2017
#GGSD
Forum

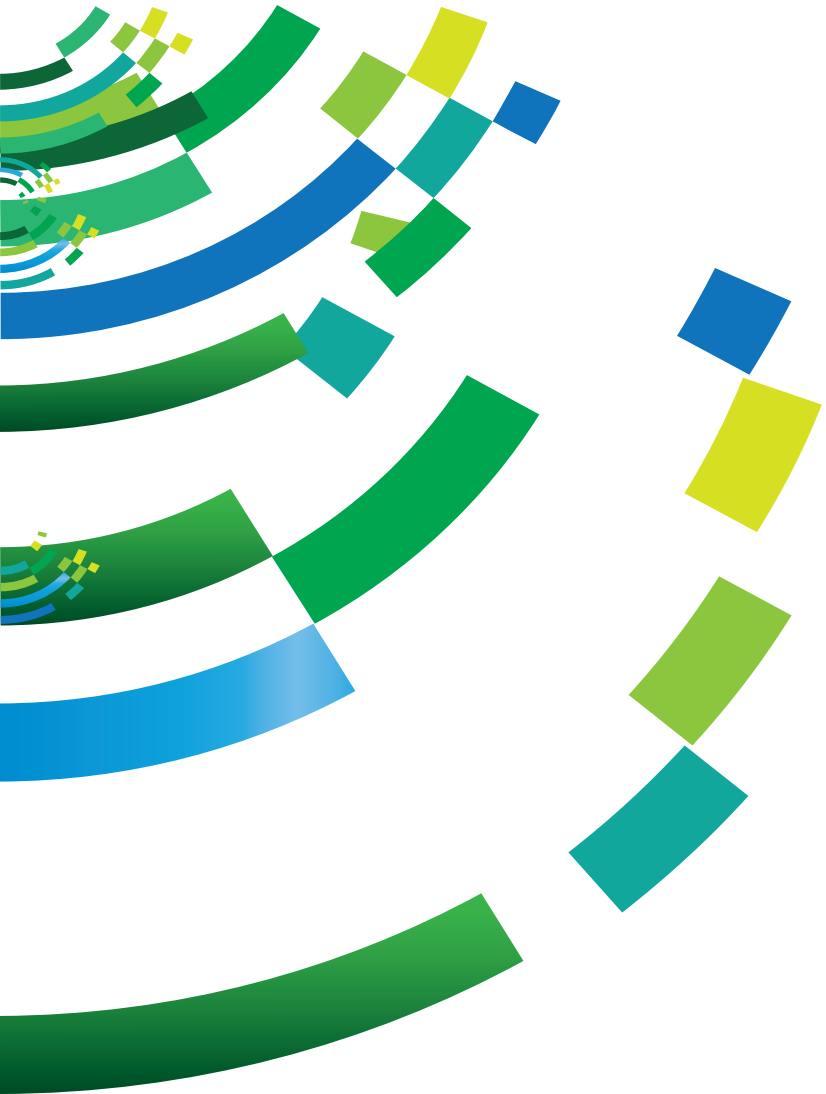
Greening
the
Ocean
Economy

Part of OECD Ocean Economy Week

21 & 22 November
OECD, Paris

Issue Paper

A preliminary assessment of indicators for SDG 14 on "Oceans"



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Authorship and acknowledgements

