 and 60.

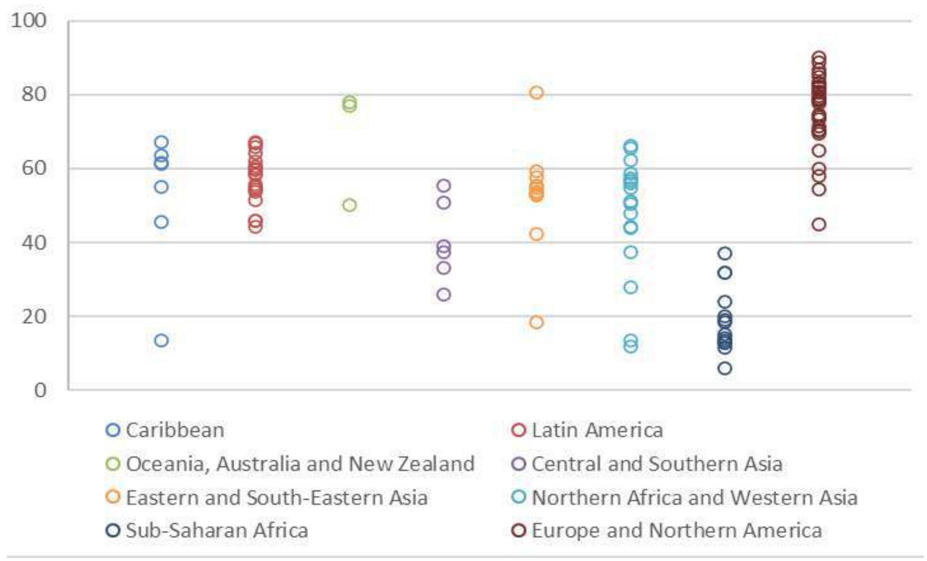
Figure 12. Distribution of scores for green-blue economic opportunities by subregions, 2020

Note: Each circle on the scatter diagram represents a country in the respective subregions.

4.2.4 Social Inclusion

For the social inclusion dimension, the scatter diagram in Figure 13 shows the diverse performance across subregions. Country performance in Europe and Northern America mostly gather around high and very high ranges, whilst the Sub-Saharan Africa around low and very low ranges. Few exceptions in Europe include Ukraine with a score of 44, performing only moderately well on social inclusion given its low scores on gender balance. Guinea-Bissau is the lowest performing country not only in Sub-Sahara but also globally with a score of only 6 in social inclusion. The lack of social equity in this country has contributed to this very low score. Oceania, represented by New Zealand, Australia, and Fiji, performs very well, with Fiji having the lowest score of 50. Fiji is predominantly constrained by its lack of universal health care coverage and low GNI per capita. The performance among the Caribbean countries ranges from moderate to high with scores from 40 to 60, except for Haiti with a score of 14 due to lack of social equity. The three OECS member countries all perform well, gathering around scores between 50 and 70, with Saint Vincent and the Grenadines being the lowest scoring country.

Figure 13. Distribution of scores for social inclusion by subregions, 2020



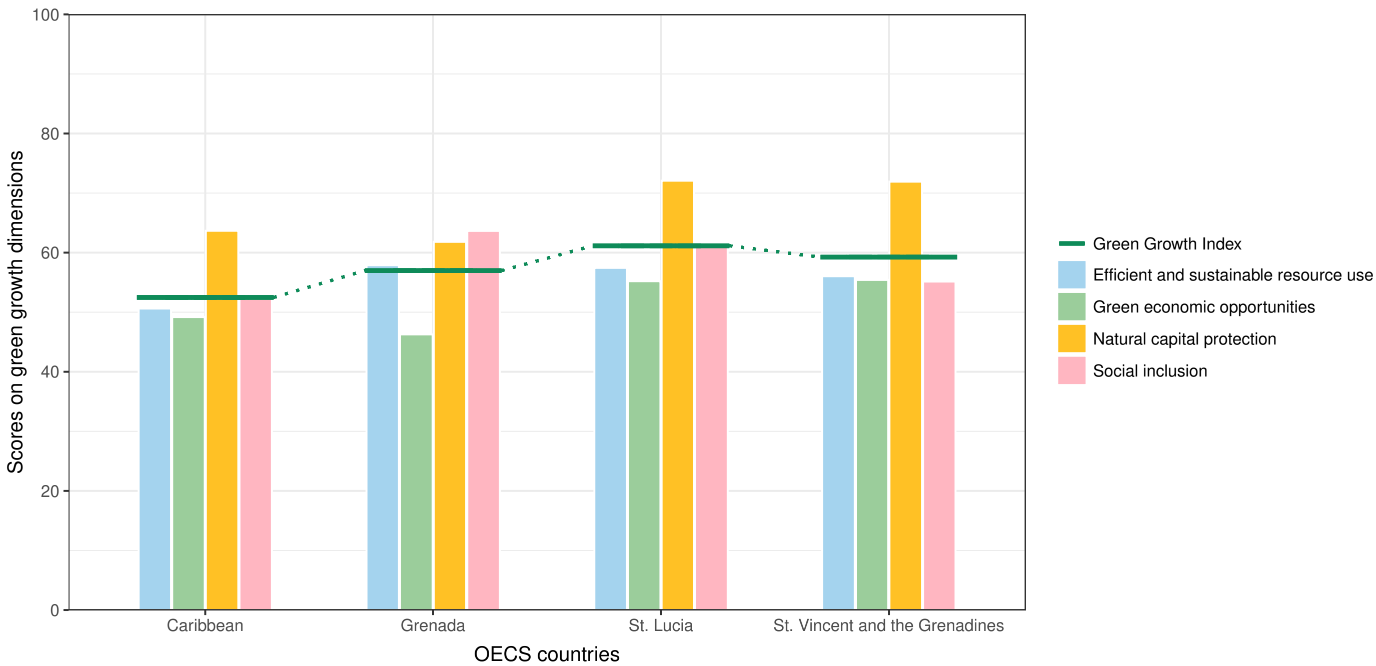
Note: Each circle on the scatter diagram represents a country in the respective subregions.

4.3 OECS Green-Blue Growth Country Performance

The Green-Blue Growth Index was computed for three OECS member countries , including Grenada, Saint Lucia, and Saint Vincent and the Grenadines. Figure 14 presents a cross-country comparison of scores for the Index and its dimensions. It also compares the scores of these OECS Member States to the average scores in the Caribbean.

Performance of Saint Lucia and Saint Vincent and the Grenadines are quite similar, with the Index score of the former only slightly higher than the latter country. Both countries appear to perform best in natural capital protection, in contrast to Grenada which scores highest in social inclusion. All three countries perform well above the other Caribbean countries at the Index and dimension levels, except for green-blue economic opportunities in Grenada, which is lower than the Caribbean average. The sections below provide a more in-depth discussion on each country's Green-Blue Growth Index performance and their scores related to efficient and sustainable resource use, natural capital protection, green-blue economic opportunities, and social inclusion.

Figure 14. Cross-country comparison of Green-Blue Growth Index performance in OECS Member States, 2020



4.3.1 Grenada

With a Green Growth Index score of 56.98, Grenada has been underperforming in comparison with other countries in the upper middle-income category (Figure 15). However, as the third-highest scoring country in the Caribbean, Grenada has been performing significantly better than its peers in the region, by roughly 4 units in 2020. Although the country experienced a decreased Index score in 2017, it has since been steadily increasing. The decline was mainly due to the drop in score in green-blue economic opportunities (Figure 16). Between 2015 and 2017, Grenada's green-blue economic opportunities decreased by almost 4 units but steadied into an increase from 2017 onwards. However, with a score value of 46.28 in 2020, it is still the weakest performing dimension in the index. As mentioned at the beginning of this chapter, Grenada has been diverging from the other two OECS Member States, given that the best performing dimension of the Index is social inclusion and not natural capital protection, as in the case for Saint Lucia and Saint Vincent and the Grenadines. The trends in dimensions in Figure 16 show that Grenada, with an index score of 63.65, performed consistently over time, with minimal changes in score value in its social inclusion and natural capital protection dimensions. Significant fluctuations, in both directions, are observed in Grenada's efficient and sustainable resource use and green-blue economic opportunities. Notable progress is observed in the first year of measurement, where the dimension for efficient use of resources experienced a drastic increase in score value of 54.04 in 2015 to 58.68 in 2016, levelling off to 57.89 in 2020. The increase can be attributed to the improvement in the ratio of total agricultural water managed area to total agricultural area (ME1).

Figure 15. Trend in Green-Blue Growth Index in Grenada and its peer country groups, 2015-2020

Figure 16. Trend in green growth dimensions in Grenada, 2015-2020

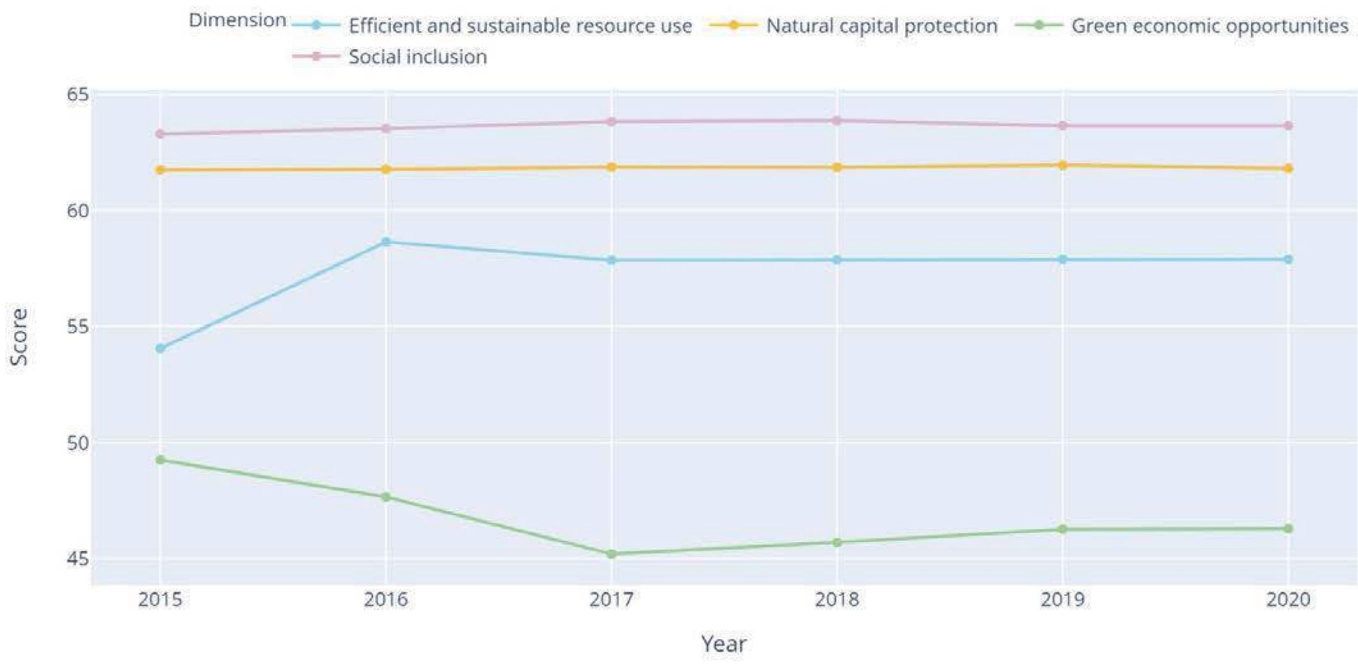


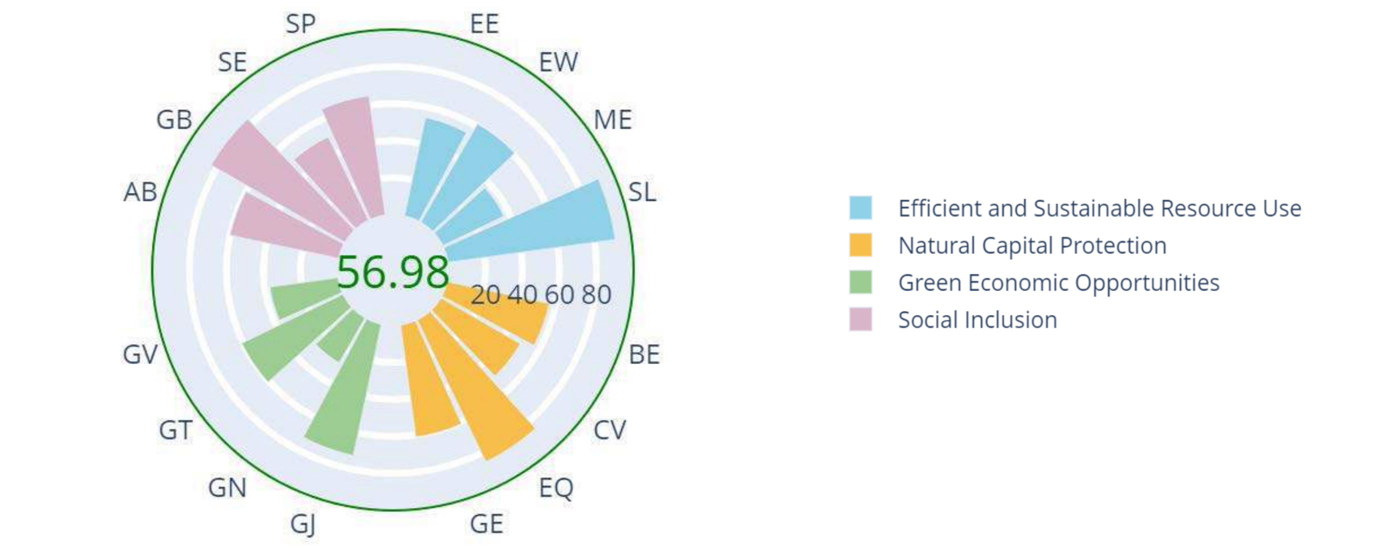
Figure 17 shows the distance to targets of the green growth indicators by categories in Grenada in 2020. Grenada performs very well in at least one category per dimension. Grenada has nearly reached its target for sustainable land use (SL), as its strongest performing category in the efficient and sustainable resource use dimension. The indicator for both nutrient balance (SL1) as well as for livestock density are close to reaching their respective sustainability target (Figure 18). Even though the category for material use efficiency (ME) is the furthest away from its target within the efficient and sustainable resource use dimension, it is predominantly restrained by the low shares of agricultural water managed areas (ME1). The categories for efficient water and energy usage perform similarly. As shown in Figure 18, on a disaggregated level, both categories are restrained by only one of the two indicators. Specifically, the improvements in the performance of the water and energy efficiency are mainly due to low scores in water use efficiency (EW1) and the share of renewable energy consumption (EE2). Similar to Saint Lucia's energy consumption, Grenada is dependent on oil imports with 98.5% of the energy derived from diesel fuels which account for 6% of GDP spending (Healey et al., 2020).

