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Global blue economy governance – A methodological approach to investigating blue economy implementation

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The proliferation of the blue economy in political discourse has gained traction in recent years, however, there remains no standardized definition. The triple bottom line goals of economic development, social equity, and environmental conservation are at the center of the blue economy vision. Yet the ambiguities surrounding the term have resulted in considerable variation in how the blue economy is implemented and what is prioritized. This paper takes a global snapshot of current approaches to national level blue economy governance. In doing so this paper provides the first global assessment of blue economy implementation approaches, through the development of a global blue economy database. Using the best available information from policy documents, media releases and other publicly available online information, we comparatively analyzed each country's governance strategy to assess the level of blue economy development in coastal states around the world. Throughout this paper we outline the novel methodological approach we took in order to develop a tool for analyzing national level blue economy implementation on the global scale. This approach will allow for ongoing and continued analysis of blue economy operationalization as the concept continues to evolve.

KEYWORDS

blue economy, governance, policy, implementation, methodology, operationalization

Introduction

The blue economy has gained traction in international and regional discourse and governance throughout the past decade (Mohanty et al., 2015; OECD, 2016; Patil et al., 2016; Mulazzani and Malorgio, 2017; Bennett et al., 2019). Despite the prominence of the term in international and national fora and programs (Bank, W2017; FAO, 2017; Nations, U, 2022a), the blue economy as a concept remains poorly defined and largely under implemented at a national level (Voyer et al., 2022). This renders the blue economy at risk of becoming a political tool rather than a tool to achieve practical objectives and advance ocean health, economic development, and social equity (Brent et al., 2020; Fabinyi et al., 2021; Louey, 2022). Given the increasing urgency of addressing the decline in ocean health, and the continued growth of ocean industries, translating high level conceptualizations of the blue economy into operational implementation and reviewing this implementation for future adaptation should be a high priority.

This paper is primarily concerned with the development of a practical assessment tool of blue economy implementation. The conceptual approach of developing a methodology to assess the extent and substance of blue economy implementation globally is grounded in the review of current literature on what should constitute a blue economy with consideration of the inclusion of triple bottom line objectives (environmental, economic, and social). This approach also recognizes the fundamental importance of governance to achieving sustainable development (Foley et al., 2020; Parlee et al., 2021; Stephenson et al., 2021), by embedding an assessment of governance arrangements within the methodological design. Governance is widely recognized as a critical component of sustainable development, and in some instances is nominated as a fourth pillar of sustainability (Foley et al., 2020; Parlee et al., 2021). Whilst governance encapsulates a broad diversity of formal and informal mechanisms aimed at enabling, supporting, or leading sustainability outcomes, in practice it remains a complex concept (Stephenson et al., 2021). For the purposes of this research, we have focused primarily on formal government interventions as a key component of governance more broadly.

Accordingly, the methodology proposes three criteria of blue economy development: evidence of policy development, integration of economic, social, and environmental dimensions of sustainable development, and assessment of the degree of implementation. We focus on enabling conditions such as governance arrangements, tools, plans, and financial mechanisms as evidence of implementation (Cisneros-Montemayor et al., 2021). Finally, we use case studies to test the effectiveness of the methodology. We also present preliminary results on the global status of blue economy implementation at the national level. The following sections outline the three criterion of blue economy development.

Policy development

One of the accepted first steps in developing and implementing a blue economy is to create governance arrangements to support it. There is no clear "standard" of blue economy governance at present (Voyer et al., 2022). However, a clear articulation of the blue economy, including the sectors which fall within it, and the development of a blue economy policy that is embedded within existing governance arrangements are important components of a blue economy in operation (Voyer et al., 2021a).

At the most fundamental level this may simply involve a national level commitment to the development of a blue economy through political statements, or through becoming signatory to regional or international commitments related to the blue economy, such as the recent ASEAN Leaders Declaration on the Blue Economy (ASEAN, 2021). Global and regional agreements, guidelines and discussions provide important drivers and context for blue economy planning at a national scale, as well as advancing efforts to harmonize blue economy efforts across international borders. For example, organizations such as WWF (2015) and UNEP (Vestergaard, 2022) have put forward high level guidelines outlining how the blue economy might be defined and implemented and there have been further calls for international guidelines or agreements (Bennett et al., 2019). However, while regional or international governance can be a driver of the operationalization of a blue economy, there are often barriers at a national level that can impact the level of meaningful implementation. Keen et al. (2018) argue that:

'External influence, often through regional and international roadmaps and policies, can help guide the development of a Blue Economy, but achieving sustainability still depends on national commitment, cultural fit, relevant capacity, and policies. A considerable degree of change and political commitment can be required to develop and implement regional policies at a national or local level'.

The translation of political statements or commitments at international forums into national level action is therefore a significant contribution towards ensuring that a blue economy is developed in a contextually sensitive way, consistent with national level priorities, culture and capacity (Voyer et al., 2021a). This might include incorporation of blue economy objectives into established policy or the development of a dedicated blue economy policy, plan, or strategy.

Integration of economic, social, and environmental dimensions of sustainable development

Despite numerous efforts to define a blue economy (Mohanty et al., 2015; Silver et al., 2015; Smith-Godfrey, 2016;

Voyer et al., 2017; Kildow, 2021; Martínez-Vázquez et al., 2021) there are ambiguities surrounding the term. This has ensured that there is considerable difference not only in the way that the blue economy is conceptualized, but in how it is implemented and what is prioritized (Voyer et al., 2018). Despite these differences, most blue economy definitions incorporate, at a minimum, a consideration of social, environmental, and economic objectives. For example, the World Bank defined the blue economy as '*the sustainable use of ocean resources for economic growth, improved livelihoods and jobs while preserving the health of the ocean*' (Bank, W, 2017). Keen et al. (2018), show that at its core the blue economy concept should '*aim to balance sustainable economic benefits with long term ocean health in a manner which is consistent with sustainable development and commitment to intra and inter-generational equity*'. Any definition or articulation of a national level blue economy approach must therefore include social, economic and environmental dimensions of sustainability at a minimum (Bennett et al., 2019). The integration of economic, social, and environmental dimensions is consistently recognized as critical to sustainable development across all UN Member states (Sachs et al., 2022) and would align blue economy governance with the UN Sustainable Development Goals (SDGs) as well as the work by the High-Level Panel for a Sustainable Ocean Economy (Stuchtey et al., 2020; Winther et al., 2020).

Whilst the blue economy has largely been accepted as a model for advancing 'triple bottom line' objectives, in practice there have been growing critiques that it is in danger of failing to adequately deliver on these objectives outside of economic development (Childs and Hicks, 2019; Cisneros-Montemayor et al., 2019; Brent et al., 2020; Cisneros-Montemayor et al., 2021). Without attention to how all three pillars of sustainability are being embedded within blue economy governance, the success of the blue economy in achieving the triple bottom line objectives will be impacted. As such objectives need to be matched with practical, time bound and funded actions or targets with accountability mechanisms such as monitoring and reporting to ensure sustainability ambitions are realized.

Implementation of the blue economy

As this paper is concerned with methodological approaches to assessing the implementation of the blue economy, it is critical to understand what implementation involves. The availability of natural capital is not a sole factor that impacts the countries' capacity to develop their blue economy, but other factors such as socio-economic conditions and governance capacity are critical (Cisneros-Montemayor et al., 2021). Strategies for implementing the blue economy across government and non-government sectors include dedicated governance structures that provide for whole-of-government institutional coordination and policy coherence, financing, monitoring, reporting and the development of operational plans for key strategic priorities such as communication, capacity building, financial accountability, stakeholder involvement and public-private partnership (Winther et al., 2020). Obtaining finance and investment in relation to activities that are relevant to ocean sectors is further evidence of implementation of a blue economy (Benzaken and Hoareau, 2021; Voyer et al., 2021a).

Current methods to assess blue economy development

At present there is no consistent and easily comparable approach to assessing the different means and approaches of blue economy development and implementation. Against such backdrop, this paper seeks to develop a method that allows us to assess the level of institutionalization and implementation of the blue economy at a national level, on a global scale. Understanding the ways in which (and the extent to which) the blue economy has been implemented at the national level and recognizing the trends for different levels implementation and operationalization is becoming increasingly important, as the concept continues to grow in popularity and the pressures on the world's oceans become increasingly apparent (IPCC, 2019). Our research contributes to this by providing a global snapshot of the 'state of play' of the real-world application of the blue economy.

Other methodological tools have been developed to assess other aspects of the blue economy. For example, Voyer et al. (2022) looked at the level of blue economy institutionalization in Commonwealth countries. Their work examined different facets of the blue economy in operation to from an understanding of governance, as well as priority sectors throughout the Commonwealth with a focus on alignment to SDGs and the Commonwealth Blue Charter. Although there is no universal definition of governance, it encompasses concepts, practices, policies, and institutions by which societal development is overseen (Rudolph et al., 2020). For this paper, the focus is on aspects of governance which enables blue economy implementation and are commonly accepted in international sustainable development contexts, including SDG 16 (transparent and accountable institutions) and SDG 17 (institutional coordination and policy coherence). Additionally, Cisneros-Montemayor et al. (2021) used available global data to quantify and map the capacity of countries to develop a blue economy. Their assessment was based on not only resource availability but also enabling conditions—namely social equity (such as human rights and gender equity), environmental sustainability, and economic viability (such as infrastructure and investment opportunity). Although similar in scope to this research, the study by Cisneros-Montemayor et al. (2021) assessed a country's capacity to establish a blue economy. Our research complements this work, by looking at what countries

have actually done in terms of establishing and implementing the blue economy.