This issue note was prepared for the 2017 GGSD Forum on Greening the Ocean Economy to steer discussions during the conference, in particular around the theme of Parallel Session A: "Monitoring progress of the SDG 14 implementation". This issue note was prepared by Dr. Laura Recuero Virto (French Ministry of Foreign Affairs and International Development). It was produced under the supervision of Kumi Kitamori, Head, Green Growth and Global relation Division, the OECD Environment Directorate. It benefitted from OECD staff contributions including comments from Jaco Tavenier, Katia Karousakis, Myriam Linster, Ivan Haščič, Frank Jesus, Roger Martini, Antonia Leroy, Claire Jolly, Nora Takrouri-Jolly, Bob Diderich, Takahiro Hasegawa, Gérard Bonnis, Laurent Daniel, Olaf Merk, Renske Schuitmaker, Claire Delpeuch, Fabiana Cerasa, Catherine Gamper, Xavier Leflaive and Sébastien Miroudot, with editorial guidance by Jaco Tavenier and Dulika Rathnayake of the OECD Environment Directorate. It benefitted also from external experts' comments including Anne-France Didier, Fred Vey, Claire Plateau, Yves Henocque, Elisabetta Bonotto, Wendy Watson-Wright, Roland Cormier, Mike Elliot, Martin Visbeck, Mark Dickey-Collas, Jean-Louis Weber, Philippe Cury, Didier Gascuel, Alain Bisseau, Yann Kervinio, Victor Raynaud, Catherine Piante and David Le Blanc. The OECD designed the cover page. The opinions expressed herein do not necessarily reflect the official views of the OECD member states.

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Abbreviations

CBD	Convention on Biological Diversity
DAC	Development Assistance Committee
DPSIR	Driver-Pressure-State-Impact-Response
FAO	Food and Agriculture Organization
FSE	Fisheries Support Estimate
HELCOM	Baltic Marine Environment Protection Commission
IAEG-SDGs	Inter-Agency and Expert Group on SDG indicators
ICM	Integrated Coastal Management
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported and unregulated
LDCs	Least Developed Countries
MDGs	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MPAs	Marine Protected Areas
MSP	Marine Spartial Planning
OECD	Organisation for Economic Co-operation and Development
PCSD	Policy Coherence for Sustainable Development
PSMA	Port State Measures Agreement
SDGs	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SIDS	Small Island Developing States
UN	United Nations
UNCEEA	United Nations Committee of Experts on Environmental-Economic Accounting
UNGA	United Nations General Assembly
UNEP	United Nations Environment Programme
UNEP-WCMC	United Nations Environment World Conservation Monitoring Centre

Executive summary

'Tackling the Challenges of Sustainable Development Goal (SDG) Monitoring' is an important topic of which at different levels of government actors are facing many challenges. Hence, this Issue paper focuses on indicators for the SDG 14 on oceans, seas and marine resources, which consists of 10 individual targets. The paper describes the nature of these SDG 14 indicators and provides an overview of the factors that have an impact on the effectiveness of monitoring the SDG 14 targets. It reviews the existing framework for the SDG 14 indicators including uncertainty, irreversibility and thresholds in the marine context, and transboundary and terrestrial-marine spatial considerations at the regional and national levels. It examines potential synergies with Multilateral Environmental Agreements (MEAs) indicators, the role of big data, links among the SDG 14 targets and between SDG 14 and other SDGs targets. It touches upon the indicative correspondences of SDG 14 indicators to the United Nations (UN) System of Environmental-Economic Accounting (SEEA) definitions.

In addition, the preliminary indicators for the SDG 14 at the UN level proposed by the Inter-Agency and Expert Group on SDG indicators (IAEG-SDGs) are discussed. Some (non-exhaustive) indicators at the regional and national levels are also explored. This issue paper reviews the framework for the SDG 14 indicators, highlights existing gaps in the indicator set and proposes possible indicators that could be developed.

As a result of this analysis, some areas that could be considered for future work at the OECD in the framework of SDG 14 indicators are suggested. The paper concludes with four suggestions for further work:

(1) Contributing to SDG 14 through OECD's work on measurement and indicators

The OECD has developed harmonised indicators on the extent of marine protected areas (MPAs), broken down by management categories set by International Union for Conservation of Nature (IUCN), drawing on the work of UN Environment World Conservation Monitoring Centre (UNEP-WCMC) (OECD, 2017a). The OECD database on Policy Instruments for the Environment PINE (oe.cd/pine) already includes some ocean/marine-related policy instruments and could be further developed. For example, the PINE database could be expanded to include policy instruments such as payments for ecosystem services (also relevant to the marine environment). The OECD also regularly updates the Fisheries Support Estimate (FSE) database.