Grenada performs relatively well in natural capital protection dimension (Figure 17I). It has nearly reached its target for environmental quality (EQ), with overall strong values for all indicators in this category (i.e., EQ1, EQ2, EQ3) (Figure 18). Two of Grenada's indicators for GHG emission reductions (GE) have nearly reached their respective target, but the overall category score is restrained by the low value of its ratio of non-CO_2 emission excluding AFOLU (GE2). Grenada has reached its target for tourism and recreation in coastal and marine areas (CV2) but still exhibits potential for improvements in its share of terrestrial and marine protected areas (CV3). Furthermore, Grenada has been performing well across its biodiversity and ecosystem protection categories. As shown in Figure 18, Grenada's share of forest land area has reached its target. Developments in their above-ground biomass stock in forests (BE3) and the share of protected mountain, marine, freshwater, and terrestrial biodiversity areas (BE1) are still required to reach the overall biodiversity and ecosystem protection targets.

Grenada's performance in the green economic opportunities dimension is predominately influenced by the scores in green employment and green trade. The high performance in green trade is attributed to Grenada's high score for fish exports (GT2) (i.e., lower exports indicate less exploitation of marine resources), which reached its sustainability target in 2020. Potential growth opportunities provide the export sector for environmental goods (GT1). Green innovation and investments are currently underperforming and exhibit the weakest link in this dimension. As Figure 18 shows, the scores for indicators including installed renewable energy capacity (GN2) and international investments in clean energy research and development (GV1) are comparatively low.

Grenada's performance in the social inclusion dimension is strong, especially when it comes to the gender balance (GB). With 33% of the parliament and 100% of the judiciary being female in 2013, the government of Grenada has increased participation in political and public life as well as efforts to eradicate all forms of violence against women (Canton, 2021). The seats held by women in the parliament increased to 46.7% in 2021, but equal gender pay remained an area for improvement in 2020 (UN Women, n.d.). The score for equal gender pay (GB2) has nonetheless reached very high in recent years (Figure 18). However, it is difficult to provide data-driven evidence on this because the Caribbean has only few studies about gender income inequality (Leonce & Jackman, 2022). The moderate performance for the social equity category can be explained by the discrepancy between its indicators (Figure 18), as the low values of income per capita (SE1) offset the high values for electricity access in urban and rural areas (SE2), averaging out the overall score for social equity. A similar pattern can be observed for the basic service accessibility and, to a lesser extent, for the social protection category, which is affected by Grenada's lack of sustainable mobility (AB2) and universal health coverage (SP2), respectively.

Figure 17. Distance to targets by indicator categories in Grenada, 2020



Note: The diagram measures distance to sustainability targets, where a score of 100 (green line in the outer circle) indicates achieving the targets for the given indicator categories.

Legend:
Efficient and sustainable energy (EE), efficient and sustainable water use (EW), sustainable land use (SL), material use efficiency (ME), environmental quality (EQ), GHG emissions reduction (GE), biodiversity & ecosystem protection (BE), cultural and social value (CV), green investment (GV), green trade (GT), green jobs (GJ), green innovation (GN), access to basic services and resources (AB), gender balance (GB), social equity (SE), and social protection (SP).

Figure 18. Performance in green-blue growth indicators in Grenada, 2020

Note: The definitions of indicator codes are available in Table 9.

4.3.2 Saint Lucia

The trend in the Green-Blue Growth Index shows that Saint Lucia has been outperforming the average middle-income and Caribbean countries (Figure 19). With a Green-Blue Growth Index score of 61.15, Saint Lucia is the highest scoring country in the Caribbean. Between the years 2015 and 2020, the country's Index score has been steadily increasing by almost 3 units. In comparison to the rest of the Caribbean subregion, Saint Lucia's score for the Index is roughly 8 units higher than the Caribbean average in 2020. With regard to the trend in the green growth dimensions (Figure 20), the social inclusion and natural capital protection have been reasonably constant over time. Although Saint Lucia's efforts in improving its performance in natural capital protection are still far from reaching sustainability targets, it is already the highest performing country in this dimension in the subregion, with an average score of 72 between 2015 and 2020. The social inclusion dimension has remained largely unchanged in the past five years, with a score of 61.18 in 2020. Saint Lucia has sustained a substantial increase in the green economic opportunities dimension score, which can be attributed to a variety of factors including many initiatives to create an enabling environment for employment (Office of the Prime Minister, 2017). Lastly, Saint Lucia's efficient and sustainable resource use has seen a steady rise over time, with the highest score being 57.44 in 2020.

Figure 19. Trend in Green-Blue Growth Index in Saint Lucia and its peer country groups, 2015-2020

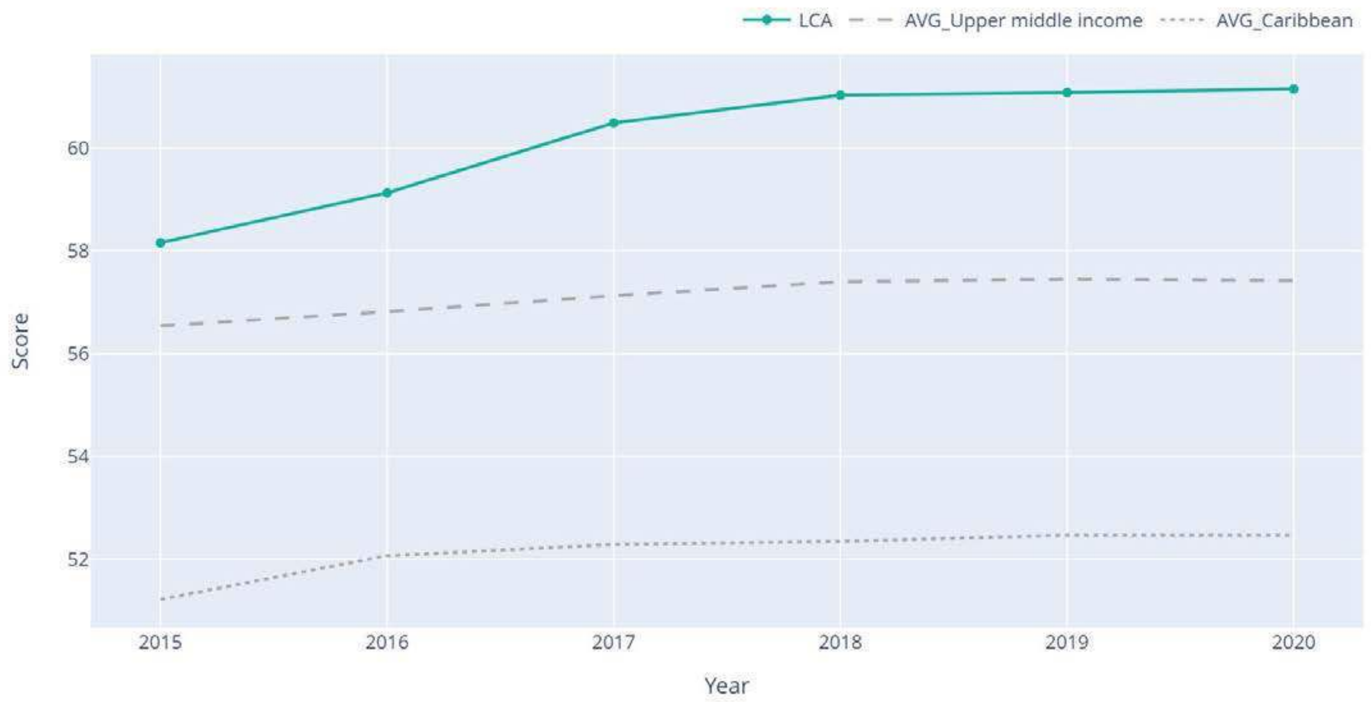
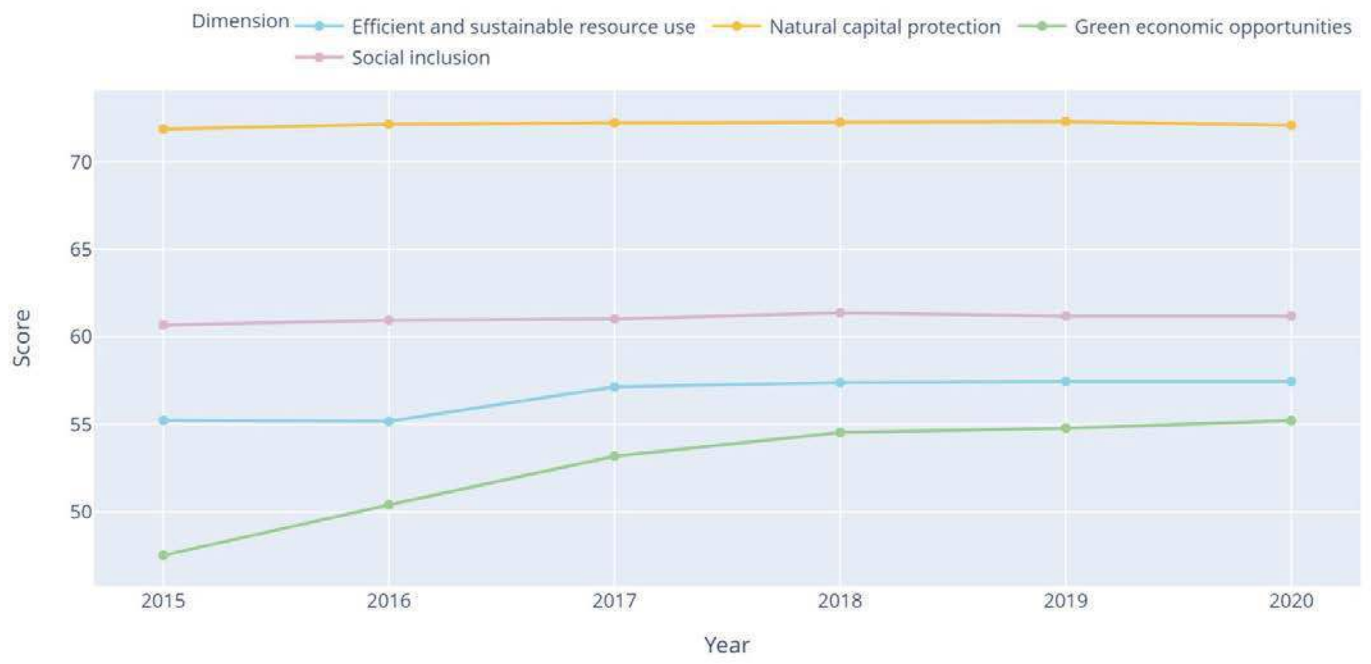


Figure 20. Trend in green growth dimensions in Saint Lucia, 2015-2020



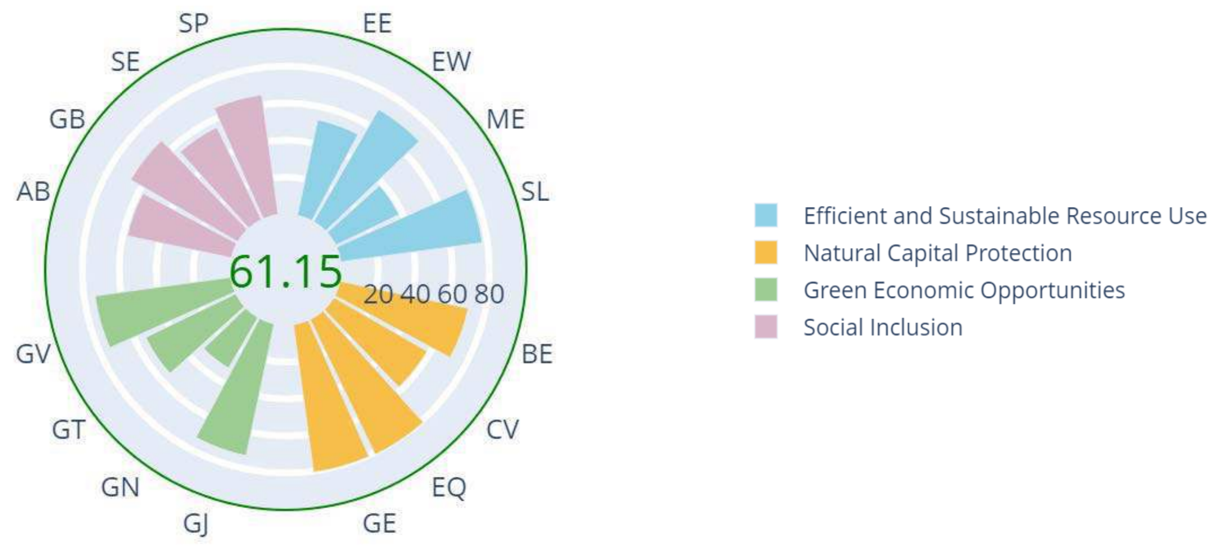
As shown in the circular diagram (Figure 21), Saint Lucia has nearly reached its target for sustainable land use (SL), as it is the strongest performing indicator in the efficient and sustainable resource use dimension. The country also shows progress in the efficient and sustainable water use dimension. This is due to the very high performance in share freshwater withdrawal to available freshwater resources (EW2) reaching the sustainability target for this indicator. Saint Lucia only performs moderately well in the efficient and sustainable energy (EE) and material use efficiency (ME) categories, particularly with respect to indicators for the share of renewable energy consumption (EE2) and share of agriculture water managed area (ME1). Like most small island states, Saint Lucia's energy consumption is dependent on oil imports (Timilsina & Shah, 2016). In 2010, the government proclaimed their interest for a short- and medium-term use of indigenous renewable energy like hydropower and geothermal energy, wind power, photovoltaic, solar thermal, and biomass (German Technical Cooperation et al., 2010), but actions have been lagging. Specifically, renewable energy targets in the country included a 35% increase in renewables of total electricity generation in 2020 (Timilsina & Shah, 2016). Even though the targets have not been reached, a 3 MW solar photovoltaic facility was completed in 2018 and additional facilities are planned (Serieux, 2019).

Saint Lucia performs very well in most indicator categories for natural capital protection (Figure 21), particularly for GHG emissions reductions (GE) and environmental quality (EQ). On an indicator level (Figure 22), the emission reductions are mostly restrained by the high ratios in non-CO_2 emissions (GE2). In natural capital protection dimension, Saint Lucia's performance is lowest in the social and cultural value which is brought about by very low score in the share of terrestrial and marine protected areas (CV3).

The performance of Saint Lucia in green economic opportunities is influenced by the high scores for green employment (Figure 21), with low levels of unemployment with advanced education (GJ1) and limited amounts of vulnerable employment (GJ2) (Figure 22). Huge growth potentials are available for Saint Lucia in green investments (GV) and green trade (GT). The performance in green trade is mainly constrained by the lack of exports of environmental goods (GT1). In contrast, reducing exploitation of marine resources by low fish exports (GT2) has compensated the low exports of environmental goods, with the former indicator reaching its sustainability targets in 2020. A similar pattern can also be observed for the green innovation category, where green mobility (GN1) has a moderate score at around 60 whilst the indicator for installed renewable electricity-generating capacity (GN2) has a very low score of 3. Saint Lucia performs well in most pillars for green investments, particularly for mobile network coverage (GV3), which has almost reached its target.