A classification tool, *the Blue Economy Development Index*, has also been developed by Adrianto et al. (2019) to assess the level of development of the blue economy in archipelagic and island states. This tool was developed in recognition of the need to track and monitor the use of marine resources in relation to sustainability and looks at the degree of importance of the blue economy to a particular jurisdiction. In doing so it looks at ocean capital (such as the quality of the resources) and enabling factors (such as governance and technology). It also examines the degree of impact of the blue economy on each jurisdiction. This is measured through social and economic capital, which involves inclusivity and equity, and sustainable growth which focuses on the employment rate, income distribution and the ocean economy (Adrianto, 2022). A cumulative score is then given to each country based on these factors to determine the level of blue economy development. The *Blue Economy Development Index* is particularly interested in how ocean resources are being used in relation to the blue economy. The model that we put forward draws on the work done by Adrianto et al. (2019) and Cisneros-Montemayor et al. (2021), but focuses on the level of engagement, policy development and operationalization of a sustainable blue economy (that is, one incorporating social, environmental, and economic dimensions) from a governance perspective. It is intended to be a simple and practical method by which to compare and analyze national approaches on a global scale.

In the next section, we outline the methodology that we employed to develop a system of categorization by which to assess the level of global blue economy implementation. The methodological approach advances current approaches to assessing blue economy implementation and operationalization. This method was tested through its application to a global assessment of national level blue economy implementation, and further explored through detailed case studies of four national responses to the blue economy.

Method

Building on the previous analysis of blue economy development in Commonwealth countries by Voyer et al. (2022), as well as the work by Adrianto (2022) and Cisneros-Montemayor et al. (2021), we developed a methodology by which to assess and categorize the level of blue economy development at a national level. This methodology relies on two schemes: the development of a global blue economy database; and the creation of a categorization tool. An overview of our approach can be seen in Figure 1 and will be described in detail in the following sections.

Developing the Global Blue Economy Database

The Global Blue Economy Database (GBED) is a collation of country by country publicly available information that details each country's blue economy activities across a range of areas such as policy, governance, sector-based activities, international engagement, planning and finance. The first step to develop the database was to group all UN member states into five regional groups based on the classifications used by the UN Department for General Assembly and Conference Management (DGACM)

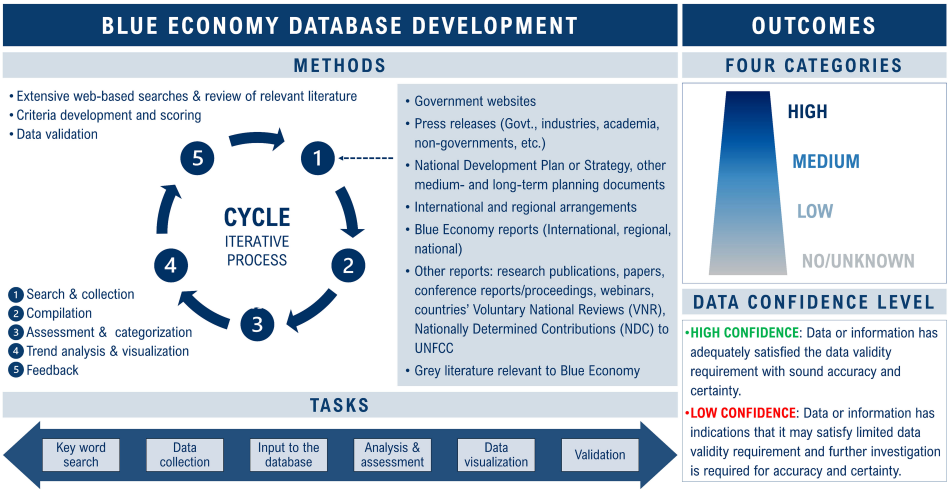


FIGURE 1
Description of the methodology.

(Nations, U, 2022b). Each state was then classified as either coastal or non-coastal. We included information on the size of the Exclusive Economic Zone (EEZ) and development status (developed, developing, least developed country), based on data from the United Nations Commission on Trade and Development (UNCTAD) (UNCTAD, 2022). This information was included as a way to identify potential trends of the Blue Economy in relation to capacity.

We then conducted a desktop review of the available web-based information to gather data on the blue economy in each of the 193 UN member states. This was initially undertaken using a key word search, which included terms such as 'blue economy' and 'blue economy policy' and related terms such as 'blue growth', 'ocean economy', 'ocean policy' 'maritime economy', 'maritime policy' 'marine economy' and 'marine policy'. The key word search was not limited to 'blue economy' as we felt that this may limit the inclusion of countries that do not explicitly use the term in relevant plans or policies. This inclusive approach to key words was chosen to reflect a range of different articulations of the blue economy concept in different countries. Data and information were included in the database if they were: a whole of government plan, policy, or strategy; incorporated clear sustainability objectives; and related to affairs relating to coasts and oceans at a national scale including land-based policies with a marine component such as an initiative to reduce marine pollution. On the other hand, the database does not consider any land-based policy in the absence of its relevancy to the ocean, for example terrestrial renewable energy; and a plan or policy that is focused on a sub national scale or developed by non-government actors, unless this was done so on behalf of, or endorsed by the national government. Using this approach, we were able to collate information on national ocean initiatives and governance relevant to their blue economy.

The web-based search also targeted publications on blue economy from a national perspective, including policy documents, official press releases and reports. For example, Blue Economy reports such as Partnerships in Environmental Management for the Seas of East Asia -National State of Oceans and Coasts - Blue Economy Growth (PEMSEA-NSOC), the World Bank Blue Economy related reports (2019-2022), and the annual EU Blue Economy Report were examined. Other relevant information that detailed or informed blue economy development also included research publications, papers, conference reports/proceedings, webinars, the Voluntary National Reviews on the Implementation of the 2030 Agenda, (VNRs), Nationally Determined Contribution to the United Nations Framework Convention on Climate Change/UNFCC (NDCs), national development plans or strategies, as well as other medium and long-term planning documents, and whenever accessible, grey literature relevant to countries' blue economy status. In the absence of specific blue economy information, these documents can provide useful information on the progress of national development relating to oceans and coasts—for example VNR reports can shed light on the implementation of SDG 14 at a national level.

Information was compiled for each country based on relevant topics which represent blue economy development and operationalization at the national level. These include specific information on the existence of a blue economy policy, plan, or strategy; institutional frameworks; financial resources; action plans; international engagement with blue economy activities; alignment of blue economy objectives to SDGs; and other examples of engagement with blue economy activities that promote accountability, transparency and coherence in sustainable financing mechanism (UNEP, 2018; Blasiak et al., 2019; Bank, W, 2021). These topics are often considered relevant for good governance, including indicators developed by the World Bank (Kaufmann et al., 2010), the OECD indicators for policy coherence (OECD, 2019), and the 11 principles for effective governance for sustainable development adopted by UN Economic and Social Council in 2018 (Committee of Experts on Public Administration, 2018).The information complied becomes illustrative of the criteria that we develop for categorization. This process of information gathering allowed us to gradually populate the GBED with adequate information that enabled us to conduct the assessment process. We adopted a 'more is more' mindset and were not restrictive in the information that we included. We worked out what information was relevant to our approach as we developed the categorization tool. Following this, we undertook a country-by-country assessment using criteria for categorization (outlined below) which allowed for the identification of the level of blue economy development in each UN Member state. Accordingly, through a process of data visualization we were able to conduct trend analysis by examining patterns of commonality and difference between countries and regions. We also held a series of workshops with the research team (the authors of this paper) to refine the objectives of the database and to develop the criteria for classification.

These steps follow an iterative process that can be repeated over time to refine, validate, and update the information in the GBED. At the time of preparing this paper, we have completed at least two cycles of database assessments and updates. This iterative approach to the methodology is effective given the rapidly changing status of blue economy development globally (Guerreiro, 2021). The open-ended nature of the methodology is an invitation to a participatory approach to developing a global database that could be further facilitated through an online platform similar to that of the SDG Dashboard (Sachs et al., 2022).

Rationale for the blue economy criteria for categorization

At the heart of this assessment process is a categorizing tool—in the form of criteria and a related scoring table—that

enables the identification and classification of the level of progress of blue economy development. Based on the scores achieved in relation to these criteria, we place each country into one of four categories: *High, Medium, Low, No/Unknown* Countries are placed into the 'unknown' classification when sufficient data or information cannot be found or is inaccessible (including when the information is not available in English). This method of categorization is not intended to provide a rigid or fixed mark on a country's blue economy development status, but it is indicative of best estimate value along a continuum of blue economy development level.