(2) Developing innovative approaches to SDG 14 data collection

A growing number of non-traditional sources of data concerning the ocean is becoming available, thanks to progress in data analytics. Technologies like blockchain which facilitates secure online transactions show promises of tracing fish from the boat to the supermarket. Real-time data from vessel transponders and satellite imagery can help spot illegal fishing and enable law enforcement. Drones may offer timely data on ocean conditions and fish stocks at a small fraction of the existing costs. The OECD could contribute to identifying and assessing, with relevant public and private stakeholders, using promising data sources that have been underutilized so far in producing official statistics.

(3) Fostering common approaches to valuing marine ecosystem services and national accounting to implement SDG 14

The OECD can promote and share lessons on various policy instruments available to conserve and sustainably use the oceans. The recent work undertaken by the OECD on the costs and benefits of MPAs could be expanded to other policy instruments (such as Marine Spatial Planning (MSP), individual transferable quotas for fisheries. The OECD could also foster common approaches, methodologies and sharing of best practices in areas such as the valuation of marine ecosystem services and integration of marine and maritime activities into national accounts. As part of this work, the OECD is convening a workshop on new approaches to evaluating the ocean economy on 22-23 November 2017.

(4) Providing incentives for best practice and peer-learning on SDG 14 indicators

The SDG indicators can be used to undertake a review process that takes stock of progress and provides incentives for best practice and peer learning (SDSN, 2015a). In line with its action plan on SDGs, the OECD continues to contribute to the development and enhancement of the UN-led Global Indicator Framework for SDGs. This is done by drawing on existing OECD expertise and helping to close data gaps by developing methodologies and capacities in support of the internationally agreed SDG monitoring and evaluation initiatives. In this regard the OECD can provide further incentives for best practice and peer learning on SDG 14 indicators.
https://www.oecd.org/dac/Better%20Policies%20for%202030.pdf

1. The rationale for the SDG indicators with a special focus on SDG 14

1.1 The 2030 Agenda for Sustainable Development and the SDG indicators

On September 25, 2015 the 193 Member States of the United Nations General Assembly (UNGA) adopted the 2030 Agenda for Sustainable Development. The 2030 Agenda is the world's first global agreement to provide a comprehensive agenda for action, to support transformations towards social, economical and environmental sustainability (Unger *et al.* 2017). Its 17 Sustainable Development Goals (SDGs) and 169 targets will guide the activities of diverse actors over the coming years (UN, 2015a).[1] The SDGs are intended to address sustainable development processes in both developed and developing countries, in order to facilitate action at all levels and with all actors including governments, civil society, private sector, science community and to strengthen the capacity of the State to achieve the desired outcomes (Houghton, 2014).

Among its 17 SDGs, SDG 14 on oceans will guide the activities of various actors on "conserving and sustainably using the oceans, seas and marine resources for sustainable development". The oceans provide services that are of direct economic importance, contribute to well-being and is a critical component of the life support systems. The oceans are, however, subject to pressures such as over-exploitation of marine resources, pollution and climate change that compromises their ability to deliver these services.

A robust follow-up and review mechanism for the implementation of the 2030 Agenda requires a solid framework of indicators to monitor progress, inform policy and ensure accountability of all the stakeholders. The IAEG-SDG on indicators proposed a global indicator framework that the UNGA adopted in March 2016 and revised in March 2017 to track progress at the global level and for collective action towards achieving the 17 SDGs (UN, 2016a; 2017a). The United Nations Statistical Commission agreed at its 48th session that this global indicator framework would include annual refinements of the indicators and two comprehensive revisions in 2020 and 2025 (UNSC, 2017a).

Global monitoring should be based, to the greatest possible extent, on comparable and standardised national data obtained through well-established reporting mechanisms from countries to the international statistical system (UN, 2016a). To complement the set of global indicators, Member States should develop more detailed indicators at the regional and national levels to track success at those scales (UNSC, 2017a). Member States could set regional and national review timelines and processes according to local needs and could report the outcomes of these reviews to the UN's annual High-Level Political Forum on Sustainable Development (SDSN, 2015a).