The social inclusion dimension shows relatively moderate performance for almost all indicator categories (Figure 21). On an indicator level (Figure 22), the discrepancies in scores of indicators across all categories explain the moderate scores, where high or very high scores in one indicator compensating for the low or very low scores in others. Out of the eight indicators, almost half have reached or are close to reaching the sustainability targets. Specifically, Saint Lucia has reached its target for equal gender pay (GB2) and nearly reached its targets in access to basic services (AB1) and access to electricity across urban and rural areas (SE2). A recent study revealed that women earn significantly higher than men in women dominated sectors and slightly lower than in men dominated sectors (Leonce & Jackman, 2022).

Figure 21. Distance to targets by indicator categories in Saint Lucia, 2020



Note: The diagram measures distance to sustainability targets, where a score of 100 (green line in the outer circle) indicates achieving the targets for the given indicator categories.

Legend:
Efficient and sustainable energy (EE), efficient and sustainable water use (EW), sustainable land use (SL), material use efficiency (ME), environmental quality (EQ), GHG emissions reduction (GE), biodiversity & ecosystem protection (BE), cultural and social value (CV), green investment (GV), green trade (GT), green jobs (GJ), green innovation (GN), access to basic services and resources (AB), gender balance (GB), social equity (SE), and social protection (SP).

Figure 22. Performance in green-blue growth indicators in Saint Lucia, 2020

Note: The definitions of indicator codes are available in Table 9.

4.3.3 Saint Vincent and the Grenadines

Saint Vincent and the Grenadines had a Green-Blue Growth Index score of 59.24 in 2020 (Figure 23). Similar to the growth pattern of the Caribbean region, it experienced a steady increase in scores from 2015. The score declined between 2016 and 2017, albeit insignificant at roughly 0.16 units. Having the third highest score in the Caribbean, Saint Vincent and the Grenadines is performing roughly 3 units better than the average upper-middle-income country and 7 units better than the Caribbean average. At the dimension level, the performance of Saint Vincent and the Grenadines is highest in natural capital protection with a score of 71.92 in 2020 (Figure 24). Its performance is only moderate for the other three dimensions, with scores ranging from 55 to 56. But there was a significant increase in the scores for green economic opportunities from 2015 to 2016 before levelling off until 2020. This trend was mainly due to the increase in international financial flows to the country in support of clean energy R&D and renewable energy production from 2016. In contrast, social inclusion virtually experienced no changes over time so that Saint Vincent and the Grenadines' performance in this dimension became [the] lowest in 2020.

Figure 23. Trend in Green-Blue Growth Index in Saint Vincent and the Grenadines and its peer country groups, 2015-2020

Figure 24. Trend in green growth dimensions in Saint Vincent and the Grenadines, 2015-2020

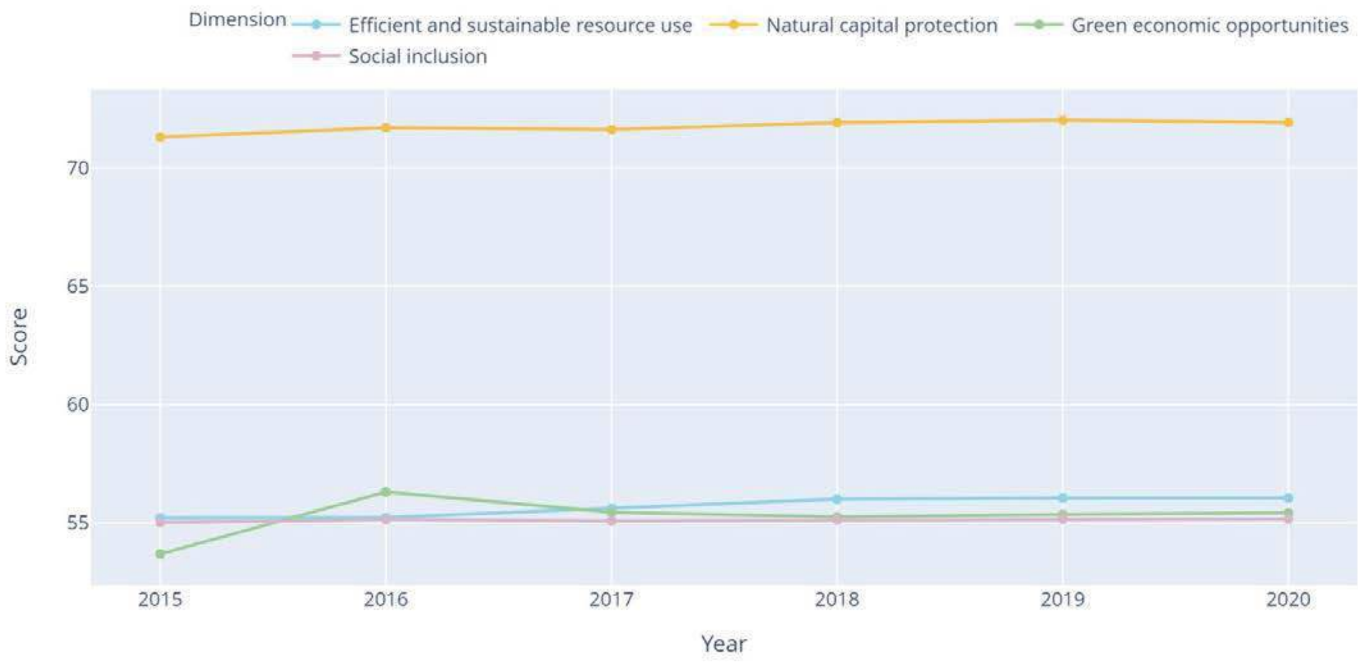


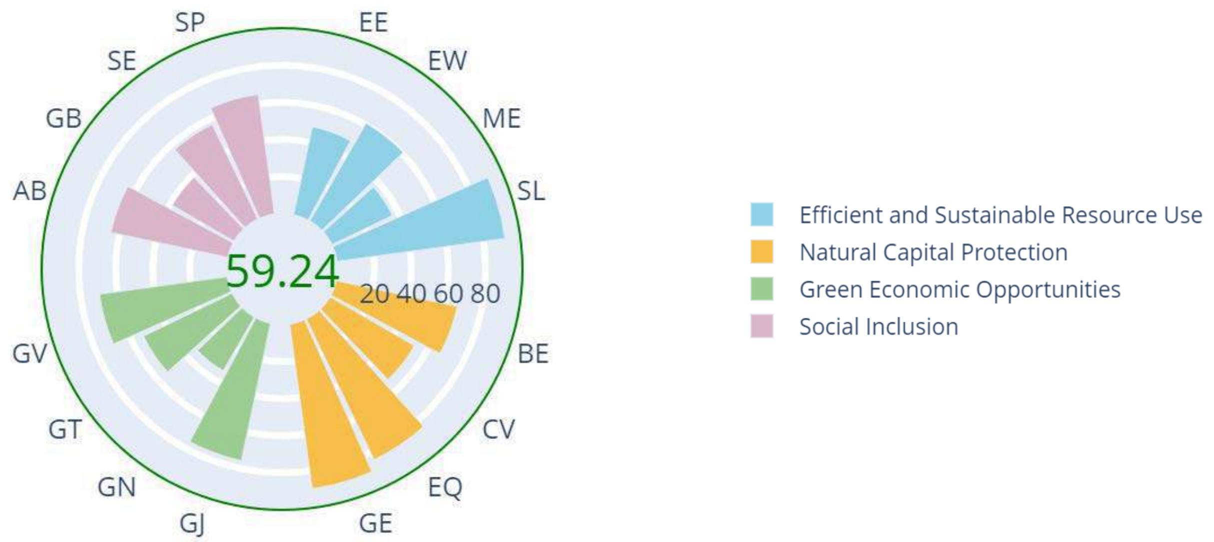
Figure 25 shows that the prospect of achieving sustainability targets in efficient and sustainable land use is very high in Saint Vincent and the Grenadines in 2020, but not for other sectors like energy, water, and materials (or wastes). Similar with Grenada and Saint Lucia, the high divergence between indicators averages out the overall scores. In the energy sector, for example, the very high score in intensity in primary energy (EE1) was levelled down by the very low score in renewable energy consumption (EE2) (Figure 26). In the water sector, the low performance in water efficiency (EW1) was compensated by the very high performance in the share of freshwater withdrawal to available freshwater resources (EW2). An almost similar patterns can be observed for the two indicators in material use efficiency (ME).

Saint Vincent and the Grenadines performs best in natural capital protection where two of the indicator categories have very high scores, particularly for the GHG emissions reduction (GE) and environmental quality (EQ) (Figure 25). At the indicator level (Figure 26), the performance on the six indicators for these two categories are all very high, with almost every indicator reaching at least a score of 80. However, Saint Vincent and the Grenadines excels in share of forest area to total land area with a score of 100, indicating that the sustainability target for this indicator has been reached. The indicators for cultural and social value have only moderate scores due to low proportion of the lack of terrestrial and marine protected areas (CV3). Protected areas of Saint Vincent and the Grenadines cover 22.42% of terrestrial and only 0.22% of marine areas (UNEP-WCMC, 2021).

With regard to the green-blue economic opportunities, Saint Vincent and the Grenadines has almost reached their target for green employment (Figure 25), with strong values for both indicators, i.e., unemployment with advanced education (GJ1) and vulnerable employment (GJ2) (Figure 26). Saint Vincent and the Grenadine excels in fish exports (GT2), having reached the sustainability target. However, very low scores for the exports of environmental goods (GT1), similar to Saint Lucia and Grenada, decrease the overall score of the green trade (GT). This pattern of high discrepancy in scores can also be observed in green innovation, where the relatively high scoring indicator for green mobility in transport (GN1) is balanced out by the low scores in installed renewable energy capacity (GN2). Lastly, green investment (GV) in Saint Vincent and the Grenadines has the second highest score in the green-blue economic opportunities. Whilst the sustainability target for 2G network coverage (GV3) has been reached, international investments in clean energy R&D remain low (GV1).

The performance of Saint Vincent and the Grenadines in social inclusion is overall moderate. Social protection has the highest score in this dimension (Figure 25). Yet, at the indicator level (Figure 26), the low score in universal health coverage (SP1) provides further opportunity to improve country performance. Similarly, the high score for access to basic services (AB1) was levelled off by the low score for universal access to sustainable transport (AB2). However, unlike Saint Lucia and Grenada, Saint Vincent and the Grenadines' performance in gender balance (GB) is relatively moderate. Both the indicator for equal gender pay (GB2) and share of women in parliament (GB1) have not or barely reached half the distance to their respective target. The sustainability target for urban-rural electricity access (SE2) has been reached. However, the score for GNI per capita (SE1) is very low (Figure 26), causing the overall performance in social equity to fall at a moderate level.

Figure 25. Distance to targets by indicator categories in Saint Vincent and the Grenadines, 2020

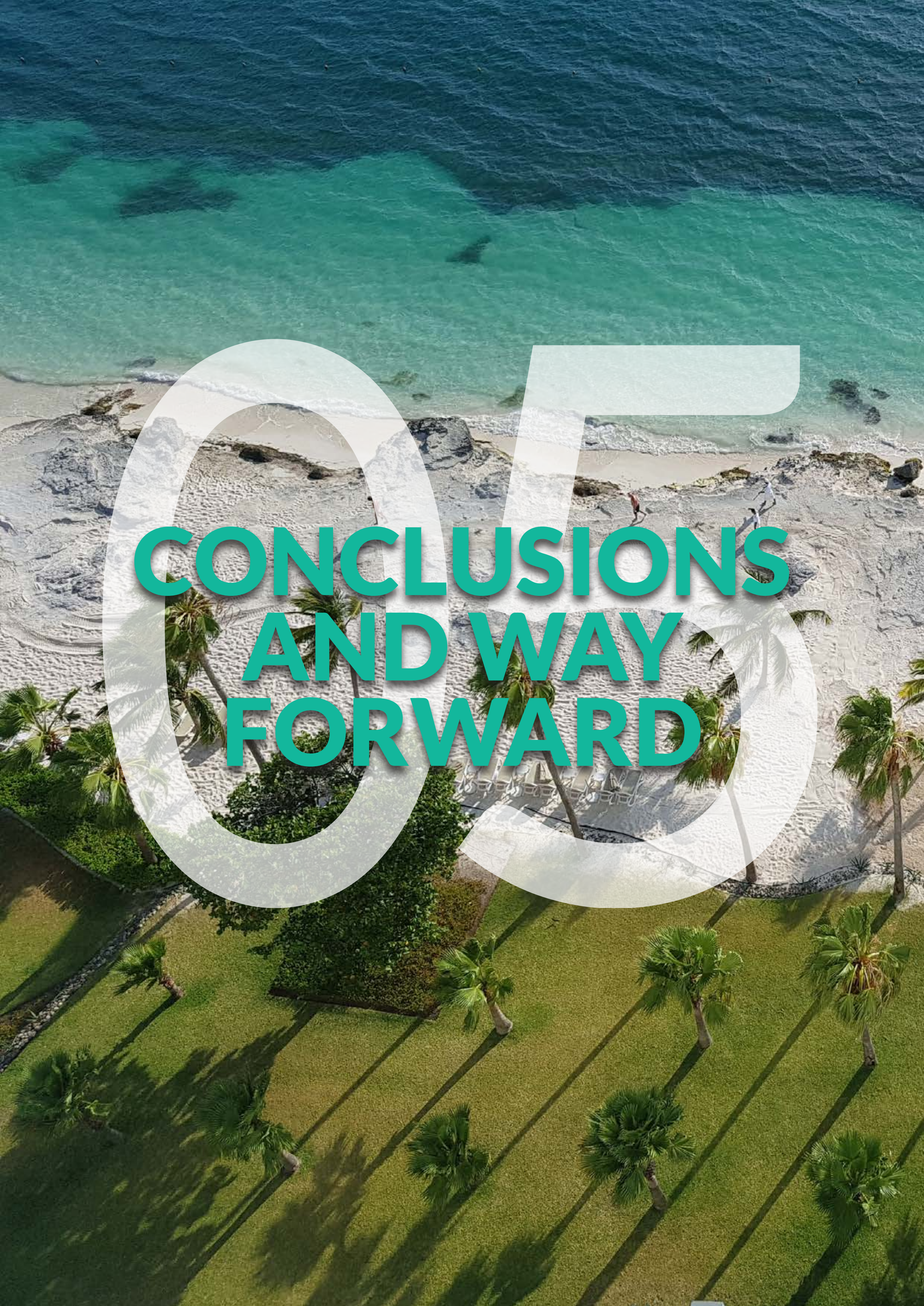


Note: The diagram measures distance to sustainability targets, where a score of 100 (green line in the outer circle) indicates achieving the targets for the given indicator categories.

Legend:
Efficient and sustainable energy (EE), efficient and sustainable water use (EW), sustainable land use (SL), material use efficiency (ME), environmental quality (EQ), GHG emissions reduction (GE), biodiversity & ecosystem protection (BE), cultural and social value (CV), green investment (GV), green trade (GT), green jobs (GJ), green innovation (GN), access to basic services and resources (AB), gender balance (GB), social equity (SE), and social protection (SP).