As this study is based on the availability of web-based data and information (in English) we recognize that there are limitations on the completeness, accuracy, and reliability of current information. However, we have addressed this limitation by labelling the data and information collected into two data confidence levels: high and low. When relevant information appears to be lacking or is not publicly available or available in English, we argue that it shows limited data validity and label it as low confidence. Information is classed as high confidence where it is readily available from a reputable source such as Government, the United Nations, or World Bank websites. In order for low confidence data to be classed as high confidence, further investigation to confirm the accuracy of the information would be necessary. We recognize that this is a continually evolving area, particularly in relation to governance. As such, the database and categorization tool that we have developed is the first step in creating an open-ended platform that can be updated iteratively.

The development of the criteria was a central component of this methodological approach as it was through this method that we were able to construct a way to assess the level of blue economy development in each country. To enable analysis and assessment of the countries on the global blue economy database we developed a set of criteria as shown in Figure 2.

Before explaining the scoring for each criterion, it is important to note that a Score of 0 in each of the three criteria indicates 'no or unknown' and is given to a country in a situation where there is no indication that any of the requirements listed in Criterion 1, 2 and 3 have been satisfied. In this situation a score of 0 is awarded, meaning there is an absence of evidence of blue economy development in that country. For some countries this score may be awarded as they are land-locked and as such have limited engagement with blue economy activities. This score is also awarded when information is not publicly available and therefore a conclusion cannot be reached.

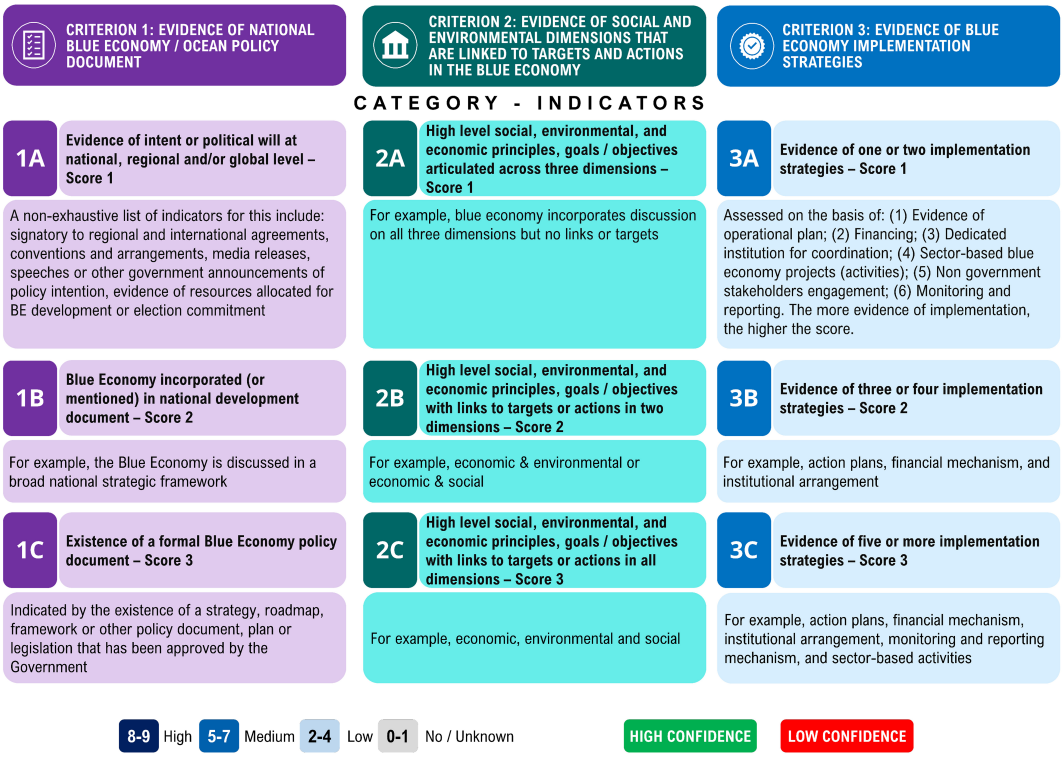


FIGURE 2
The criteria and scoring. .

Criterion 1: Evidence of National Blue Economy/Ocean Policy document

This criterion seeks to identify whether the country has a national level Blue Economy (or ocean) policy document, and the level to which such document outlines a plan of action concretely showing how the country intends to manage the development of its coastal and ocean space.

As discussed above, the existence of a policy document is an essential component of blue economy implementation (Voyer et al., 2021a). A national blue economy policy document will guide the development and conduct of programs and provide a point of reference and shared objectives for government and non-government stakeholders to prepare, plan and execute the policy into operational level activities. For the purposes of this database assessment, we did not distinguish between a blue economy policy and other commonly used integrated oceans policies, such as a National Ocean Policy. The most important consideration is whether the policy document establishes the capacity to govern and manage economic activities in the coastal and ocean space, based on the principle of sustainable development with the incorporation of social and environmental dimensions. The existence of a policy document at the national level is also useful for accountability and transparency purposes, as it places pressure on the country to monitor, evaluate and report the policy implementation. In practice, many different ocean governance tools designed to manage multiple activities in countries' coastal and ocean areas are used to achieve similar objectives related to the blue economy concept. The scoring guide for the assessment of **Criterion 1** is as follows:

* Score 1 (Category 1A – Evidence of intent or political will at national, regional and/or global level) is given to a country that indicates a political willingness or intention from government to develop a blue economy policy, plan, or strategy. This intention may be expressed at a national, regional, and/or global level. Examples of intent or political will include: government signatory in regional and international agreements, conventions and arrangements, government media releases, speeches or announcements endorsing the blue economy, or other evidence of government engagement such as election pledges, and commissioning of academic reports or policy recommendations from educational institutions and/or non-government stakeholders.
* Score 2 (Category 1B – Blue economy incorporated (or mentioned) in national development document) is given in a circumstance where the concept of a blue economy has been incorporated (or at a minimum, mentioned) in another policy document, such as a long-term, medium-term, and/or short-term national development plan or vision, or strategic framework.
* Score 3 (Category 1C – Existence of a formal blue economy policy document) is given to a country that has a formal blue economy policy document. Policy adoption is commonly an outcome of policy development or formulation processes and indicates a more mature state of implementation than Category 1A and 1B. Some clear indicators of this category are the existence of a strategy, roadmap, framework or other policy document, plan or legislation that has been approved by the national government, or at the ministerial or departmental levels of government. In many cases, the legislation includes designation of institutions or authorities with rights and responsibilities to plan, implement and evaluate the policy (Guerreiro, 2021).

Criterion 2: Evidence of social and environmental dimensions that are linked to targets and actions in the blue economy

This criterion identifies the inclusion of the three dimensions of the sustainable development (economic, environment, and social) into blue economy policy and practice.

Based on our view that the blue economy involves social and environmental goals as well as economic development goals (Bank, W, 2017; Keen et al., 2018), we deemed it important to assess each country on the *substance* of their blue economy policy, rather than simply its existence. Although many states claim to have a blue economy policy which incorporates social, environmental, and economic dimensions (consistent with the post-2015 Sustainable Development agenda from which it originates), this is not always reflected in the targets or activities actually adopted to give effect to the blue economy policy. Accordingly, we felt it appropriate to assess the evidence of social and environmental dimensions in each country's blue economy policy, by considering whether there are clearly articulated targets and actions in each dimension (Stephenson et al., 2019; Stephenson et al., 2021).

Achieving a balance between economic development, social equity and environmental sustainability should be considered a high priority, and the implementation of all three dimensions in national level policy is key to delivering a sustainable blue economy. However, there is no agreement on the scale of acceptable tradeoffs and synergies inherent in sustainable development, nor any guidance or agreed standard on measuring the optimal balance of economic, social, and environmental dimensions. In the absence of such a benchmark, minimizing potential harm to social equity and damage to environmental health would be the minimum baseline in order to ensure that social and environmental safeguards offer an appropriate check and balance mechanism

to economic development (Bank, W, 2017; UNEP, 2020). With this in mind, the scoring guide for the assessment of **Criterion 2** is as follows:

* Score 1 (Category 2A – High level social, environmental, and economic principles, goals or objectives articulated across three dimensions) is given to countries that articulate high level social, environmental, and economic principles, goals, or objectives in their national development plan. A national development plan is not necessarily a blue economy specific plan, but rather can be a general or sector-based plan that is aligned to the SDGs or other development objectives. Frequently, countries will achieve this minimum score, however without clear links to targets and actions that aim to fulfil all the triple bottom line objective goals, a higher score cannot be awarded. In the absence of clearly articulated targets and actions, these concepts remain high level.
* Score 2 (Category 2B – High level social, environmental, and economic principles, goals, or objectives with links to targets or actions in two dimensions) is given in a circumstance where social, environmental, and economic principles, goals or objectives are articulated with clear links to targets or actions in two dimensions. For example, if there is a clear indication of the absence of social equity or evidence of environmental compromises in the marine resource management or development plan then a country will not score above 2.
* Score 3 (Category 2C – High level social, environmental, and economic principles, goals or objectives with links to targets or actions in all dimensions) is given to a country that has fully incorporated social, environmental, and economic principles, goals, or objectives into their blue economy policy with clear links to targets and actions.