1.2 The policy relevance of the SDG 14

The oceans provide goods and services that are of direct economic relevance for sectors such as fisheries, aquaculture, offshore oil and gas, shipping, tourism and offshore wind energy (Visbeck *et al.,* 2014). The oceans economy's value stands at USD 1.5 trillion in 2010 (or 2.5% of the world gross value added) and is projected to double its contribution by 2030, with the fastest growth in offshore wind energy, marine aquaculture, fish processing and port activities (OECD, 2016a). More broadly, coastal areas within 100 kilometres off the oceans account for 61% of the global gross national

[1] The SDGs build and expand on the Millennium Development Goals (MDGs), a global-goal setting process with a series of time-bound and quantified targets for the period 2000-2015. See annex 1 on how MDGs contribute to SDG 14.

product (UNEP, 2006). The oceans accounted for 31 million direct full-time jobs in 2010, mainly in industrial capture fisheries and tourism (OECD, 2016a). Moreover, 350 million jobs are linked to the oceans through fishing, aquaculture, tourism and research (UNCTAD, 2014).

Aggregate income figures do not adequately reflect how the oceans contribute to well-being, particularly at the local level through food security, nutrition and income, as sources of poverty alleviation and livelihood opportunities (Mills *et al.*, 2011). Regarding human health, 4.3 billion people obtain about 15% of their intake of animal protein through fish consumption and about one billion people depend on fish for their primary source of protein (FAO, 2000; UNDESA, 2014). Fisheries and aquaculture assure the livelihoods of 10-12% of the world's population with over 90% of those employed by capture fisheries working in small-scale operations in developing countries (FAO, 2014). These services are particularly relevant for 54 coastal and island countries, the majority of which are developing nations, given that the oceans constitute up to two thirds of their total national territory (Islam, 2015).

The oceans are an essential life support system of the Earth (Rockström *et al*., 2009; UNCSD, 2012). They provide ecosystem services including water filtration, coastal protection, biodiversity provisioning, nutrient cycling, carbon sequestration and recreational areas for tourism (OECD, 2017a). These have been estimated to be worth approximately USD 250 000 billion per year (Nelleman *et al*., 2009). The oceans, for example, are the primary regulator of the global climate, recycling over 93% of the carbon dioxide and absorbing about 30% that humans produce (IOC/UNESCO, IMO, FAO, UNDP, 2011). In addition, the oceans have absorbed 90% of the energy from the warming of the Earth in the last few decades (Turley *et al.,* 2013) and provide us with half of the oxygen we breathe (UNCSD, 2012).

While ensuring healthy and productive oceans is vital for achieving sustainable development, pressures from human activities are compromising the ability of the oceans to continue to deliver economic, social and environmental benefits (UNCSD, 2012). Key pressures include over-fishing and over-exploitation of marine resources, pollution, invasive alien species, habitat destruction and climate change (UNDESA, 2014; OECD, 2017a). For instance, 85% of the world's fisheries are fully exploited or overexploited, depleted or recovering from depletion (FAO, 2016). Overfishing has resulted in lost benefits to fishing nations of roughly USD 50 billion per year (World Bank and FAO, 2009).[2] The global value of catch from Illegal, Unregulated and Unreported (IUU) fishing has doubled between 2004 and 2011, resulting in losses of between USD 10-23 billion per year (Pew Environmental Group, 2011; UNCSD, 2012).