Figure 26. Performance in green-blue growth indicators in Saint Vincent and the Grenadines, 2020

Note: The definitions of indicator codes are available in Table 9.



05

CONCLUSIONS AND WAY FORWARD

The report presents the results of the pilot project to develop a Green-Blue Growth Index to measure the performance of the OECS Member States to transition to the green and blue economy. The framework of the Green Growth Index, which consists of four interlinked green growth dimensions – efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion, was adapted to develop the Green-Blue Growth Index. The review of literature revealed that the green growth and blue economy are two interrelated concepts. For this reason, the global Green Growth Index includes blue economy indicators, albeit lacking them in the green economic opportunities dimension. The development of the Green-Blue Growth Index aimed to enhance the blue economy indicators to assess performance in small island states like the OECS Member States.

5.1 Highlights of the Results

The Index was computed for 111 countries excluding the landlocked countries to allow comparison of green-blue growth performance across subregions and within the Caribbean subregion. The highlights of the results from the Green-Blue Growth Index are as follows:

- The performance of the countries in the Caribbean is overall moderate, lagging behind the developed countries in Europe and North America but ahead of the developing and least developed countries in Africa and a few Asian subregions.
- Overall, the Green-Blue Growth Index in the Caribbean subregion shows an upward trend from 2015 to 2020, albeit at a slow rate.
- Within the Caribbean, the OECS Member States perform generally better than the rest in the subregion. The performance in these countries is better in natural capital protection and social inclusion than in efficient and sustainable resource use and green-blue economic opportunities.
- Thus, there are ample opportunities to improve green-blue growth performance in the latter two dimensions in the OECS subregion. However, opportunities vary across the OECS Member States because the ability to reach the sustainability targets differ from various indicators.

5.2 The Next Steps

The Green-Blue Growth Index was computed only for three OECS Member States: Grenada, Saint Lucia, and Saint Vincent and the Grenadines, due to lack of data for many indicators in the subregion. Notwithstanding the selection of these three countries, time-series data were limited and required data imputation. While indicators for employment are not available in online databases of international organizations, data can be collected from national statistics. As a result, the data were collected from the website of national statistical offices in Grenada, Saint Lucia, and Saint Vincent and the Grenadines. However, the employment indicators only refer to decent employment and not to green employment. The following could be considered as next steps for advancing the Green-Blue Growth Index.

- The replication of the Green-Blue Growth Index in the rest of the OECS subregion will require data collection from relevant national agencies to fill in data gaps. For indicators that are published in online databases of the international organizations, it would be helpful to share the collected data to the publisher for two reasons: a) to improve data availability for OECS Member States in international online databases for ease of access; and b) to facilitate consistency checks of the data by the international organizations which usually align data available globally.
- The OECS Commission is currently collaborating with the United Nations Economic Commission for Latin America and the Caribbean to improve the OECS Members States' data and information systems to monitor progress including the SDG indicators. This initiative could provide necessary support on not only addressing data gaps, but also improving the blue economy indicators in the framework for the Green-Blue Growth Index, as presented in this report.
- The continuation of the webinar series (three were held in 2021) on the Green-Blue Growth Index could be useful in raising awareness on the value of the Index and gaining support from OECS experts for its further development and replication in other OECS Member States. Building capacity to develop and apply the Index in development plans at the regional and national level would also provide opportunities for its replication in the rest of the OECS Member States.

REFERENCES

Ababouch, L. (2015). Fisheries and Aquaculture in the Context of Blue Economy. In Feeding Africa (pp. 1–16).

Abu Bakar, N., Anyanji, V. U., Mustapha, N. M., Lim, S. L., & Mohamed, S. (2015). Seaweed (Eucheuma cottonii) reduced inflammation, mucin synthesis, eosinophil infiltration and MMP-9 expressions in asthma-induced rats compared to Loratadine. Journal of Functional Foods, 19, 710–722.

Acosta, L. A., Maharjan, P., Peyriere, H., Galotto, L., Mamiit, R. J., Ho, C., Flores, B. H., & Anastasia, O. (2019). Green Growth Index: Concept, Methods and Applications. In GGGI Technical Report (No. 5). Green Growth Performance Measurement (GGPM) Program, Global Green Growth Institute (GGGI).

Acosta, L. A., Zabrocki, S., Eugenio, J. R., Sabado Jr., R., Gerrard, S. P., Nazareth, M., & Luchtenbelt, H. G. H. (2020). Green Growth Index 2020 - Measuring Perfomrnace in Achieving SDG Targets. In GGGI Technical Report (No. 16). Green Growth Performance Measurement Program, Global Green Growth Institute (GGGI).

AfDB. (2014). Transitioning towards Green Growth: A Framework for the African Development Bank. African Development Bank.

Anthonj, C., Fleming, L., Cronk, R., Godfrey, S., Ambelu, A., Bevan, J., Sozzi, E., & Bartram, J. (2018). Improving Monitoring and Water Point Functionality in Rural Ethiopia. Water, 10, 1–17.

Barber, R. M., Fullman, N., Sorensen, R. J. D., Bollyky, T., McKee, M., Nolte, E., Abajobir, A. A., Abate, K. H., Abbafati, C., Abbas, K. M., Abd-Allah, F., Abdulle, A. M., Abdurahman, A. A., Abera, S. F., Abraham, B., Abreha, G. F., Adane, K., Adelekan, A. L., Adetifa, I. M. O., … Murray, C. J. L. (2017). Healthcare Access and Quality Index based on ortality from causes amenable to personal health care in 195 countries and territories, 1990-2015: A novel analysis from the global burden of disease study 2015. Lancet, 390(10091), 231–266.

Barbier, E. B. (2017). Marine Ecosystem Services. Current Biology, 27(11), R507–R510.

Bennett, N. J., Cisneros-Montemayor, A. M., Blythe, J., Silver, J. J., Singh, G., Andrews, N., Calò, A., Christie, P., Di Franco, A., Finkbeiner, E. M., Gelcich, S., Guidetti, P., Harper, S., Hotte, N., Kittinger, J. N., Le Billon, P., Lister, J., López de la Lama, R., McKinley, E., … Sumaila, U. R. (2019). Towards a Sustainable and Equitable Blue Economy. Nature Sustainability, 2, 991–993.

CANARI. (n.d.). Blue economy or “Bluewashing” Carribean Coastal Development? Caribbean Natural Resources Institute. Retrieved February 3, 2021, from https://canari.org/news/blue-economy-or-bluewashing-caribbean-coastal-development/

CANARI. (2019). Transitioning to Inclusive, Resilient and Environmentally Sustainable Economies in the Easter Caribbean. In CANARI Policy Brief (No. 25). Caribbean Natural Resources Institute (CANARI).

Canton, H. (2021). Economic Commission for Latin America and the Caribbean—ECLAC. In The Europa Directory of International Organizations 2021 (23rd ed., pp. 142–144). Routledge.

Central Statistics Office of Grenada. (n.d.). Grenada National Population and Housing Census Report 2011. https://gov.gd/sites/mof/files/stats/Publication/Census-Report-2011-Revised-Final.pdf

Dogaru, L. (2021). Green Economy and Green Growth — Opportunities for Sustainable Development. Multidisciplinary Digital Publishing Institute Proceedings, 63(1), 70–77.

Dornan, M., Morgan, W., Newton Cain, T., & Tarte, S. (2018). What’s in a Term? “Green Growth” and the “Blue-Green Economy” in the Pacific Islands. Asia and the Pacific Policy Studies, 5(3), 408–425.

Eikeset, A. M., Mazzarella, A. B., Davíðsdóttir, B., Klinger, D. H., Levin, S. A., Rovenskaya, E., & Stenseth, N. C. (2018). What is Blue Growth? The Semantics of “Sustainable Development” of Marine Environments. Marine Policy, 87, 177–179.

EIU. (2015). The Blue Economy: Growth, Opportunity and a Sustainable Ocean Economy. Economist Intelligence Unit.

Ertör, I., & Hadjimichael, M. (2020). Editorial: Blue Degrowth and the Politics of the Sea: Rethinking the Blue Economy. Sustainability Science, 15(1), 1–10.

EU. (2012). Blue Growth: Opportunities for Marine and Maritime Sustainable Growth (pp. 1–13). European Commission.

European Comission. (2020). The EU Blue Economy Report 2020. European Union, Luxembourg.

Eurostat. (n.d.). Glossary: Livestock Density Index. Retrieved December 10, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_density_index

FAO. (2013). Achieving Blue Growth. Food and Agriculture Organization of the United Nations (FAO).

GEC. (2012). Nine Principles of a Green Economy. Green Economy Coalition. https://www.greeneconomycoalition.org/news-analysis/sign-9-principles-green-economy

Georgeson, L., Maslin, M., & Poessinouw, M. (2017). The Global Green Economy: A Review of Concepts, Definitions, Measurement Methodologies and their Interactions. Geo: Geography and Environment, 4(1), 1–23.

German Technical Cooperation, CARICOM, & Organization of American States. (2010). National Energy Policy: Saint Lucia (pp. 1–16).

GGGI. (2017). GGGI Refreshed Strategic Plan 2015-2020: Accelerating the Transition to a New Model of Growth.

GGKP. (2013). Moving Towards a Common Approach on Green Growth Indicators. Green Growth Knowledge Platform.

Gleick, P. H., & Palaniappan, M. (2010). Peak water limits to freshwater withdrawal and use. Proceedings of the National Academy of Sciences of the United States of America, 107(25), 11155–11162. https://doi.org/10.1073/pnas.1004812107

Golden, J. S., Virdin, J., Nowacek, D., Halpin, P., Bennear, L., & Patil, P. G. (2017). Making Sure the Blue Economy is Green. Nature Ecology and Evolution, 1(0017), 1–3.

Healey, V., Beshilas, L., Kamyria, C., & Gary, J. (2020). Energy Snapshot - Grenada. National Renewable Energy Lab. (NREL), Golden, CO (United States).

Jacob, A., & Møller, A. K. (2017). Policy landscape of trade in environmental goods and services. In Asia-Pacific Research and Training Network on Trade Working paper No. 166. United Nations Economic and Social Commission for Asia and the Pacific.

Jha, S., Sandhu, S. C., & Wachirapunyanont, R. (2018). Inclusive Green Growth Index: A New Benchmark for Quality of Growth. Asian Development Bank (ADB).

Leiva, M. (2020). What is the Blue Economy, and is it Green? Investment Monitor. https://investmentmonitor.ai/global/what-is-the-blue-economy

Leonce, J., & Jackman, M. (2022). Gender Income Inequality in Saint Lucia. World Journal of Entrepreneurship, Management and Sustainable Development, 18(1), 87–104.

Mishra, S. K. (2008). Construction of Composite Indices in Presence of Outliers. SSRN Electronic Journal, 1–5.

Ocean Governance. (n.d.). Blue Economy. Retrieved January 31, 2021, from https://www.earthsystemgovernance.net/oceans/?page_id=79 1

OECD. (2011). Towards Green Growth: Monitoring Progress. OECD Publishing.

OECD. (2012). Inclusive Green Growth: For the Future We Want (pp. 1–44). OECD Publishing.

OECD. (2015). Green Growth in Fisheries and Aquaculture (pp. 1–112). OECD Publishing.

OECD. (2016). The Ocean Economy in 2030. OECD Publishing.

OECD. (2017). Green Growth Indicators 2017. OECD Publishing.

OECD, & JRC. (2008). Handbook on Constructing Composite Indicators: Methodology and User Guide. OECD Publishing.

OECS, & CANARI. (2019). OECS to establish Green-Blue Economy Strategy and Action Plan with CANARI. https://pressroom.oecs.org/oecs-to-establish-green-blue-economy-strategy-and-action-plan-with-canari#:~:text=In an OECS green-blue,to OECS countries and territories.

Office of the Prime Minister. (2017). Government renews committment to employment. http://www.govt.lc/news/government-renews-commitment-to-employment

PAGE. (2017). The Green Economy Progress Measurement Framework - Methodology. United Nations Environment Programme (UNEP).

Patil, P. G., Virdin, J., Diez, S. M., Roberts, J., & Singh, A. (2016). Toward a Blue Economy: A Promise for Sustainable Growth in the Caribbean: An Overview (pp. 1–91). The World Bank.

Pauli, G. P. (2010). The Blue Economy Book: 10 Years, 100 Innovations, 100 Million Jobs. Paradigm Publications.

Ram, J., & Kaidou-Jeffrey, D. (2020). Financing the Blue Economy in the Wider Caribbean. In The Caribbean Blue Economy (1st ed., pp. 210–225). Routledge. https://doi.org/10.4324/9780429342233-19

Reddy, K. S., & Mehra, J. (2017). Energy Intensity in India and its Impact on GDP. IOSR Journal of Business and Management, 6–12.

Ronquillo, C., & Currie, L. (2012). The digital divide: Trends in global mobile and broadband Internet access from 2000-2010. 346–350.

Rustomjee, C. (2016). Developing the Blue Economy in Caribbean and Other Small States. In Policy Brief No. 75 (pp. 1–5). Centre for International Governance Innovation (CIGI).

Saavedra, J. J., & Alleng, G. P. (2020). Sustainable Islands: Defining a Sustainable Development Framework Tailored to the Needs of Islands. In Technical Note (IDB-TN-2053; pp. 1–72). Inter-American Development Bank (IDB).

Schmalensee, R. (2012). From "Green Growth" to Sound Policies: An Overview. Energy Economics, 34, S2–S6.

Schutter, M. S., & Hicks, C. C. (2019). Networking the Blue Economy in Seychelles: Pioneers, Resistance, and the Power of Influence. Journal of Political Ecology, 26, 425–447.

Serieux, J. L. (2019). National energy efficiency monitoring report of Saint Lucia. Project Documents, (LC/TS.2019/73), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).

Silver, J. J., Gray, N. J., Campbell, L. M., Fairbanks, L. W., & Gruby, R. L. (2015). Blue Economy and Competing Discourses in International Oceans Governance. Journal of Environment and Development, 24(2), 135–160.

Smith-Godfrey, S. (2016). Defining the Blue Economy. Maritime Affairs: Journal of the National Maritime Foundation of India, 1–7.

Solomon, F. N. (2020). Rethinking the Oceans: Transitioning to the Blue Economy. Institute of Marine Affairs (IMA). https://www.ima.gov.tt/2020/06/08/rethinking-the-oceans-transitioning-to-the-blue-economy/

Soma, K., van den Burg, S. W. K., Hoefnagel, E. W. J., Stuiver, M., & van der Heide, C. M. (2018). Social Innovation – A Future Pathway for Blue Growth? Marine Policy, 87, 363–370.