Criterion 3: Evidence of blue economy implementation strategies

This criterion seeks to identify actual operationalisation of the blue economy in practice. It includes primarily evidence of documented implementation plans or mechanisms to operationalise blue economy, and whenever applicable other evidence indicating the progress that has been made in blue economy related activities. For example, the blue economy has established sectors such as marine living resources, marine non-living resources, marine renewable energy (mainly offshore wind), port activities, shipbuilding and repair, maritime transport and coastal tourism in EU regions (Commission, E 2022).

Bearing in mind the enabling conditions that contribute to a country's capacity to effectively implement a sustainable blue economy (Benzaken and Hoareau, 2021; Cisneros-Montemayor et al., 2021; Voyer et al., 2021a), we take into account six components to assess the level of blue economy implementation in each country as follows:

1) Evidence of operational cross sectoral plan or action plans: national action plans, integrated ocean management plans, for example Marine Spatial Planning (MSP) or Integrated Coastal Zone Management (ICZM); other short-term, medium-term and long-term plans;
2) Existence of funding mechanisms that at minimum covers the source of fund, its value and the funding purposes;
3) Dedicated whole of government institutional structures and or mechanisms to harmonize and coordinate the implementation of the blue economy;
4) Existence of sector-based blue economy projects or activities that contributes to economic, social, and environmental goals, such as job creation and added value to national economy (Gross Value Added (GVA) and Gross Domestic Product (GDP)).
5) Evidence of non-government stakeholders' engagement in developing and operationalizing blue economy policies or plans in ocean sector activities; and
6) Monitoring and reporting mechanism that tracks progress and can provide inputs for future review and adaptation.

These considerations are related to the enabling conditions, that contribute to a country's capacity to effectively implement a sustainable blue economy (Benzaken and Hoareau, 2021; Cisneros-Montemayor et al., 2021; Voyer et al., 2021a). Regardless of the existence of an overarching national blue economy policy, some existing ocean-based governance and economic activities such as marine zoning, integrated coastal management, ecosystem based, and community-based fisheries management have already been implemented in certain countries. When these mechanisms included social and environmental dimensions they were counted as evidence towards a country's blue economy implementation, despite not being specifically labelled as 'blue economy'.

The scoring guide for the assessment of **Criterion 3** is:

* Score 1 (Category 3A – Evidence of one or two implementation strategies) is given to countries in the early stages of blue economy operationalization and where there is evidence of the employment of one or two of the components listed above. Countries with no national blue economy policy in place may fulfil this category in a circumstance where they have institutional capacity to implement blue economy activities or have sectoral based blue economic activities or have sought financing for relevant blue economy activities through

either national (state) budget, private sector, or international donors such as organizations under United Nations System and intergovernmental organisations (IGOs).

* Score 2 (Category 3B – Evidence of three or four implementation strategies) is given to countries that have evidence of a high level of blue economy operationalization by satisfying three or four components identified above. At this level, countries usually have a blue economy policy to provide overarching guidance for implementation, whether incorporated in a national development framework (Category 1B) or established as a specific blue economy policy (Category 1C).
* Score 3 (Category 3C – Evidence of 5 or more implementation strategies) is given to countries that have reached an advanced level of blue economy implementation as indicated by the presence of five or more of the components listed above. At this level, countries will have a capability to operationalize cross-sectoral economic activities based on policies or plans.

Preliminary results of pilot categorization

The current global snapshot of blue economy development throughout the 193 UN member states is shown in Figure 3. Of these countries, 10% of countries have been identified in our categorization systems as having high level blue economy development and implementation. This 10% equates to approximately 20 countries, all of which are coastal states. Most countries in this category are developed countries, however some developing countries actively promote blue economy development (such as Seychelles, Palau, and Bahamas) and they have been categorized as high development. Of the 193 states considered, 20% (or 39 countries) were categorized as medium development, which means they have made some effort to develop their Blue Economy and operationalize it, both through policy and action. Most of the states considered (70%, or 134 countries) were categorized as low development or no/unknown.

Of the 193 UN member countries, 36% (or 69 countries) have developed a blue economy policy, plan or strategy or incorporated blue economy in other planning documents (as considered in Criterion 1), but only 22% (or 43 countries) have indicated the articulation of social and environmental objectives into targets and actions in their blue economy plan (as considered in Criterion 2). However, we found evidence of blue economy operationalization (as considered in Criterion 3) in relation to 31% (or 60 countries). Based on the availability of information 24% (46 countries) were assessed with a high confidence level for the data, but 76% (147 countries) were assessed with a low data confidence level, mainly due to lack of official information on Government websites or a lack of publicly available information in English.

The chart in Figure 4 shows a breakdown of blue economy development by region. Countries from the Western Europe and Others Group lead the way on blue economy development, and many of the countries in this Group had evidence of blue economy implementation and operationalization. The analysis confirmed that land-locked countries had a low level of interest in developing a blue economy at a national level. However, our research did show that some land-locked countries have engaged with the blue economy concept and are looking to raise

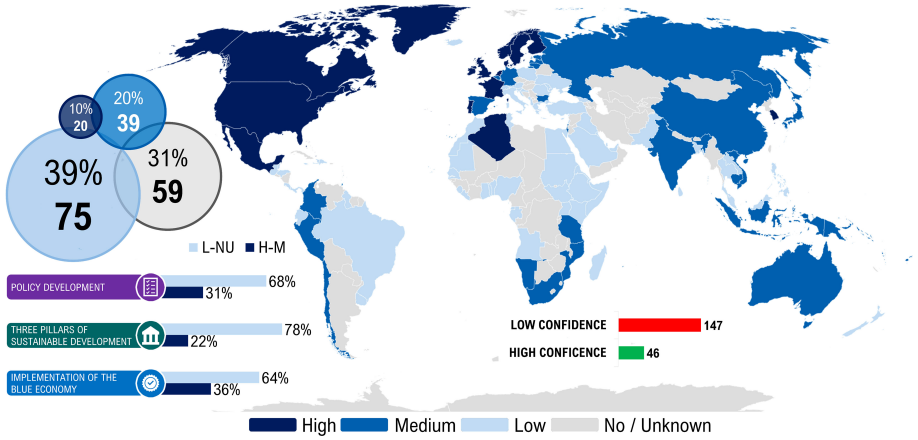
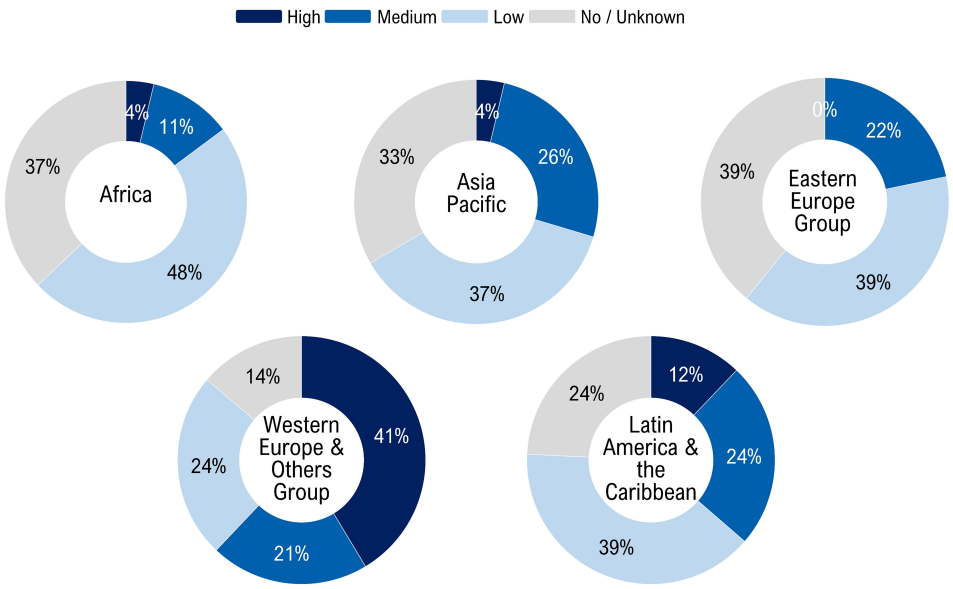


FIGURE 3
Global blue economy development overview.



Note: Western Europe & Other Group includes North America, Australia, and New Zealand.

FIGURE 4
Global blue economy development by region.

awareness of blue economy related activities or initiatives. For example, Austria is contributing to the reduction of marine plastic pollution throughout their terrestrial activities (Austria, 2020), and Mongolia has interest in global shipping registries (Administration, M. M 2018).

Classification case studies

To further investigate the efficacy of the assessment criteria, we undertook a more detailed assessment of four case studies, which consisted of assessing a sample case (country) across each level of development. Four countries were randomly chosen to represent both developed and developing economies, with a variety of maritime interests from different regions and reflecting the availability of publicly accessible information. Other than being representative of different levels of development status and different regions the choice of countries was arbitrary. The inclusion of case studies was to illustrate how the classification tool works in practice, rather than providing an in-depth analysis.