When it comes to pollution of the oceans, 80% comes from land-based sources (Diaz and Rosenberg, 2008). Marine pollution mainly results from direct discharge, land run-off, ship pollution, atmospheric pollution and deep sea mining (OECD, 2017a). Moreover, up to 80% of all litter in our oceans is made of plastic. By 2050, oceans will carry more plastic than fish and an estimated 99% of seabirds will have ingested plastic (UNEP and GRID-Arendal, 2016). Excess nutrients lead to eutrophication, which, if left unchecked, can lead to hypoxic dead zones which have increased 10

[2] For the base year, 2004, the 95% confidence interval for the lost economic benefits in the global marine fishery was found to be between USD 26 billion and USD 72 billion, with the most likely estimate to be on the order of USD 50 billion. This estimate does not take account of several important factors and is thus a conservative estimate of the potential losses.

fold between 1969 and 2010 (UNCSD, 2012). Invasive alien species are introduced to different habitats through ballast water from commercial shipping, also resulting in adverse impacts on marine industries as well as human health (OECD, 2017a). For instance, 7000 marine species are carried around the world in ballast water every day (WWF, 2009). There are invasive alien species in 80% of the world's 232 marine ecoregions (IOC/UNESCO, IMO, FAO, UNDP, 2011).

Habitat destruction along the coast and in the oceans results from harmful fishing practices, poor agricultural practices, coastal development, forestry sectors, mining, dredging and anchoring, and tourism (OECD, 2017a). Such destruction significantly compromises or eliminates the conditions necessary for plants and animals to survive.

With the absorption of the carbon dioxide from the atmosphere the oceans are also becoming increasingly acidic at a rate that is 10 times faster nowadays than in the last 65 million years leading to decreased survival, calcification, growth, development and abundance of marine organisms (Noone *et al*., 2012; Kroeker *et al.,* 2013). The negative effects of climate change also includes increased frequency, intensity of weather and climate extremes, ocean warming, sea-level rise, as well as changes in ocean circulation and salinity (UNDESA, 2014).

The adverse impacts of climate change on the oceans by 2100 are estimated to cost between USD 600 million and USD 2 trillion (Noone *et al.,* 2012). Climate change is threatening the survival and well-being of Small Island Developing States (SIDS) and coastal communities in developing countries (Cicin-Sain *et al.*, 2011). For instance, increase in frequency and intensity of extreme events such as hurricanes and floods due to climate change, will further increase the damage already in excess of 20% of the gross domestic product in many SIDS (Payet, 2008).

To summarise, the SDG 14 targets cover the aforementioned anthropegenic pressures on the marine environment (targets 14.1–14.6, 14.a and 14.c) as well as the SIDS and coastal communities which are particularly dependent on the oceans and are thus impacted by the negative socioeconomic impacts (targets 14.3, 14.6, 14.7, 14.a and 14.b) (Table 1). The interlinkages amongst the SDG 14 targets, between SDG 14 and other SDGs targets are summarised in Annex 3.

Table 1. SDG 14 targets

SDG 14 targets	
14.1	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution
14.2	By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
14.3	Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels
14.4	By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics
14.5	By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information
14.6	By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation[3]
14.7	By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism
14.a	Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries
14.b	Provide access for small-scale artisanal fishers to marine resources and markets
14.c	Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The future we want"

Source: UN (2015a).

[3] Taking into account ongoing World Trade Organization negotiations, the Doha Development Agenda and the Hong Kong ministerial mandate.

Table 2. SDG 14 examples of indicators for SDG 14

Target	Global indicator	Source	Availability	Disaggregation	Type
14.1	14.1.1 Index of coastal eutrophication (i) and floating plastic debris density (ii)	MEA – United Nations Environment Programme in co-operation with Intergovernmental Oceanographic Commission	From 2021	National	State(i) Pressure(ii)
14.2	14.2.1 Proportion of national exclusive economic zones managed using ecosystem-based approaches	MEA - United Nations Environment Programme in co-operation with Intergovernmental Oceanographic Commission	From 2021	National	Response
14.3	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	MEA – Intergovernmental Oceanographic Commission in co-operation with United Nations Environment Programme	After 2020	Global, regional	State
14.4	14.4.1 Proportion of fish stocks within biologically sustainable levels*	MEA – Food and Agriculture Organisation***	1974 - 2013	Global	State
14.5	14.5.1 Coverage of protected areas in relation to marine areas	MEA - United Nations Environment Programme's World Conservation Monitoring Centre, BirdLife Index, International Union for Conservation of Nature***	2000 - 2017	National	Response
14.6	14.6.1 Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing	MEA - Food and Agriculture Organisation	After 2017	National	Response
14.7	14.7.1 Sustainable fisheries as a proportion of gross domestic product in small island developing States, least developed countries and all countries**	Food and Agriculture Organisation	No set date	National	State
14.a	14.a.1 Proportion of total research budget allocated to research in the field of marine technology	Intergovernmental Oceanographic Commission in co-operation with United Nations Environment Programme	From 2018	National	Response