Statistical Office of St. Vincent and the Grenadines. (n.d.-a). 2017 Labour Force Survey. Retrieved January 4, 2022, from http://stats.gov.vc/data/request-data/

Statistical Office of St. Vincent and the Grenadines. (n.d.-b). Employed Population by Status in Employment and Sex (Percentages). Retrieved January 4, 2022, from https://stats.gov.vc/wp-content/uploads/2018/10/Employed-Population-by-Status-in-Employment-and-Sex-2015-and-2017.xlsx

SusGren. (2021). CMBP Improve Seamoss. https://susgren.org/projects/cmbp-improve-seamoss/

The Blue Economy. (n.d.). The Blue Economy. https://www.theblueeconomy.org/

Thi, N. B. D., Kumar, G., & Lin, C. Y. (2015). An overview of food waste management in developing countries: Current status and future perspective. Journal of Environmental Management, 157, 220–229.

Timilsina, G. R., & Shah, K. U. (2016). Filling the gaps: Policy supports and interventions for scaling up renewable energy development in Small Island Developing States. Energy Policy, 98, 653–662.

UN ECLAC-CELADE. (n.d.). 2010 Housing & Population Census. United Nations Economic Commission for Latin America and the Caribbean- Latin American and Caribbean Demographic Centre. Retrieved January 4, 2022, from https://redatam.org/binlca/RpWebEngine.exe/Portal?BASE=PHC2010C&lang=ENG [

UN ESCAP. (2012). Green Economy in a Blue World: Pacific Perspectives. United Nations Economic and Social Commission for Asia and the Pacific.

UN ESCAP. (2013). Green Growth Indicators: A Practical Approach for Asia and the Pacific.

UN Women. (n.d.). Country Fact Sheet: Grenada. United Nations Entity for Gender Equality and the Empowerment of Women. Retrieved January 5, 2022, from https://data.unwomen.org/country/grenada

UNCTAD. (2014). The Oceans Economy: Opportunities and Challenges for Small Island Developing States. 1–32.

UNDESA. (2012). A Guidebook to the Green Economy. Issue 1: Green Economy, Green Growth, and Low-Carbon Development - History, Definitions and a Guide to recent publications. United Nations Department of Economic and Social Affairs.

UNEP-WCMC. (2021). Protected Area Profile for Saint Vincent and the Grenadines from the World Database of Protected Areas. https://www.protectedplanet.net/country/VCT

UNEP. (2011). Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. United Nations Environment Programme.

UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, & GRID-Arendal. (2012). Green Economy in a Blue World: Synthesis Report. United Nations Environment Programme (UNEP), Food and Agriculture Organization (FAO), International Maritime Organisation (IMO), United Nations Development Programme (UNDP), International Union for Conservation of Nature (IUCN), World Fish Center, GRID-Ar.

UNSD. (2018). Standard country or area codes for statistical use (M49). The United Nations Statistics Division. https://unstats.un.org/unsd/methodology/m49/

UNSTATS. (n.d.). SDG Global Database. United Nations Statistics Division. Retrieved December 21, 2021, from https://unstats.un.org/sdgs/unsdg

Voyer, M., Quirk, G., McIlgorm, A., & Azmi, K. (2018). Shades of Blue: What Do Competing Interpretations of the Blue Economy Mean for Oceans Governance? Journal of Environmental Policy and Planning, 20(5), 595–616.

Wenhai, L., Cusack, C., Baker, M., Tao, W., Mingbao, C., Paige, K., Xiaofan, Z., Levin, L., Escobar, E., Amon, D., Yue, Y., Reitz, A., Sepp Neves, A. A., O'Rourke, E., Mannarini, G., Pearlman, J., Tinker, J., Horsburgh, K. J., Lehodey, P., … Yufeng, Y. (2019). Successful Blue Economy Examples with an Emphasis on International Perspectives. Frontiers in Marine Science, 6(261), 1–14.

Williams, M. (2022). St.Kitts and Nevis: sea moss farming, moss gloss. https://aquadocs.org/handle/1834/36024

World Bank. (2012). Inclusive Green Growth: The Path to Sustainable Development. World Bank.

World Bank. (2019). Women, Business and the Law. https://wbl.worldbank.org/

World Bank, & UN DESA. (2017). The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Devloping States and Coastal Least Developed Countries. World Bank.

WWF. (2015). Principles for a Sustainable Blue Economy. World Wildlife Fund (WWF) Baltic Ecoregion Programme.

APPENDICES

Appendix 1 Description of the green and blue growth indicators

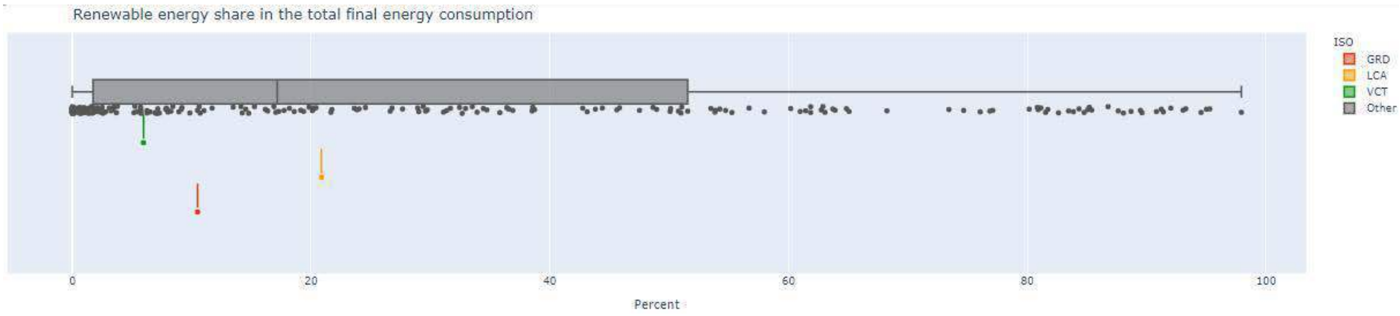
Codes	Available data	Baseline data*	Data downloaded source	Website	Year(s) imputed for 2021 Index (only consider years between 2015 and 2020)
EE1	2000-2018	2018	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2019, 2020
EE2	2000-2018	2018	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2019, 2020
EW1	1992-2017	2017	AQUASTAT	https://www.fao.org/aquastat/statistics/	2018-2020
EW2	2000-2018	2018	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2019, 2020
SL1	1961-2018	2018	FAO	http://fenix.fao.org/faostat/internal/en/#data/ESB	2019, 2020
SL2	1961-2019	2019	FAO	http://www.fao.org/faostat/en/	2020
ME1	2007-2017 5years interval	2017	AQUASTAT	https://www.fao.org/aquastat/statistics/	2018-2020
ME2	2014-2018	2018	FAO	http://www.fao.org/faostat/en/#data/SCL	2019, 2020
EQ1	1990-2017	2017	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=EN.ATM.PM25.MC.M3	2018-2020
EQ2	1990-2019	2019	GHDx	http://ghdx.healthdata.org/	2020
EQ3	2018	2018	WB data	https://datacatalog.worldbank.org/dataset/what-waste-global-database	2019, 2020
GE1	1990-2018	2018	ClimateWatch and WB data	https://www.climatewatchdata.org/ https://api.worldbank.org/v2/country/all/indicator/?indicator=SP.POP.TOTL	2019, 2020
GE2	1990-2018	2018	ClimateWatch and WB data	https://www.climatewatchdata.org/ https://api.worldbank.org/v2/country/all/indicator/?indicator=SP.POP.TOTL	2019, 2020
GE3	1990-2018	2018	ClimateWatch and WB data	https://www.climatewatchdata.org/ https://api.worldbank.org/v2/country/all/indicator/?indicator=SP.POP.TOTL	2019, 2020
BE1	2000-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	-
BE2	1990-2018	2018	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2019, 2020
BE3	2000-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	-
CV1	1993-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	-
CV2	2012-2020	2020	OHI	http://ohi-science.org/ohi-global/download	-
CV3	2016-2018	2018	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=ER.PTD.TOTL.ZS	2019, 2020
GJ1	1990-2020	2020	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=SL.UEM.ADVN.ZS	-
GJ2	1991-2020	2020	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=SL.EMP.VULN.ZS	-
GN1	2020	2020	Sum4all	https://www.sum4all.org/gra-tool/country-performance/global	2015-2019
GN2	2016-2020	2020	IRENA and WB data	https://www.irena.org/Statistics/View-Data-by-Topic/Renewable-Energy-Balances/Country-Profiles	-

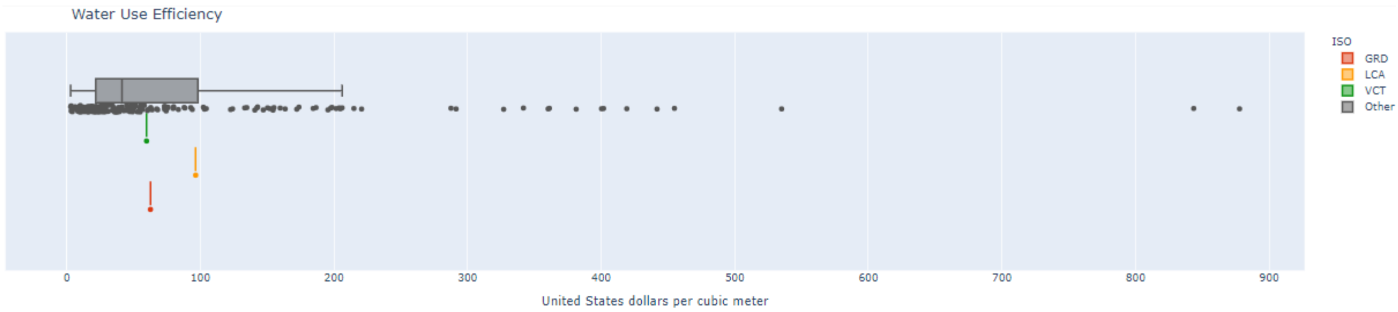
Codes	Available data	Baseline data*	Data downloaded source	Website	Year(s) imputed for 2021 Index (only consider years between 2015 and 2020)
GT1	2000-2019	2019	UN COMTRADE data and OECD and APEC classifications of environmental goods	https://comtrade.un.org/data/	2020
GT2	2014-2018	2018	FAO	http://www.fao.org/faostat/en/#data/FBS	2019, 2020
GV1	2000-2020	2020	UNSTATS_AND_ WB data	https://unstats.un.org/sdgs/indicators/database/ https://api.worldbank.org/v2/country/all/indicator/?indicator=NY.GDP.MKTP.CD	-
GV2	1996-2019	2019	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=GB.XPD.RSDV.GD.ZS	2020
GV3	2000-2019	2019	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2020
AB1	2000-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	-
AB2	2020	2020	Sum4all	https://www.sum4all.org/gra-tool/country-performance/global	2020
GB1	2000-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	-
GB2	1971-2020	2020	WB WBL	http://wbl.worldbank.org/en/reports	-
SE1	1990-2020	2020	WB data	https://api.worldbank.org/v2/country/all/indicator/?indicator=SI.DST.10TH.10 https://api.worldbank.org/v2/country/all/indicator/?indicator=SI.DST.02ND.20 https://api.worldbank.org/v2/country/all/indicator/?indicator=SI.DST.FRST.20	-
SE2	2000-2019	2019	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2020
SP1	1990-2015 5years interval	2015	GHDx	http://ghdx.healthdata.org/	2016-2020
SP2	1990-2020	2020	UNSTATS	https://unstats.un.org/sdgs/indicators/database/	2016-2019

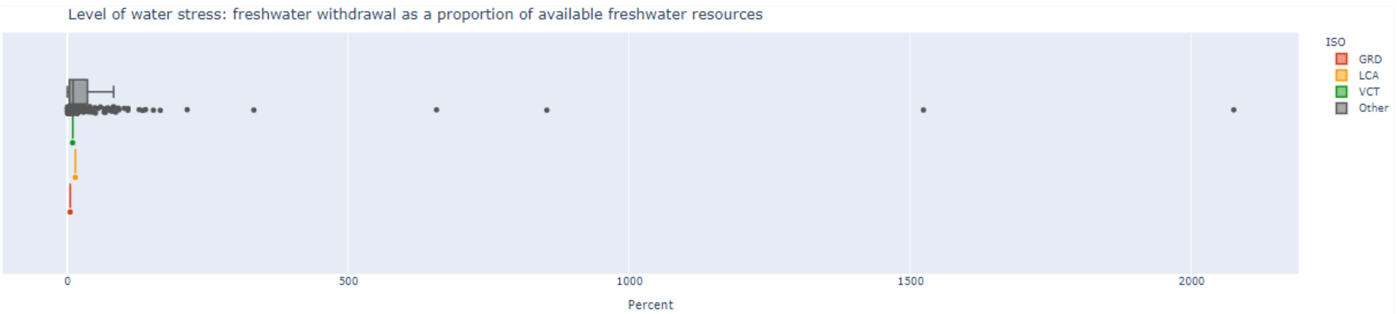
**The last year for which data is available for the indicator*
Legend:
EE1 - Energy intensity level of primary energy (MJ per GDP); EE2 - Share renewable to total final energy consumption (Percent); EW1 - Services water use efficiency (U\$/m^3); EW2 - Share freshwater withdrawal to available freshwater resources (Percent); SL1 - Soil nutrient budget (Kilogram nitrogen per hectare); SL2 - Ruminant livestock number to total agricultural area, density (Percent); ME1 - Ratio total agricultural water managed area and total agricultural area (Ratio); ME2 - Share food waste to total food consumption (Share)
EQ1 - PM2.5 air pollution, mean annual population-weighted exposure (Micrograms per m^3); 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); GE1 - Ratio CO_2 emissions incl LUCF to population (Tons per capita); GE2 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population (CO_2e Tons per capita); GE3 - Ratio non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population (CO_2e Tons per capita); BE1 - Average proportion of Marine, Freshwater/Terrestrial, and Mountain 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); 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)
GJ1 - Unemployment with advanced education (% of total labor force with advanced education); GJ2 - Vulnerable employment, total (% of total employment); GN1 - Green Mobility in sustainable transport (Score); GN2 - Installed renewable electricity-generating capacity (watts per capita); GT1 - Share export of environmental goods (OECD and APEC class.) to total export (Percent); GT2 - Share of fish exports to domestic consumption (higher value less sustainable); GV1 - (a) International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems (millions of constant United States dollars) [Note: only for developing countries] and (b) Research and development expenditure as a proportion of GDP (Percent) [Note: only for developed countries]; GV2 - Proportion of population covered by at least a 2G mobile network (%)
AB1 - Proportion of population using basic drinking water services, basic sanitation services, and with access to electricity and clean fuels/technology (Percent); AB2 - Universal access - sustainable transport (Score); GB1 - Proportion of seats held by women in national parliaments (Percent); GB2 - Getting paid, laws and regulations for equal gender pay (Score); SE1 - GNI per capita, PPP (current international \$); SE2 - Proportion of population with access to electricity, by urban/rural (Percent); SP2 - Universal health coverage (UHC) service coverage index (Index); SP3 - Proportion of urban population living in slums (Percent)