Table 1 outlines the justifications for the scores that were awarded to the four case studies. The case studies are useful in illustrating the application of this method and in testing its validity, whilst also identifying gaps that can be adjusted in the future development of the database and the categorization tool. The following sections provide an overview of each case study in order to demonstrate the application and effect of the scoring methodology.

High category - Portugal (developed economy)

Portugal is at the forefront of global advocacy in promoting sustainable development in the ocean (Government of Portugal, 2021). As a member of the High-Level Panel for a Sustainable Ocean Economy (Panel, O 2020) and the European Union (EU), Portugal has aligned its national policy to support the regional policy commitments stipulated in the EU Integrated Maritime Policy (IMP) with its subsequent blue economy policy documents (Soma et al., 2015; Katarzyna et al., 2016; Moreira and Bravo, 2019; Commission, E 2021).

At the national level, the blue economy is at the core of the Portuguese National Ocean Strategy (Portugal, G. o2014; Portugal, G. o 2021a). The adoption of Circular and Sustainable Blue Economy as Strategic Goal-2 (SG2) in Portugal's National Ocean Strategy 2021-2030 indicates a balanced approach to the blue economy that includes social inclusivity and environmental protection. It shows evidence of economic, social, and environmental dimensions that are linked to targets and actions in the blue economy. The evidence of blue economy in Portugal's National Ocean Strategy is linked to strategic goals and is in full alignment with social and

TABLE 1 Classification case studies in 4 sample countries.

Countries	CRITERION-1			CRITERION-2			CRITERION-3			Total Score	Category	Confidence Level
	1A (1)	1B (2)	1C (3)	1A (1)	1B (2)	1C (3)	1A (1)	1B (2)	1C (3)			
Portugal			3			3			3	9	High	HC
	1st, 2nd & 3rd National Ocean Strategy with Action Plan			BE Vision - sustainable ocean economy includes social and ecological targets and actions			Financing, action plan, projects, institutional arrangements (DGPM & CIAM)					
Mozambique			3	1				2		6	Medium	HC
	The Mozambique Policy and Strategy of the Sea (POLMAR) was developed in 2017 to serve several objectives including the development of a blue economy			Mozambique supports the principles of sustainable development			Plans, financial mechanism, dedicated institution, sectoral projects					
Jamaica		2		1			1			4	Low	HC
	The Green Paper on Coastal and Oceans Management for Jamaica, 2002, 'Vision 2030 National Development Plan' and member of HLP			Vision 2030 includes mention of all three dimensions			Sector-based projects					
Bosnia and Herzegovina	0	0	0	1			0	0	0	1	No/ Unknown	LC
	Unknown			Bosnia and Herzegovina supports the principles of sustainable development			Unknown					

environmental objectives. Accordingly, Portugal has been awarded the highest score (3) for Criterion 1 and 2.

To implement its blue economy, Portugal has developed an action plan that accompanies the National Ocean Strategy. The action plan includes 10 objectives with 180 concrete measures (Portugal, G. o 2021a). Portugal has dedicated institutions for ocean policy development and implementation, including blue economy related programs and activities (*Direção-Geral de Política do Mar*/DGPM within the Ministry of Maritime Affairs and the Inter-ministerial Commission for Ocean Affairs/CIAM chaired by Prime Minister as inter-agency mechanism). It has sector-based projects including renewable ocean energy, aquaculture, tourism, and marine mineral resources. Portugal has also established a financial mechanism and investment plan to support blue economy implementation. One example of this financial scheme is 'Portugal Blue' which is directed to support the economy with climate impact and sustainable development objectives (European Investment Fund, 2020). With at least five components of implementation strategies in place, Portugal satisfies the highest level of Criterion 3.

As an active proponent of the blue economy at global, regional, and national levels with adequate implementation strategies, Portugal satisfies all criteria and is categorized as **a highly developed blue economy country**.

Medium category - Mozambique (developing economy)

The overarching legal framework for the blue economy in Mozambique is the Sea Law 1996 which specifies the requirements for the use of Mozambique's jurisdiction and is implemented through the Legal Regime for the National Maritime Use or RJUEM (Mozambique, G. o 2017a). The primary policy document relevant to the blue economy is the Sea Policy or POLMAR (Mozambique, G. o2017b), which aligns with sustainable development as seen in the pillars of governance and inter-ministerial coordination, marine and coastal environment, economic development, territorial development, human capital development and international cooperation. The

Mozambique's Sea Policy makes reference to economic, social and environmental principles, objectives and strategies for implementation including a participatory marine spatial planning process (POEM) but does not have clear links to social and environmental targets and actions. Thus, Mozambique was awarded the highest score (3) for Criterion 1, but a score of only 1 for Criterion 2.

Mozambique has advanced its blue economy policy with a marine spatial plan and the establishment of a funding mechanism called ProAzul (ProAzul, 2022). However, a whole-of-government implementation plan has yet to be finalized, which would clarify strategic priorities for economic, environmental, and social objectives, the responsibilities of relevant ministries, and the enabling environment to facilitate implementation, including finance, institutional coordination and policy alignment and reporting. ProAzul has developed a Blue Economy Roadmap that identifies priorities for investment and blue financing opportunities have been canvassed with the support of the World Bank ProBlue program (Benzaken et al, 2021). The government had committed to establish a National Sea Council in 2019, but this was not supported by Cabinet. Instead, a committee of national directors of relevant Ministries has been endorsed as the mechanism for whole of government coordination. Accordingly, Mozambique was only able to score 2 in Criterion 3.

Altogether, Mozambique has made good progress in developing a legal and policy framework for a sustainable Blue Economy as well as a financing mechanism (Pro Azul). However, more information is needed in the status of institutional coordination. For these reasons, Mozambique is assessed as being in **the medium category** in their Blue Economy development.

Low category - Jamaica (developing economy)

Jamaica's policy and plan for the blue economy is associated in the National Policy on Oceans and Coastal Zone Management Policy, which was adopted and implemented in 2002 (Mattis and Edwards, 2015). The policy includes principles to protect the ocean and coastal environment and to foster sustainable management of ocean and coastal resources (NCOCZM, 2000). In 2018, Jamaica's leadership endorsed the High-Level Panel for a sustainable ocean economy's commitment to 100% sustainable management of ocean areas within a national jurisdiction (Ocean Panel, O2020). This global initiative is in full alignment with the Vision 2030 – Jamaica National Development Plan, which promotes the sustainable management and use of environmental resources (Smith, 2020). Jamaica has not, however, articulated a specific blue economy policy, but rather adopted broad principles and guidance from external sources or publications such as High Level Panel's blue papers as reference for implementation (Smith, 2020). The inclusion of Blue Economy in the National Development Plan and Jamaica's support of sustainable development principles have led Jamaica to a score 2 for Criterion 1 and a score of 1 for Criterion 2.

On the policy implementation side, an inter-ministerial council – National Council on Oceans and Coastal Zone Management (NCOCZM) – chaired by the Ministry of Foreign Affairs and Foreign Trade plays a key role in marine policy formulation in Jamaica. There is also evidence of the conduct of sector-based projects with support from international institutions, for example, the assessment and economic valuation of coastal protection services of mangroves by the University of the West Indies (UWI) that is funded by World Bank (Smith, 2020). This evidence allows for a score of 1 in Criterion 3.

Overall, given the absence of a blue economy policy and inadequate evidence of implementation, Jamaica's Blue Economy development is in **the low category.**

Unknown/no category - Bosnia and Herzegovina (developing economy)

At present, there is no evidence of national intention of blue economy or ocean policy development in Bosnia and Herzegovina (no score for the first criterion). Bosnia and Herzegovina recognizes the problems in its ocean and coastal areas, such as the negative impact of tourism, dumping of waste, and ballast water issues. The country supports the concept of sustainable development, as seen in its commitment to include SDG 14 in VNR 2019 (Herzegovina, G. O. B. A2019). Accordingly, Bosnia and Herzegovina can receive a score of 1 for Criterion 2.

Criterion 3 is not assessed in relation to Bosnia and Herzegovina situation due to the absence of English language publications on the ocean economy and a lack of knowledge about the national ocean policy or blue economy.

Overall, Bosnia and Herzegovina's Blue Economy development is categorized as **unknown/no category**.

Discussion

The categorization tool developed through this study which also used as an evaluative lens has enabled the identification of different stages of national level blue economy development on a global scale, and the preliminary identification of trends of blue economy development at the national level. The development of the criteria was a crucial component of this methodological approach as it was through this method that we were able to construct a way to make an initial assessment on the level of Blue Economy development in 193 UN member states. This

methodological approach has allowed for rapid analysis and assessment. The key preliminary findings of the assessment and subsequent categorization has provided useful insights that can support global, regional, and national efforts to optimize the development of blue economy policy and governance. This section will first outline the key preliminary findings that emerged through the application of the assessment tool. It will then go on to discuss the methodological approach that we took, through the development of the database, the criteria, and the assessment tool. In doing so we will discuss the how the tool worked in practice, the lessons learned, and how it can be used in the future.