14.b	14.b.1 Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries	MEA - Food and Agriculture Organisation	From 2016	National	Response
14.c	14.c.1 Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nation Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources	United Nations Division for Ocean Affairs and the Law of the Sea, Office for Legal Affairs	No set date	National	Response

Notes: The IAEG-SDGs will revise this list of indicators in 2020. The acronym "MEA" in the data sources signals that the SDG 14 indicators are also used for reporting in at least one key MEA. The type is defined according to the DPSIR framework. *: "IUU fishing" is a possible additional indicator (UNSC, 2017a). **: "The economic impact of sustainable fisheries, aquaculture, tourism and other coastal and marine resources uses" and "the productivity of aquaculture" are possible additional indicators (UNSC, 2017a). ***: Data available at: https://unstats.un.org/sdgs/indicators/database/.

Source: IAEG-SDG (2016) and UNSC (2017a; 2017b; 2017c).

2. The SDG 14 indicators: examples, frameworks and concepts

2.1 Effective SDG 14 monitoring and implementation through SMART SDG 14 targets

Effective monitoring and evaluation of SDG 14 requires SMART SDG 14 targets (Specific, Measurable, Attainable, Relevant [for all countries], and Time-bound) (OECD, 2015b). While some of the targets are fairly SMART (e.g. 14.5) with clear quantitative targets, others such as targets 14.1, 14.2, 14.3, 14.7 and 14.b are less so. For instance, target 14.3 could have been reformulated to "ensure that the pH level of the uppermost ocean layer does not fall by more than 0.2 units compared to pre-industrial figures" (Loewe and Rippin, 2015). Targets 14.3, 14.4 and 14.b would need to be time bound to be concrete (Loewe and Rippin, 2015). In practice, it appears that the IAEG-SDGs chose starting points for individual SDG 14 targets as being "here and now", without taking a scientifically verifiable baseline into account (Houghton, 2014).

Most SDG 14 targets are not measurable in quantitative terms because the data is not yet available, particularly at the global level (section 3). According to the OECD (2015b), among the outcome targets, only target 14.5 is quantifiable, while targets 14.1, 14.3 and 14.7 are partly quantifiable. Target 14.2, in particular, involves the measurement of a poorly quantifiable subject. In addition, some of the targets are not sufficiently ambitious. For example, ICSU, ISSC (2015) and Loewe and Rippin (2015) argue that the IAEG-SDGs could have reformulated target 14.5 to "conserve at least 20-30% of the area of marine ecosystems through an ecologically representative and effectively managed system of marine protection areas and halt by 2050, the anthropogenic drivers of biodiversity loss". Targets 14.3 and 14.b would require clarification of the institutional framework within which, action would take place (Houghton, 2014).

2.2 Conceptual frameworks: different ways to look at the marine context

For policy relevance, the key issue is the policy question that an indicator seeks to answer (OECD, 1993; UNECE, 2017). The focus of countries in establishing indicator sets has generally been to meet the information needs of a national sustainable development strategy, without being based on an explicitly defined conceptual framework (UNECE, 2009). Where expressed explicitly, the framework may be based on the Pressure-State-Response approach developed by the OECD as well as the Driver-Pressure-State-Impact-Response (DPSIR) approach which makes all the components of the Pressure-State-Response model apparent. The DSPIR approach was adopted by the United Nations Development Programme in 1997 and is used by European Environmental Agency (OECD, 1993; UNECE, 2009).The DPSIR framework is consistent with the ecosystem approach in the marine context and can be applied to SDG 14 (Weber, 2010; de Jonge *et al.,* 2012; Cooper *et al.,* 2013; Loewe and Rippin, 2015).[4] These frameworks should integrate the multiple activities in a marine area and the continuum between adjacent ecosystems (Elliott *et al.,* 2007).[5] The complexity of the marine system will likely lead to a range of consequences, some of which will be unintended and