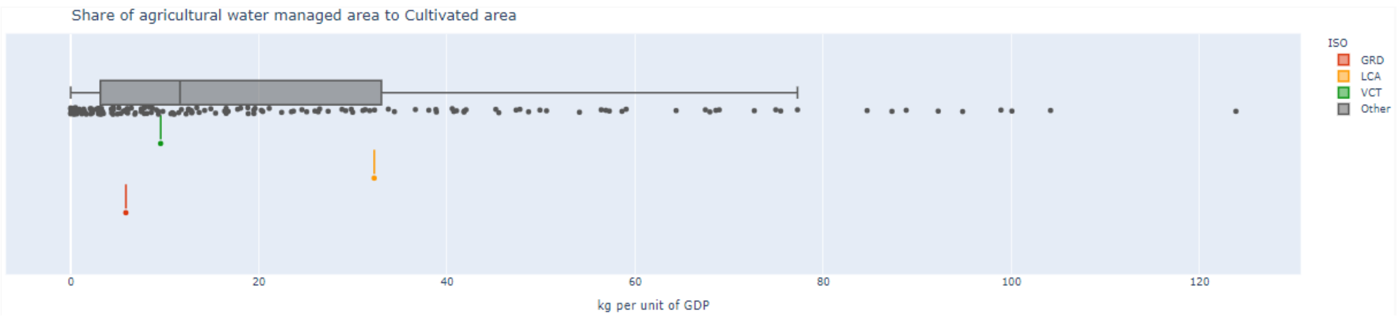
Appendix 2 Outliers identified for the green and blue growth indicators

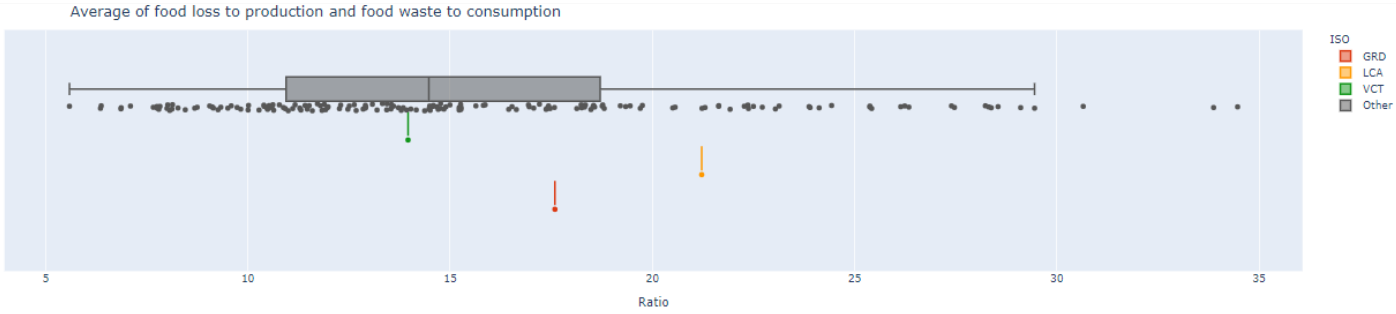
Efficient and Sustainable Resource Use

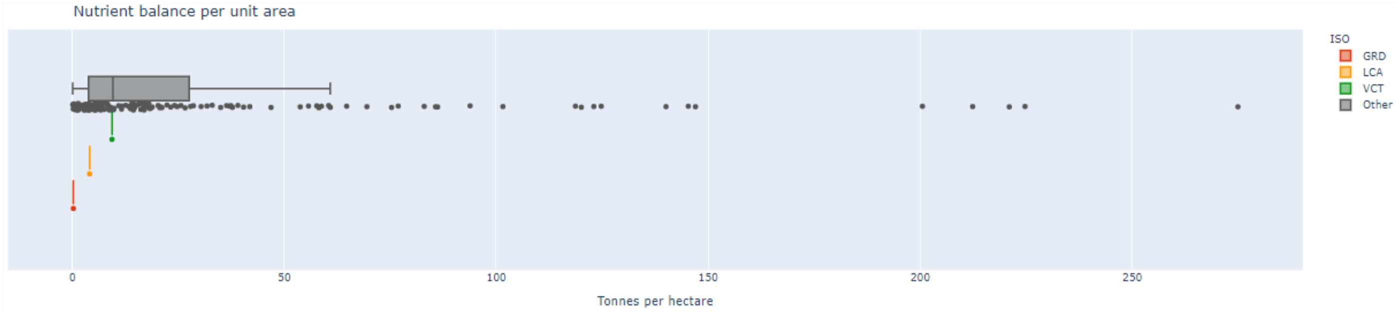


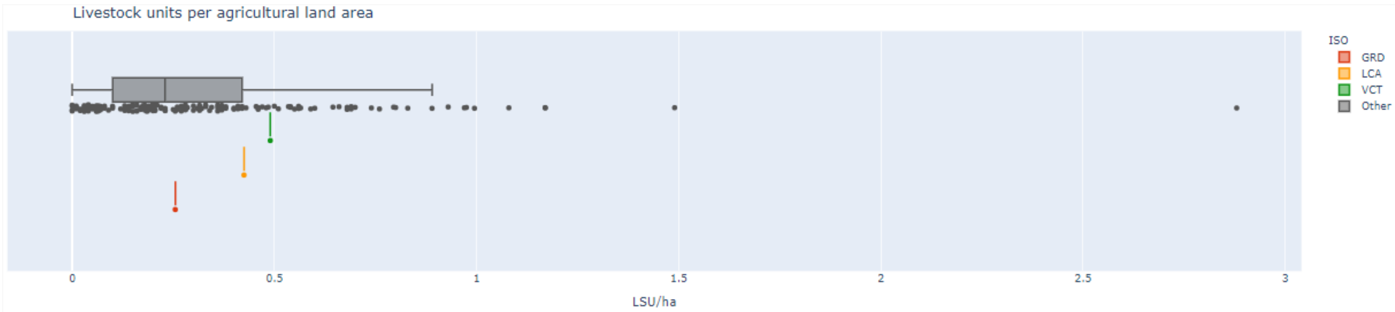




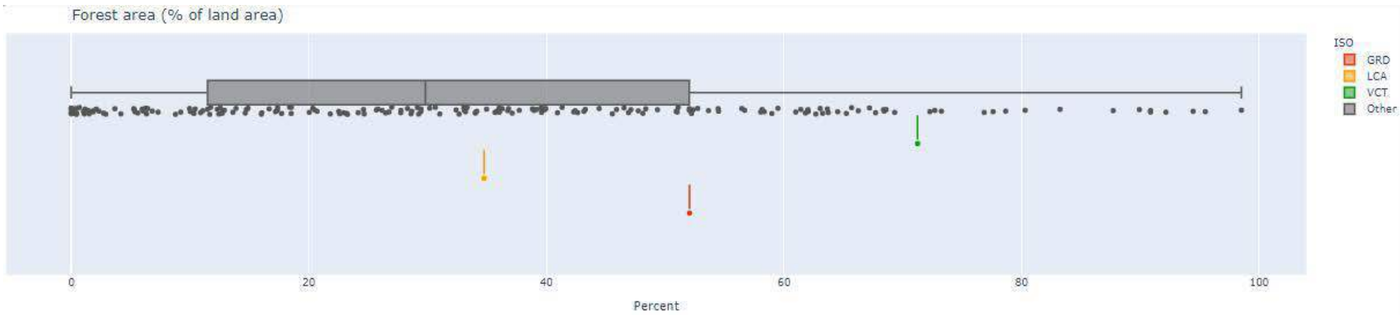


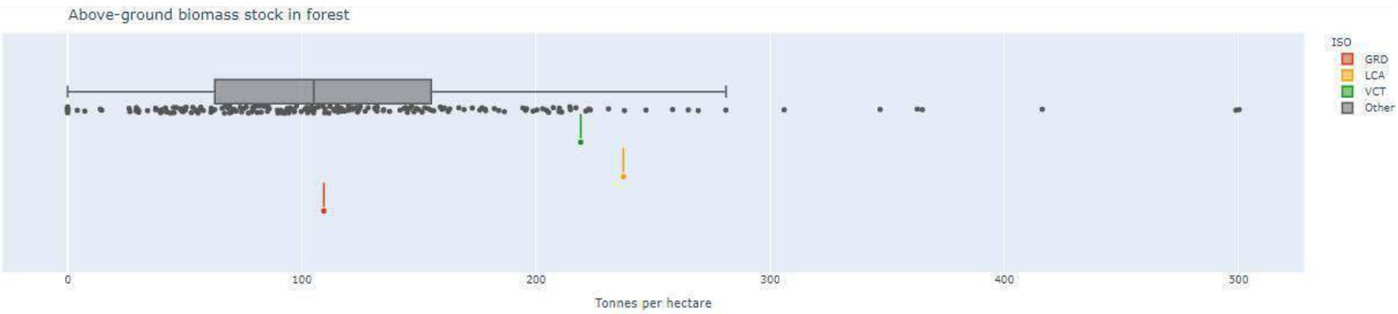


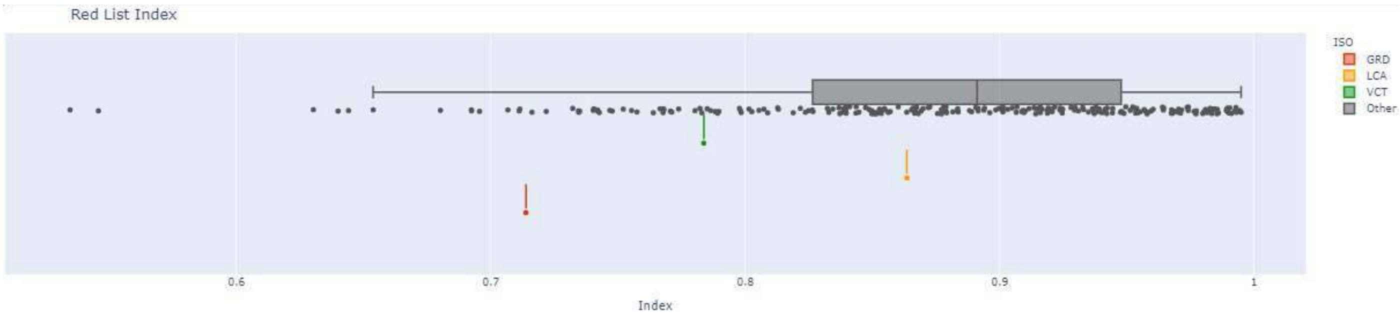


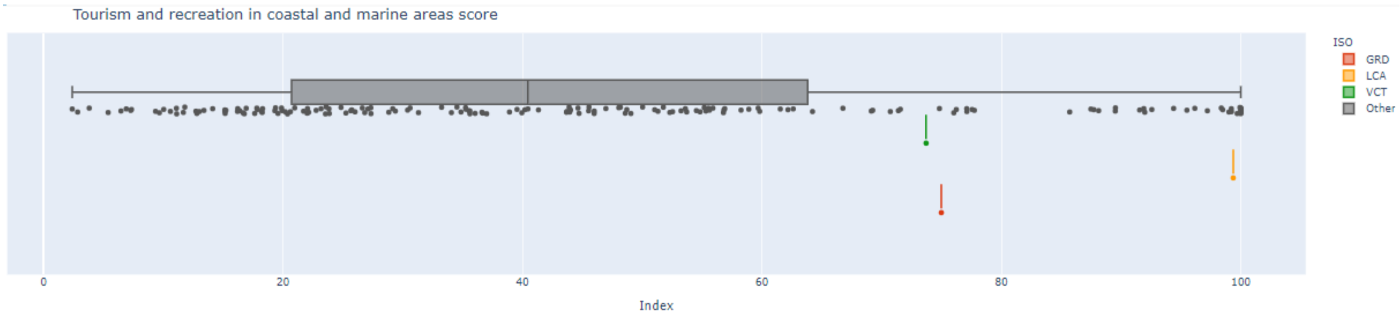


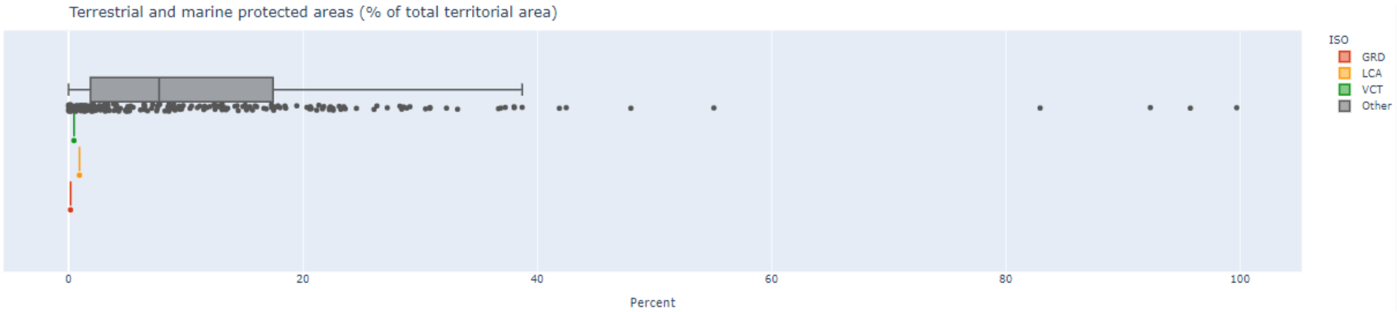
Natural Capital Protection

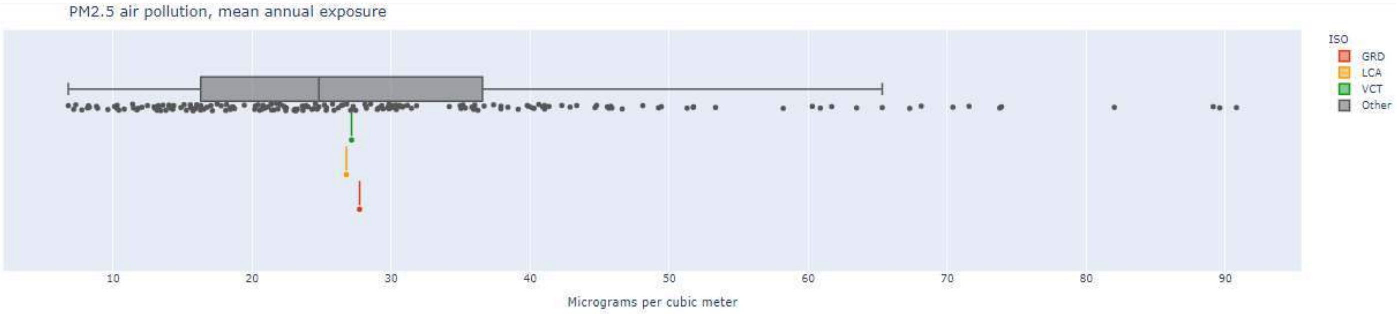





Red List Index
ISO
GRD
LCA
VCT
Other
0.6
0.7
0.8
0.9
1
Index

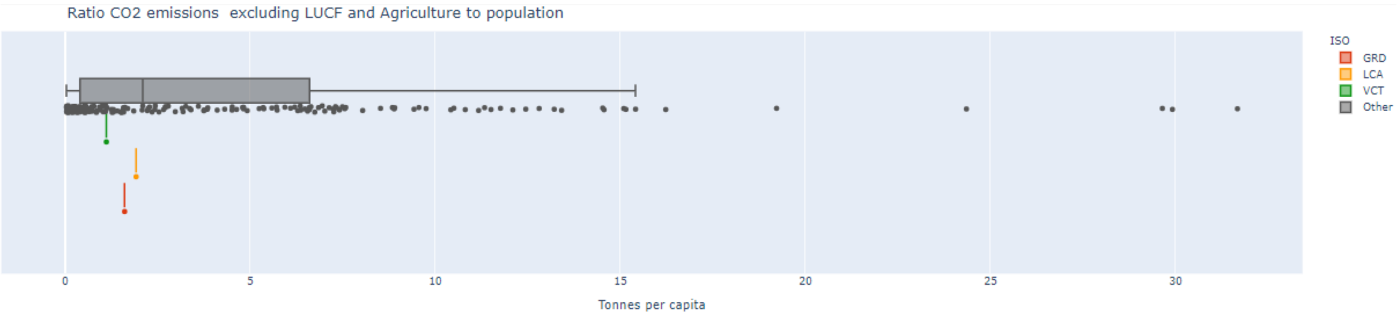

Tourism and recreation in coastal and marine areas score
ISO
GRD
LCA
VCT
Other
0
20
40
60
80
100
Index