Key preliminary findings

By investigating blue economy development globally, we were able to gain some insights into the status of blue economy development in ocean regions and different influences of regional initiatives to the blue economy development at the national level. Our preliminary analysis has shown that only 30% or 59 of the 193 UN member states could be identified as having made good progress on blue economy development. Western Europe and Other Group had the highest percentage of high development status of any region. This corroborates the findings by Voyer et al. (2021b) who found that Europe were playing dominant role in commitment to the blue economy, most likely supported by regional agreements such as the EU's Blue Growth Strategy. This paper also confirms that sub regions with a larger proportion of land-locked countries have a lower level of national blue economy development than those with more coastal states, for example, Central African, Middle East and Central Asia.

The analysis of the categorization illustrated that different countries have different approaches and priorities in institutionalizing and operationalizing the blue economy. This analysis assists in identifying broad trends and high-level comparisons across national levels governments and regions. It should be noted however that the more detailed examination of countries and the case studies point to significant nuance in the ways in which the trends are translating to national contexts. Countries may not necessarily have a blue economy policy or strategy in place but demonstrate capability and capacity in blue economy sectors; for example, Iceland which have advanced the ocean cluster concept as their blue economy implementation approach (Hansen et al., 2018). However, other countries have institutionalized the blue economy at a conceptual level and have a policy or strategy in place; but they have limited institutional and technical capacity to implement and maintain the continuity of the policy implementation in the long term, for example, Mozambique and Antigua & Barbuda. Hassanali (2022) found that the institutional arrangements of Caribbean states were largely not in a position to optimize blue economy development, thus organizational and institutional restructuring would be required to effectively develop the blue economy.

The diverse perspectives and practical application of the blue economy as policy highlights that the concept has arisen as a significant political phenomenon at national, regional, and global levels but is being adopted and implemented at national and local levels with adjustment and modifications to suit specific domestic circumstances. For example, Seychelles employs its blue economy policy as an instrument to govern the sustainable development of its ocean domain. Other countries like Papua New Guinea and Fiji choose to incorporate a blue economy section in their national ocean policy that is formulated to address specific challenges in national ocean governance. This is a common pattern of national ocean policies that were developed after 2012 when the term 'blue economy' came into use at the Rio+20 conference. Another preliminary insight gained in this research is that the incorporation of the blue economy is often as part of a broader national development framework such as a National Development Plan or Green Development Plan. This is the case for countries such as Brunei and Cambodia (National Council on Green Growth, 2013; Ministry of Finance and Economy, Brunei Darusallam, 2020).

Future development of the Global Blue Economy Database and areas for further research

In the development of this methodological approach the refinement of criteria was of critical importance. At its core, the operationalization of the Blue Economy involves policy and subsequent implementation, we also argue that it needs to incorporate the three dimensions of a sustainable Blue Economy (economic prosperity, environmental conservation, and social equity). For these reasons therefore, these pillars became an important criterion by which we assessed national level blue economy development. Finding information based on these three criteria was at times difficult. For example, identifying clear targets and actions towards the three dimensions of sustainability in national policy documents was not always a clear task. Furthermore, assessing the actual level of implementation or operationalization (rather than just what is said to have been done, or what is earmarked to be done) based on available information carried certain challenges. For these reasons, ensuring that the process is iterative is of key importance. In other words, updating the database and re-assessing countries development status as new information becomes available should be considered a crucial part of the process.

The preliminary results of the assessment and subsequent categorization has provided useful insights that can support global, regional, and national efforts to optimize the

development of blue economy policy and governance. This database can serve as a comparative and complementary tool for analytical purposes and can be used in combination with other global databases (for example, global income and development status), which would help to validate whether a country's income and development status correlate with their blue economy development progress. The trends identified in this initial assessment highlight the location of regions where blue economy development is limited—for example, in the 70% of UN member states who had low and no/unknown development in blue economy. It is fair to assume that blue economy development and implementation has not been a priority in these states. Through identifying regions with low levels of engagement this may in turn, help international donors and financial institutions to strategically direct their financial aid to areas where blue economy to date, has not been a priority. Further understanding regional and global trends and drivers on national blue economy adoption will be beneficial for decision making process and policy development in the future.

Furthermore, this database and assessment tool can be useful in fostering collaboration and cooperation between countries in developing the blue economy. The interconnectedness of the ocean and the shared barriers to effective governance ensure that collaboration and cooperation between countries and across scales should be a priority. Crossman et al, 2022 argue that '*despite the inherently transboundary and entangled nature of ocean governance issues, ocean governance continues to suffer from a lack of effective coordinating mechanisms across scales and sectors*'. Opportunities for regional cooperation at the policy development and implementation stage, mechanisms for exchanging information and blue economy experiences, and identifying capacity needs are essential components to harness international cooperation. Examples on how to integrate the three dimensions of sustainability in the blue economy should be given priority, to ensure that the blue economy does not become merely an exercise in blue growth with little consideration for social equity and the health of ocean and coastal ecosystems.

Our approach complements the work of Cisneros-Montemayor et al. (2021) and Adrianto et al. (2019) who also developed mechanisms to assess the levels of implementation of the Blue Economy. Whilst still being in its infancy, the database and categorization tool that we have developed is useful in assessing the level of blue economy implementation. The use of the three criteria was intended to provide a simple tool that provides a snapshot rather than an in-depth country-by-country analysis as is seen in the tool developed by Adrianto et al. (2019). The case studies outlined in this paper illustrate how this assessment tool works in practice. The four sample countries examined were illustrative of the varied approaches to practical application. The simplicity and practicality are beneficial in two ways: the tool can be widely used by non-technical expert analysts, and it can be customized for a more detailed assessment in the future.

Our methodological approach was reliant on publicly available information. In moving forward with blue economy governance and operationalization we suggest that countries should endeavor to ensure transparency and openness in their blue economy development. Rather than operating as individual states, recognizing the interconnectedness of the ocean and working together on integrated Blue Economy policies would instead be beneficial.

Conclusion

This paper outlined the method we employed and was intended to demonstrate how the assessment tool works in practice. It is intended that future applications of the database will facilitate data entry by a range of users and be accessible on a public platform. Future applications of this tool will be beneficial in confirming the key drivers of the blue economy. The drivers of blue economy implementation will be able to be examined more thoroughly. As the data we used was found on web-based sources, ideally it would be able to be validated by those with specific insights on a country-by-country level. The database and subsequent assessment are intended to be iterative. In this sense, we intend this tool to continue to be developed and updated. This iterative process will enable the monitoring of rapid changes in Blue Economy development.

Effectively developing, implementing, and operationalizing blue economy policies remains an international governance challenge. Our research has shown that globally, levels of blue economy governance remain low, despite the popularity of the term in international and regional political discourse. Factors contributing to this are likely to be related to the challenges of blue economy governance and ocean governance more broadly. Furthermore, Graziano et al. (2022) show that '*the Blue Economy is still conceptualized and operationalized heterogeneously, with variations not just between countries but within regions*. This statement corroborates the findings of this paper, as we identified a range of approaches to blue economy governance that reiterated the varied levels of blue economy development both regionally and globally. It is our hope that applying the methodology developed for and used in this study could help national governments to strengthen their approaches to the blue economy through the combination of national policy guidance, full incorporation of sustainability principles and effective implementation strategies.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

Author contributions

LW – Idea conception, methodology development, database creation, data collection, data visualization and co-writing, case study development; FC - Idea conception, methodology development, database creation, data collection and co-writing; DB - Idea conception, methodology development, case study development, editing and feedback; KA - Idea conception, methodology development, editing and feedback; CG - Idea conception, methodology development, editing and feedback; CR - Idea conception, methodology development, data collection; MV - Idea conception, methodology development, editing and feedback. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Administration, M. M (2018) *Introduction - Mongolia maritime administration* (Mongolia Maritime Administration (MMA). Available at: https://www.monmarad.gov.mn/en/intro (Accessed 2 September 2022).

Adrianto, L., Eisner, N., and Situmorang, A. (2019). *Blue economy development index: A conceptual framework the 2019 Startup Business Summit (SBS)*. (Manado, Indonesia: Archipelagic and Island States Forum). Available at: https://static1.squarespace.com/static/61c034b19223544de2255a77/t/62346eeaced63f5f61cafbfb/1647603445622/P2S2_UNDP_Blue%2BEconomy%2BDevelopment%2BIndex_lr.pdf.

Adrianto, L. (2022) *Blue Economy Development Index (BEDI) - Measuring the Progress of Sustainable Blue Economy International Conference on Sustainable Ocean Economy and Climate Changes Adaptation*, Vietnam. Available at: https://conference.undp.org.vn/wp-content/uploads/2022/05/UNDP-Blue-Economy-Workshop-BEDI-12-05-22.pdf.

ASEAN (2021) *ASEAN leaders' declaration on the blue economy* (ASEAN). Available at: https://asean2021.bn/latestnewsall/asean-leaders-declaration-on-the-blue-economy (Accessed 13 September 2022).

Austria, R. O (2020). *Austria And the 2030 agenda: Voluntary national review – report on the implementation of the sustainable development goals 2020 (Volutary national review report, issue* (Vienna: A. F. Chancellery). Available at: https://sustainabledevelopment.un.org/content/documents/26512VNR_2020_Austria_Report_English.pdf.