[4] The Pressure-State-Response model was initially developed to assess ecosystems. This model and its derived versions are not fully appropriate for monitoring all sustainable development dimensions. The risk assessment framework of the Intergovernmental Oceanographic Commission, risk - exposure - vulnerability, would be equally useful in the SDG 14 discussion, with identification of the cluster of countries at risk (UNEP, 2014a).

[5] Risk assessment and risk management frameworks to account for natural and anthropogenic hazards would complete a unifying framework for integrated marine management. Given the uncertainties and lack of data in human-ocean systems and internal ocean interactions, these analytical frameworks should be kept as simple as possible (MEEM, 2017).

others not apparent until some threshold state has been reached (Tett *et al.,* 2013).[6] The process of developing suitable SDG 14 indicators to measure the human-ocean system should be accompanied by the task of defining such safe minimum standards for interventions into the system (Visbeck *et al*., 2013).

The capital-accounting approach is an alternative sustainable development indicator framework to the Pressure-State-Response approach (UNECE, 2009).[7] Under the capital-accounting approach, sustainable development can be measured by determining whether the economy's productive capacity is maintained or growing so that the wealth of future generations will not decrease (Rickels *et al*., 2016). However, the role and value of the oceans for this productive capacity has not yet been appropriately considered (Visbeck *et al.*, 2014).

Under this approach, it is possible to define requirements on possible pathways for increasing economic activities in a sustainable way, in the same manner as the safe minimum standards (Visbeck *et al.*, 2014). In addition, it is possible to interpret the SDG 14 indicators within a comprehensive framework that is compatible with macro-economic indicators and the budgeting process, i.e. the UN SEEA which provides formal definitions and guidance for measuring capital stocks. An analysis of the correspondence of individual SDG indicators and SEEA variables shows where synergies exist and should be considered for a cost effective implementation of both frameworks (Annex 2).

2.3 The multidimensionality of the SDG 14 indicators

The transboundary and terrestrial-marine spatial considerations should be taken into account in order to ensure that the SDG 14 can be action-oriented (Houghton, 2014). The main spatial scales of intervention for each of the SDG 14 targets determine the most relevant geographical spans for the provision of indicators: subnational, national, transnational, regional or global (Annex 2, Table A2).

There are different approaches to integrating these spatial considerations. For instance, the Global Water Partnership's Mediterranean experience and guidelines for an "Integrative methodological framework for coastal, river basin and aquifer management" brings together the integrated water resources management (including surface water and groundwater management), spatial planning, climate change adaptation and integrated coastal management (ICM), instead of preparing them separately (UNEP/MAP - PAP/RAC *et al.,* 2015). Further into the sea, MSP can also be a means for integrating these spatial considerations (Visbeck *et al.*, 2013).

2.4. Potential synergies between Multilateral Environmental Agreements and SDG 14 indicators

There are synergies between the SDG 14 targets and key MEAs such as the Convention on Biological Diversity (CBD) and its 20 Aichi targets as well as the Ramsar Convention on wetlands (Table 3) and their associated indicators. In addition also other agreements such as the Port State Measures

[6] Ensuring sustainable development under uncertainty requires attributing sustainability criteria to current actions instead of attributing them to future unknown states (Baumgärtner and Quaas, 2010). For that reason, avoiding potential critical zones for certain actions can ensure safe minimum standards of conservation (Ciriacy-Wantrup, 1952).

[7] A limitation of the Pressure-State-Response approach is that it does not work if evidence for causal linkages is missing. In addition, there may be multiple pressures for most states, and multiple states arising from pressures, which create difficulties in identifying indicators (Pintér *et al.,* 2005).