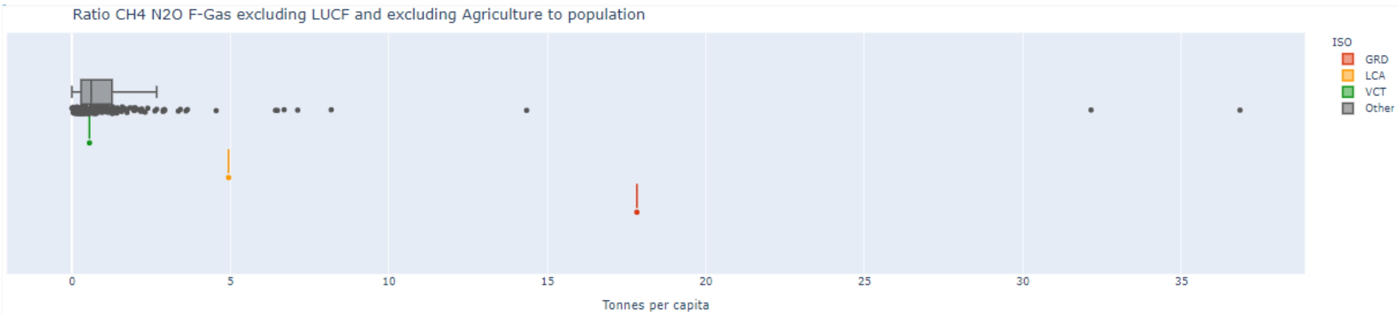

Terrestrial and marine protected areas (% of total territorial area)
ISO
GRD
LCA
VCT
Other
0
20
40
60
80
100
Percent

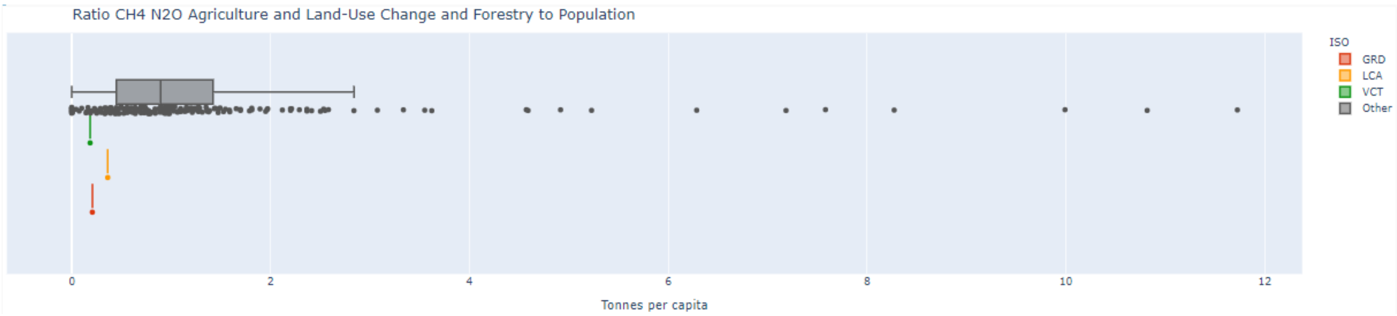

PM2.5 air pollution, mean annual exposure
ISO
GRD
LCA
VCT
Other
10
20
30
40
50
60
70
80
90
Micrograms per cubic meter

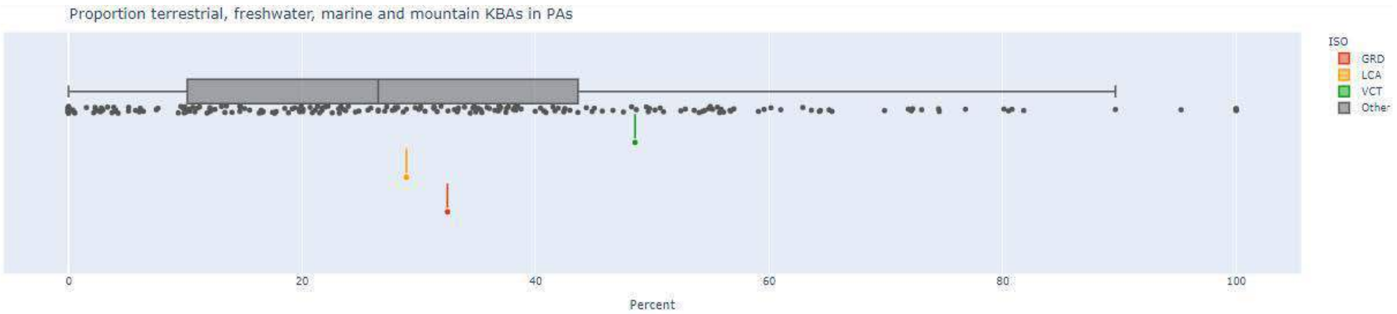

DALYs (Disability-Adjusted Life Years), Rate, Age-standardized, Unsafe water source
ISO
GRD
LCA
VCT
Other
0
2k
4k
6k
8k
10k
12k
14k
16k
18k
Age-standardized Disability-Adjusted Life Years lost per 100,000 persons


Municipal solid waste (MSW) generation per capita tons per capita
ISO
GRD
LCA
VCT
Other
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Tonnes per capita

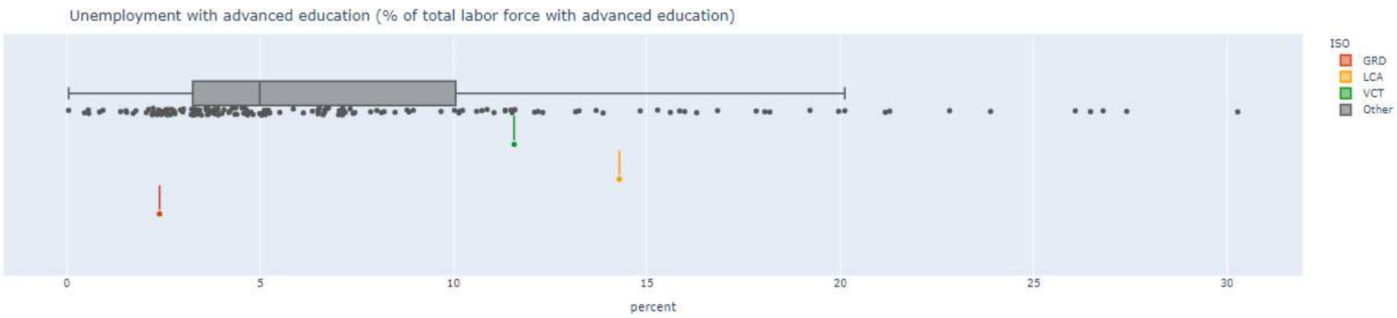

Ratio CO2 emissions excluding LUCF and Agriculture to population
ISO
GRD
LCA
VCT
Other
0
5
10
15
20
25
30
Tonnes per capita

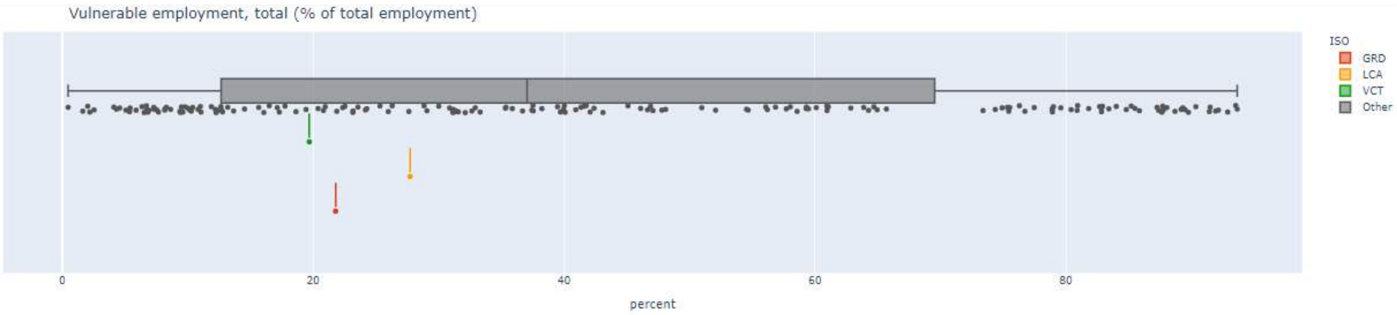

Ratio CH4 N2O F-Gas excluding LUCF and excluding Agriculture to population
ISO
GRD
LCA
VCT
Other
0
5
10
15
20
25
30
35
Tonnes per capita

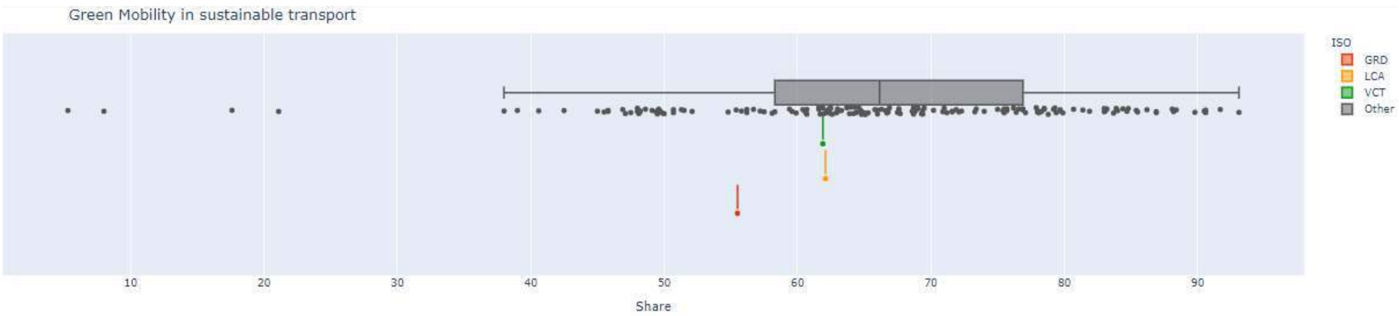

Ratio CH4 N2O Agriculture and Land-Use Change and Forestry to Population
ISO
GRD
LCA
VCT
Other
0
2
4
6
8
10
12
Tonnes per capita

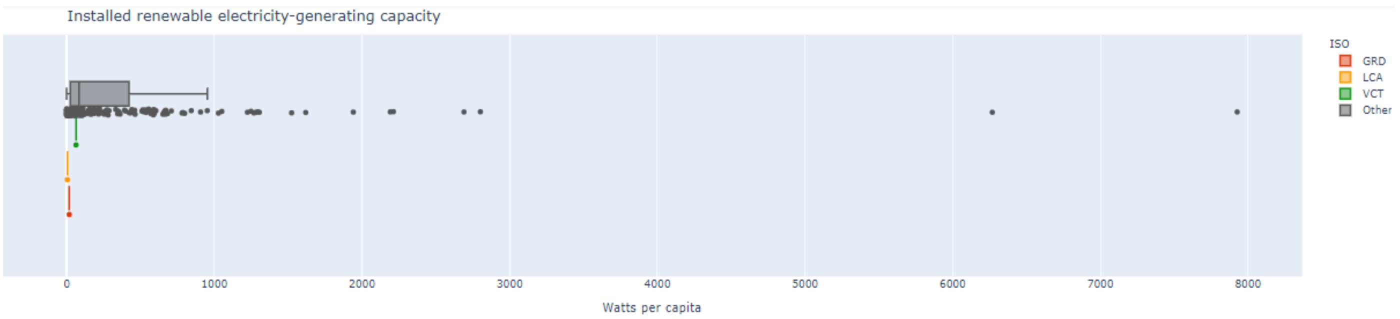

Proportion terrestrial, freshwater, marine and mountain KBAs in PAs
ISO
GRD
LCA
VCT
Other
0
20
40
60
80
100
Percent