Bank, W (2017) *The potential of the blue economy: Increasing long-term benefits of the sustainable use of marine resources for small island developing states and coastal least developed countries* (Washington, D.C.). Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/26843/115545.pdf?sequence=1&isAllowed=y.

Bank, W (2021). *Riding the blue wave: Applying the blue economy approach to world bank operations* (W. Bank). Available at: https://openknowledge.worldbank.org/handle/10986/37212?locale-attribute=en.

Bennett, N. J., Cisneros-Montemayor, A. M., Blythe, J., Silver, J. J., Singh, G., Anews, N., et al. (2019). Towards a sustainable and equitable blue economy. *Nat. sustainability* 2 (11), 991–993. doi: 10.1038/s41893-019-0404-1

Benzaken, D., De Vos, K.-P. S.W. Bank (2021) *Financing mechanisms for sustainable blue economy development in Mozambique*. Available at: https://documents.worldbank.org/curated/en/885071624984316653/Financing-Mechanisms-for-Sustainable-Blue-Economy-Development-in-Mozambique.

Benzaken, D., and Hoareau, K. (2021). "From concept to practice: The blue economy in Seychelles," in *The blue economy in Sub-Saharan Africa: Working for a sustainable future*. Ed. D. L. Sparks (New York: Taylor & Francis Group).

Blasiak, R., Wabnitz, C. C. C., Daw, T., Berger, M., Blandon, A., Carneiro, G., et al. (2019). Towards greater transparency and coherence in funding for sustainable marine fisheries and healthy oceans. *Marine Policy* 103508, 1–4. doi: 10.1016/j.marpol.2019.04.012

Brent, Z. W., Barbesgaard, M., and Pedersen, C. (2020). The blue fix: What's driving blue growth? *Sustainability Sci.* 15 (1), 31–43. doi: 10.1007/s11625-019-00777-7

Childs, J., and Hicks, C. C. (2019). Securing the blue: political ecologies of the blue economy in Africa. *J. political Ecol.* 26 (1), 323–340. doi: 10.2458/v26i1.23162

Cisneros-Montemayor, A. M., Moreno-Báez, M., Reygondeau, G., Cheung, W. W. L., Crosman, K. M., González-Espinosa, P. C., et al. (2021). Enabling conditions for an equitable and sustainable blue economy. *Nat. (London)* 591 (7850), 396–401. doi: 10.1038/s41586-021-03327-3

Cisneros-Montemayor, A. M., Moreno-Báez, M., Voyer, M., Allison, E. H., Cheung, W. W. L., Hessing-Lewis, M., et al. (2019). Social equity and benefits as the nexus of a transformative blue economy: A sectoral review of implications. *Marine policy. 109* 103702. doi: 10.1016/j.marpol.2019.103702

Commission, E (2021). *Sustainability criteria for the blue economy: Main report* (Luxembourg: P. O.T. E. Union). Available at: https://op.europa.eu/en/publication-detail/-/publication/893c5ae2-a63a-11eb-9585-01aa75ed71a1/language-en.

Commission, E (2022). *The EU blue economy report 2022* (Luxembourg: Publications Office of the European Union). doi: 10.2771/793264

Committee of Experts on Public Administration (2018). *Principles of effective governance for sustainable development* (UN DESA – New York: United Nations Department of Economic and Social Affairs (DESA). Available at: https://publicadministration.un.org/Portals/1/Images/CEPA/Principles_of_effective_governance_english.pdf.

Crosman, K. M., Allison, E. H., Ota, Y., Cisneros-Montemayor, A. M., Singh, G. G., Swartz, W., et al. (2022). Social equity is key to sustainable ocean governance. *NPJ Ocean Sustainability* 1 (1), 4. doi: 10.1038/s44183-022-00001-7

Fabinyi, M., Wu, A., Lau, S., Mallory, T., Barclay, K., Walsh, K., et al. (2021). China's blue economy: A state project of modernisation. *J. Environ. Dev.* 30 (2), 127–148. doi: 10.1177/1070496521995872

FAO (2017). *Blue growth initiative – partnering with countries to achieve the sustainable development goals* (Rome, Italy: FAO). Available at: https://www.fao.org/3/i7862e/I7862E.pdf.

Foley, P., Pinkerton, E., Wiber, M. G., and Stephenson, R. L. (2020). Full-spectrum sustainability: An alternative to fisheries management panaceas. *Ecol. Soc.* 25 (2), 1–9. doi: 10.5751/ES-11509-250201

Fund, E. I. (2020) *PORTUGAL BLUE is set to mobilise €75 million in the blue economy ecosystem European investment fund (EIF)*. Available at: https://www.eif.org/what_we_do/equity/news/2020/portugal-blue-75-million-in-the-blue-economy-system.htm (Accessed 2 September 2022).

Government of Portugal. (2021). *National Ocean Strategy 2021-2030* (Lisbon: Direção-Geral de Política do Mar, DGPM). Available at: https://www.dgpm.mm.gov.pt/enm-21-30.

Graziano, M., Alexander, K. A., McGrane, S. J., Allan, G. J., and Lema, E. (2022). The many sizes and characters of the blue economy. *Ecol. economics* 196, 1–13. doi: 10.1016/j.ecolecon.2022.107419

Guerreiro, J. (2021). The blue growth challenge to maritime governance. *Front. Mar. Sci.* 8. doi: 10.3389/fmars.2021.681546

Hansen, E. R., Holthus, P., Allen, C. L., Bae, J., Goh, J., Mihailescu, C., et al. (2018). *Ocean/Maritime clusters: Leadership and collaboration for ocean sustainable development and implementing the sustainable development goals (World ocean council white paper February 2018 issue* (World Ocean Council (United States): W. O. Council). Available at: https://www.oceancouncil.org/wp-content/uploads/2018/03/Ocean-Maritime-Clusters-and-Sustainable-Development-WHITE-PAPER-FINAL-2018-logo_edited.pdf.

Hassanali, K. (2022). Examining institutional arrangements toward coordinated regional ocean governance and blue economy policy development in the Caribbean community (CARICOM). *Coast. Manage.* 50 (5), 1–23. doi: 10.1080/08920753.2022.2082835

Herzegovina, G. O. B. A (2019). *Implementation of agenda 2030 and the sustainable development goals in Bosnia and Herzegovina (Volutary national review report, issue* (Sarajevo: G. O. B. A. Herzegovina). Available at: https://sustainabledevelopment.un.org/content/documents/23345VNR_BiH_ENG_Final.pdf.

IPCC (2019). *IPCC special report on the ocean and cryosphere in a changing climate* (Cambridge, UK and New York, USA: C. U. Press).

Katarzyna, S., Tihomir, L., and Ivana, P. (2016). "Assessment of compliance of polish and Croatian maritime policies with the integrated maritime policy of the EU," in *International OFEL conference on governance, management and entrepreneurship, Zagreb.* (Zagreb, Croatia: Centar za istrazivanje i razvoj upravljanja d.o.o)

Kaufmann, D., Kraay, A., and Mastruzzi, M. (2010). *The worldwide governance indicators: Methodology and analytical issues [Policy research working paper WPS 5430]* (Washington, D.C.: W. Bank). Available at: http://documents.worldbank.org/curated/en/630421468336563314/The-worldwide-governance-indicators-methodology-and-analytical-issues.

Keen, M. R., Schwarz, A.-M., and Wini-Simeon, L. (2018). Towards defining the blue economy: Practical lessons from pacific ocean governance. *Mar. Policy* 88, 333–341. doi: 10.1016/j.marpol.2017.03.002

Kildow, J. T. (2021). "OP/ED: The importance of the new blue economy to a sustainable blue economy: an opinion," in *Preparing a workforce for the new blue economy: people, products and policies*. Eds. L. Hotaling and R. W. Spinrad (Amsterdam, The Netherlands: Elsevier Inc), 135–146. doi: 10.1016/B978-0-12-821431-2.02038-2

Louey, P. (2022). The pacific blue economy: An instrument of political maneuver. *Mar. Policy* 135, 104880. doi: 10.1016/j.marpol.2021.104880

Martínez-Vázquez, R. M., Milán-García, J., and de Pablo Valenciano, J. (2021). Challenges of the blue economy: evidence and research trends. *Environ. Sci. Europe* 33 (1), 1–17. doi: 10.1186/s12302-021-00502-1

Mattis, L. D., and Edwards, P. (2015). "Jamaica's oceans and coastal policy," in *Routledge handbook of national and regional ocean policies*. Eds. B. Cicin-Sain, D. Vanderzwaag and M. C. Balgos (London: Routledge), 260–282. doi: 10.4324/9781315765648

Ministry of Finance and Economy, B. D (2020). *Towards a dynamic and sustainable economy: Economic blueprint for Brunei darussalam* (Brunei Darusallam: Ministry of Finance and Economy). Available at: https://www.mofe.gov.bn/Shared%20Documents/OTHERS/banner/Brunei%20Darussalam's%20Economic%20Blueprint.pdf.

Mohanty, S. K., Dash, P., Gupta, A., and Gaur, P. (2015). "Prospects of blue economy in the Indian ocean," in *Research and information system for developing countries* (New Delhi, India: Research and Information System for Developing Countries). Available at: https://iora.ris.org.in/en/books-reports/prospects-of-blue-economy.

Moreira, F. C., and Bravo, B. M. (2019). EU Integrated maritime policy and multilevel. *Juridical Tribune* 9 (3), 535–48.

Mozambique, G. o (2017a). *Decree no. 21/2017: Approving the regulation that establishes the legal regime for the national maritime zone use (RJUEM)* (Maputo: Council of Ministers). Available at: http://extwprlegs1.fao.org/docs/pdf/moz168087.pdf.

Mozambique, G. o (2017b). *Resolution 39/2017: Approving the Sea policy and strategy (POLMAR)* (Maputo: Council of Ministers). Available at: http://extwprlegs1.fao.org/docs/pdf/moz172386.pdf.

Mulazzani, L., and Malorgio, G. (2017). Blue growth and ecosystem services. *Marine Policy*. 50 (5), 17–24. doi: 10.1016/j.marpol.2017.08.006

National Council on Green Growth (2013). *National Strategic Plan on Green Growth 2013-2030* (Phnom Penh, Cambodia: National Council for Sustainable Development (NCSD). Available at: https://ncsd.moe.gov.kh/resources/document/national-strategic-plan-green-growth-2013-2030en.

Nations, U (2022a)Making waves for a blue economy. In: (United Nations). Available at: https://www.un.org/en/desa/making-waves-blue-economy (Accessed 26 August 2022).

Nations, U (2022b) *Regional groups of member states. UN department for general assembly and conference management (DGACM)*. Available at: https://www.un.org/dgacm/en/content/regional-groups (Accessed 25 August 2022).

NCOCZM (2000). *Towards ocean and coastal zone management policy in Jamaica* (Kingston, Jamaica: National Council on Oceans and Coastal Zone Management (NCOCZM). Available at: http://faolex.fao.org/docs/pdf/jam175483.pdf.

OECD (2016). *The ocean economy in 2030*. (Paris, France: OECD Publishing)

OECD (2019). *Policy coherence for sustainable development 2019: Empowering people and ensuring inclusiveness and equality* (Paris: OECD).

Panel, O (2020). *Transformations for a sustainable ocean economy: A vision for protection, production and prosperity (Vol. 2022)* (Global (WRI - Washington, D.C.): Ocean Panel). Available at: https://oceanpanel.org/ocean-action/files/transformations-sustainable-ocean-economy-eng.pdf.

Parlee, C. E., Foley, P., López Gómez, M. A., Miah, M. R., Mather, C., and Stephenson, R. L. (2021). Full spectrum sustainability and a theory of access: Integrating social benefits into fisheries governance. *Marine policy* 104764, 1–17. doi: 10.1016/j.marpol.2021.104764

Patil, P. G., Virdin, J., Diez, S. M., Roberts, J., and Singh, A. (2016) *Toward a blue economy: A promise for sustainable growth in the Caribbean*. Available at: https://openknowledge.worldbank.org/handle/10986/25061.

Portugal, G. o (2014). *National ocean strategy 2013-2020* (Lisbon: Direção-Geral de Política do Mar: DGPM).

Portugal, G. o (2021a) (Lisbon: Direção-Geral de Política do Mar: DGPM). Available at: https://www.dgpm.mm.gov.pt/enm-21-30.

ProAzul (2022) *Blue action fund funds project "Building a blue future for ecosystems and people on the East African coast"* (ProAzul). Available at: https://www.proazul.gov.mz/2022/06/30/blue-action-fund-financia-projecto-construindo-um-futuro-azul-para-ecossistemas-e-pessoas-na-costa-leste-africana/ (Accessed 2 September 2022).

Rudolph, T. B., Ruckelshaus, M., Swilling, M., Allison, E. H., Österblom, H., Gelcich, S., et al. (2020). A transition to sustainable ocean governance. *Nat. Commun.* 11 (1), 3600–3600. doi: 10.1038/s41467-020-17410-2

Sachs, J. D., Lafortune, G., Kroll, C., Fuller, G., and Woelm, F. (2022). *From crisis to sustainable development: the SDGs as roadmap to 2030 and beyond* (Cambridge, UK: Cambridge University Press). doi: 10.1017/9781009210058

Silver, J. J., Gray, N. J., Campbell, L. M., Fairbanks, L. W., and Gruby, R. L. (2015). Blue economy and competing discourses in international oceans governance. *J. Environ. Dev.* 24 (2), 135–160. doi: 10.1177/1070496515580797

Smith, A. (2020) *PM Affirms jamaica's commitment to protecting the ocean's resources* (Jamaica Information Service (JIS). Available at: https://jis.gov.jm/pm-affirms-jamaicas-commitment-to-protecting-the-oceans-resources/ (Accessed 23 August 2022).

Smith-Godfrey, S. (2016). Defining the blue economy. *Maritime affairs (New Delhi India)* 12 (1), 58–64. doi: 10.1080/09733159.2016.1175131

Soma, K., van Tatenhove, J., and van Leeuwen, J. (2015). Marine governance in a European context: Regionalization, integration and cooperation for ecosystem-based management. *Ocean Coast. Manage.* 117, 4–13. doi: 10.1016/j.ocecoaman.2015.03.010

Stephenson, R. L., Hobday, A. J., Allison, E. H., Armitage, D., Brooks, K., Bundy, A., et al. (2021). The quilt of sustainable ocean governance: Patterns for practitioners. *Front. Mar. Sci.* 8. doi: 10.3389/fmars.2021.630547

Stephenson, R. L., Wiber, M., Paul, S., Angel, E., Benson, A., Charles, A., et al. (2019). Integrating diverse objectives for sustainable fisheries in Canada. *Can. J. fisheries Aquat. Sci.* 76 (3), 480–496. doi: 10.1139/cjfas-2017-0345

Stuchtey, M. R., Vincent, A., Merkl, A., Bucher, M., Haugan, P. M., Lubchenco, J., et al. (2020). *Ocean solutions that benefit people, nature and the economy (Reports, issue* (Washington, D.C.: W. R. Institute). Available at: https://oceanpanel.org/publication/ocean-solutions-that-benefit-people-nature-and-the-economy/.

UNCTAD (2022) *Country classification* (UNCTADstat). Available at: https://unctadstat.unctad.org/EN/Classifications.html (Accessed 25 August 2022).

UNEP (2018) *The principles: Sustainable blue finance* (UNEP). Available at: https://www.unepfi.org/blue-finance/the-principles/ (Accessed 17 October 2022).

UNEP (2020). *UNEP environmental, social and sustainability framework (ESSF)* (UNEP). Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/32022/ESSFEN.pdf?sequence=1&isAllowed=y.

Vestergaard, O. (2022) *Sustainable blue economy transition framework advancing the sustainable blue economy in ASEAN region, online*. Available at: https://www.unep.org/events/webinar/advancing-sustainable-blue-economy-asean-region.

Voyer, M., Allison, E. H., Farmery, A., Fabinyi, M., Steenbergen, D. J., van Putten, I., et al. (2021a). The role of voluntary commitments in realizing the promise of the blue economy. *Global Environ. Change* 71, 102372. doi: 10.1016/j.gloenvcha.2021.102372

Voyer, M., Benzaken, D., and Rambourg, C. (2022). Institutionalizing the blue economy: an examination of variations and consistencies among commonwealth countries. *Philos. Trans. R. Soc. London. Ser. B Biol. Sci.* 377 (1854), 20210125–20210125. doi: 10.1098/rstb.2021.0125

Voyer, M., Quirk, G., Farmery, A. K., Kajlich, L., and Warner, R. (2021b). Launching a blue economy: crucial first steps in designing a contextually sensitive and coherent approach. *J. Environ. Policy Plann.* 23 (3), 345–362. doi: 10.1080/1523908X.2020.1856054

Voyer, M., Quirk, G., McIlgorm, A., and Azmi, K. (2018). Shades of blue: what do competing interpretations of the blue economy mean for oceans governance? *J. Environ. Policy Plann.* 20 (5), 595–616. doi: 10.1080/1523908X.2018.1473153

Voyer, M., Quirk, G., McIlgorm, A., Azmi, K., Kaye, S., and McArthur, M. (2017). *The blue economy in Australia: Conceptualising the blue economy, its relationship with maritime security, and its role in Australian oceans governance* (Canberra, Australia: Sea Power Centre). Available at: http://www.navy.gov.au/media-room/publications/sea-power-series-blue-economy-australia.

Winther, J.-G., Dai, M., Douvere, F., Fernandes, L., Halpin, P., Hoel, A. H., et al. (2020). *Integrated ocean management (Blue paper, issue* (WRI - Washington, D.C.: W. R. Institute). Available at: https://oceanpanel.org/publication/integrated-ocean-management/.

WWF (2015). *Principles for a sustainable blue economy* (Solna, Sweden: WWF). Available at: https://www.wwfbaltic.org/report/principles-for-a-sustainable-blue-economy/.