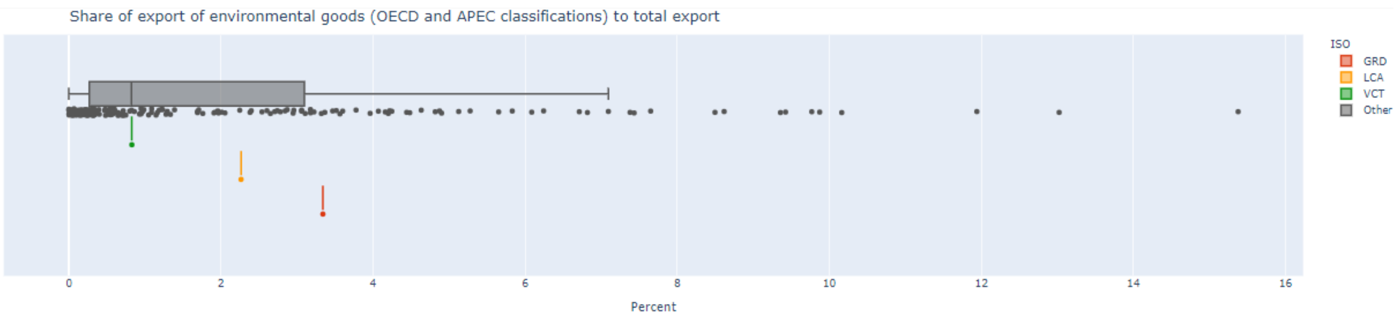
Green-Blue Economic Opportunities

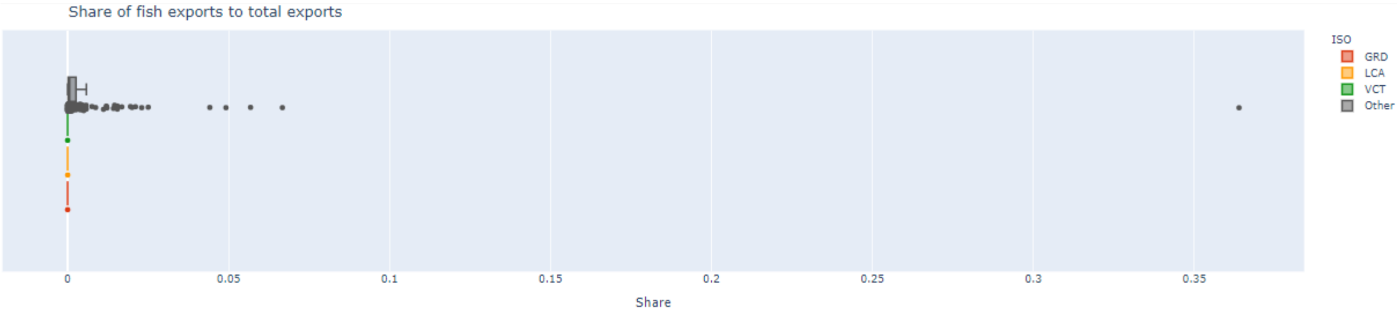


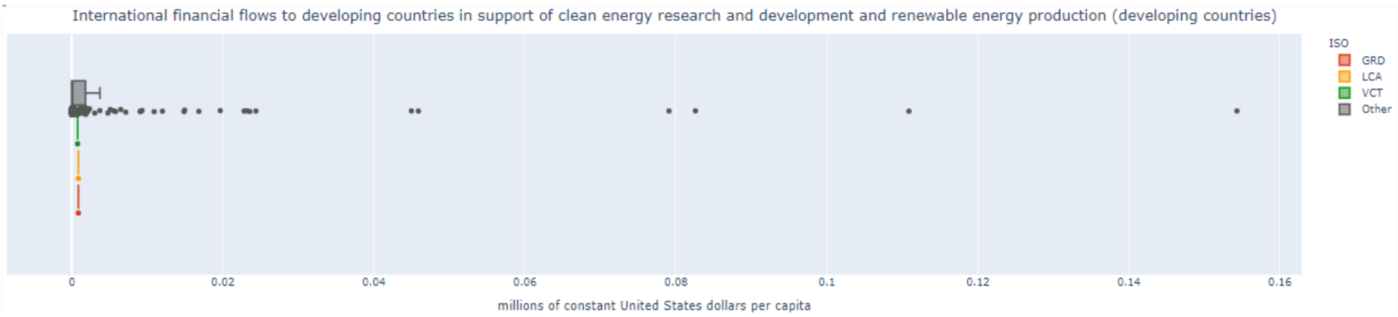


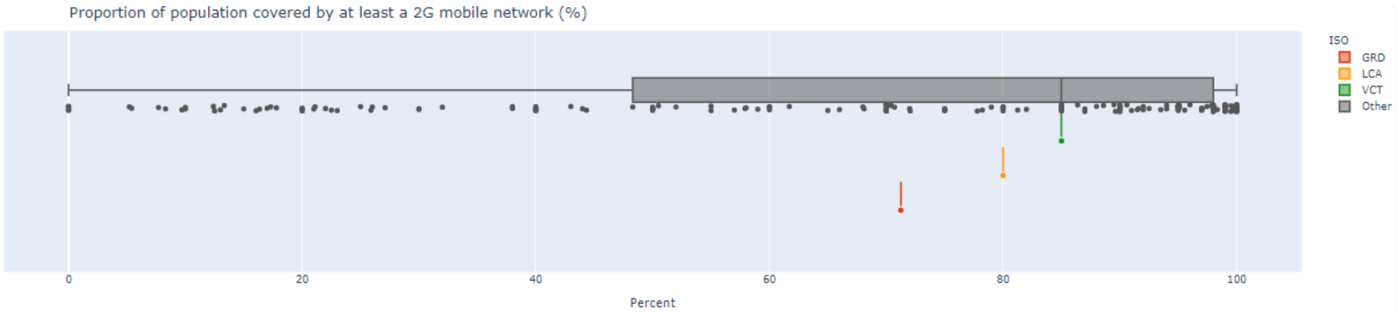




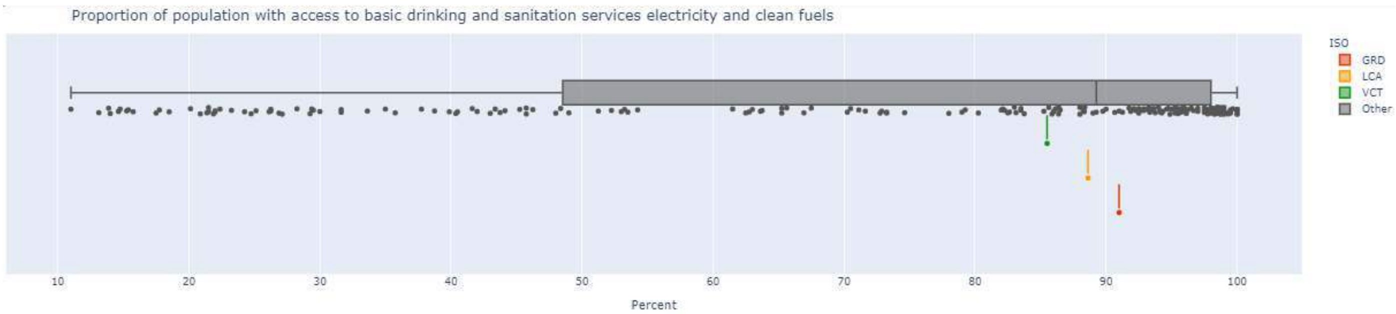


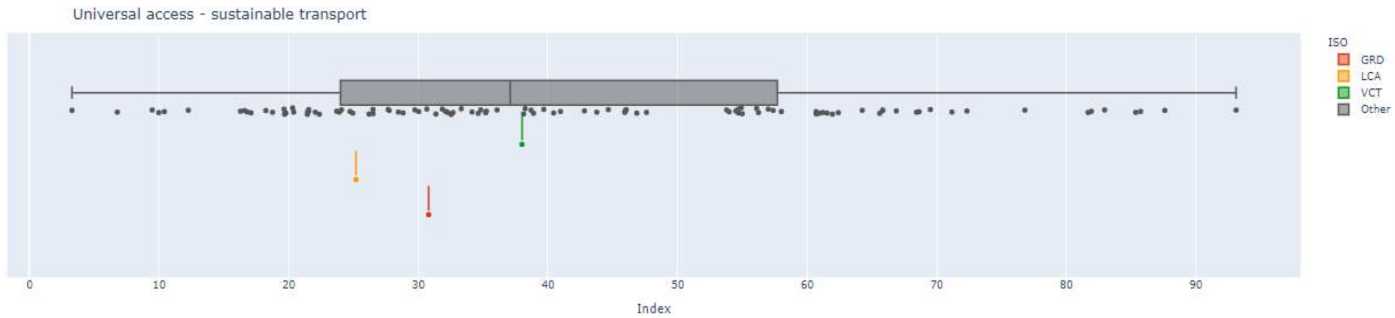


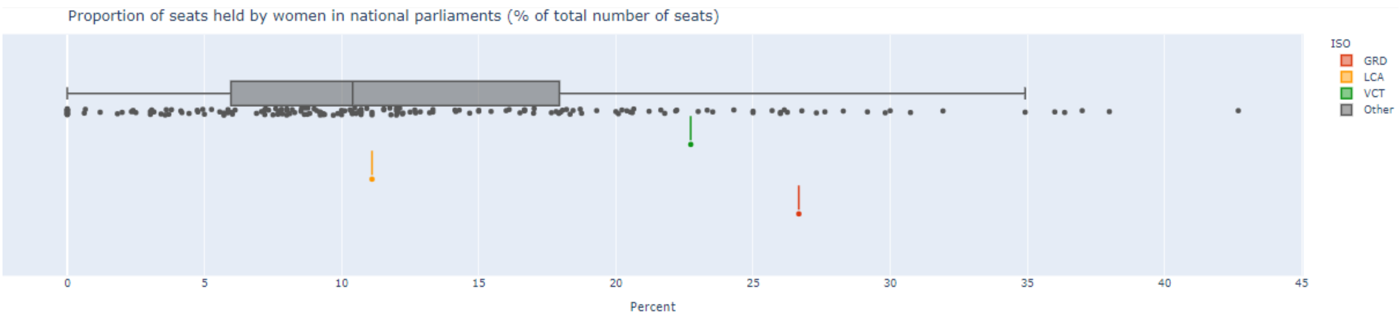


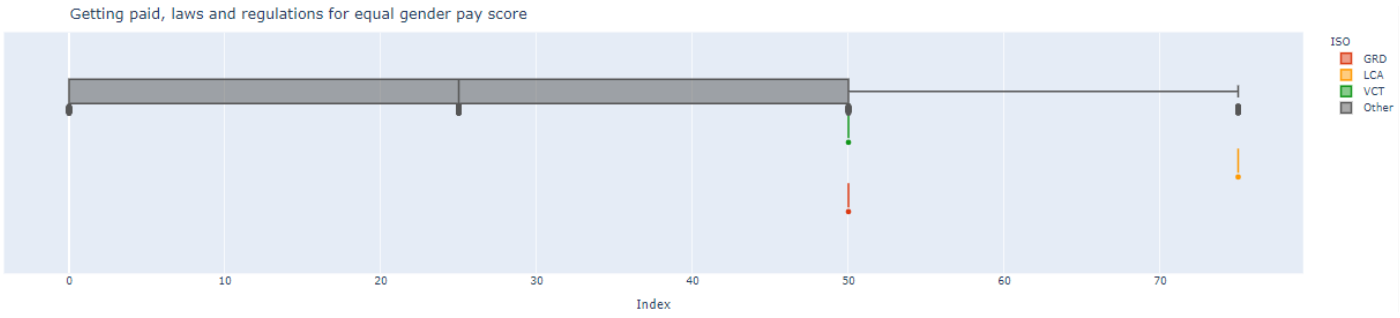


Social Inclusion

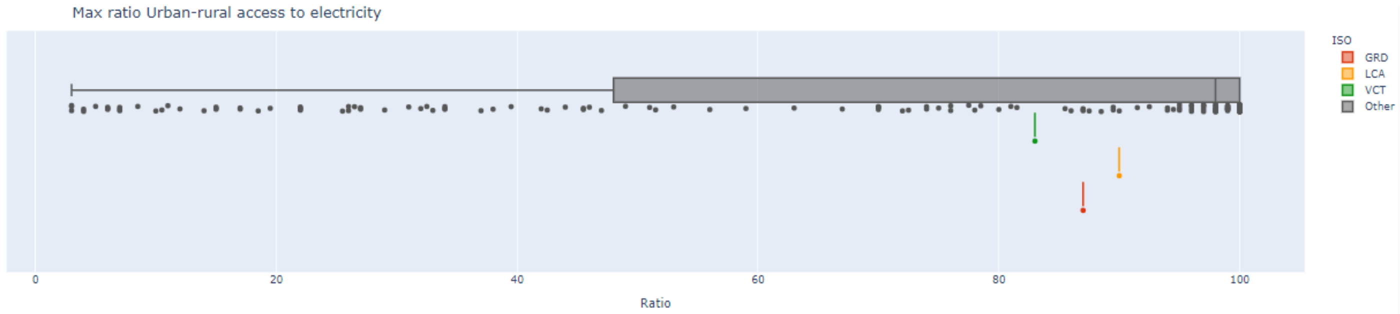


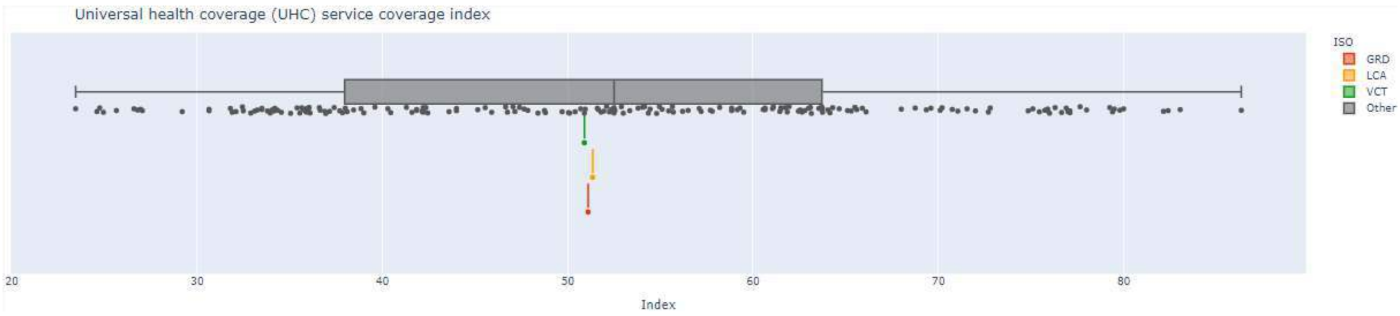


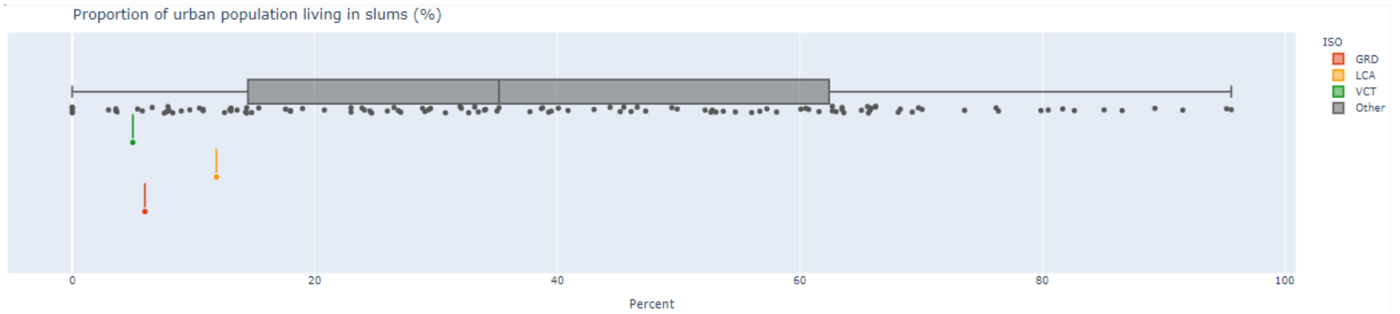



Getting paid, laws and regulations for equal gender pay score
ISO
GRD
LCA
VCT
Other
0
10
20
30
40
50
60
70
Index


GNI per capita, PPP (current international $)
ISO
GRD
LCA
VCT
Other
0
20k
40k
60k
80k
100k
Dollars


Max ratio Urban-rural access to electricity
ISO
GRD
LCA
VCT
Other
0
20
40
60
80
100
Ratio


Universal health coverage (UHC) service coverage index
ISO
GRD
LCA
VCT
Other
20
30
40
50
60
70
80
Index


Proportion of urban population living in slums (%)
ISO
GRD
LCA
VCT
Other
0
20
40
60
80
100
Percent

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