Agreement (PSMA) and various Food and Agriculture Organization (FAO) standards of conduct are relevant.

Table 3. Expected synergies between some key MEAs and SDG 14 targets

MEAs	SDG 14 target
Convention on Biological Diversity	14.1 14.2 14.3 14.4 14.5 14.6 14.7 14.a 14.b 14.c
Convention on Wetlands	14.1 14.2 14.3 14.5 14.7 14.b 14.c
Convention on the Conservation of Migratory Species of Wild Animals	14.2 14.4 14.5
United Nations Framework Convention on Climate Change	14.2
Regional Seas Conventions and Action Plans	14.1 14.2 14.3 14.5 14.7 14.a 14.b 14.c
Chemicals conventions (Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Stockholm Convention on Persistent Organic Pollutants and others)	14.1
Convention on International Trade in Endangered Species of Wild Flora and Fauna	14.2 14.4

Notes: This table displays a non-exhaustive list of MEAs. For instance, the Port State Measures Agreement (PSMA) and various FAO standards of conduct are also relevant.

Source: Author's elaboration based on UNEP (2016) and Ramsar (2017).

Table 4. Synergies between indicators: CBD Aichi Biodiversity targets and SDG 14 targets

Aichi Biodiversity target	Generic Aichi indicator	SDG 14 target	Specific indicator
Target 4 - By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Trends in population and extinction risk of utilized species including species in trade	14.2	Proportion of national exclusive economic zones managed using ecosystem-based approaches
Target 6 - By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Trends in proportion of fish stocks outside safe biological limits	14.4	Proportion of fish stocks within biologically sustainable levels
	Trends in fishing practices	14.6	Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing
	Trends in catch per unit effort	14.b	Progress by countries in the degree of application of a legal /regulatory /policy/institutional framework which recognizes and protects access rights for small-scale fisheries
Target 8 - By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity	Trends in pollution	14.1	Index of coastal eutrophication (ICEP) and floating plastic debris density
Target 10 - By 2015, the multiple Anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	Trends in pressures on coral reefs	14.3	Average marine acidity (pH) measured at agreed suite of representative sampling stations
Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area based conservation measures, and integrated into the wider landscapes and seascapes.	Trends in area of coastal and marine areas conserved	14.5	Coverage of protected areas in relation to marine areas

Source: CBD (2016b). For complementary analyses, see Rockström (2014) and HELCOM (2017).

3. Preliminary indicators for SDG 14

This chapter provides an overview of the preliminary indicators for SDG 14. It highlights the UN level indicators work proposed by the IAEG-SDGs. It also explores some (non-exhaustive) indicators at the regional level as they better reflect regional challenges of governments.

During the development of the SDG 14 targets under the UN, a decision was made not to consider existing data availability to monitor progress towards these targets as the aim was to be policy relevant first and subsequently to pay attention to the measurement agenda. For this goal, therefore, eight out of 10 indicators are **currently not available compared to 58% for all SDGs indicators** as listed in Table A8 in Annex 6. The indicators should in fact meet the following criteria: (i) relevant; (ii) methodologically sound; (iii) measurable; (iv) easy to communicate and access; (v) limited in number; and (vi) outcome focused at the global level (UN, 2015b).[8] The IAEG-SDGs has classified the global indicators into three categories based on the soundness of methodology and the availability of data (UNSC, 2017c). While the SDG 14 was the only goal with no publicly available data by mid-2016, the United Nations Statistics Division currently provides open access to the two available SDG 14 indicators, namely 14.1.1 (index of coastal eutrophication and floating plastic debris density) and 14.5.1 (coverage of protected areas in relation to marine areas) (Dunning and Kalow, 2016).[9] Without publicly accessible data, citizens and external groups cannot keep United Nation Member States accountable for their progress in implementing the SDG 14 (OECD, 2016e).

The indicator for the target 14.4 is the "proportion of fish stocks within biologically sustainable levels" (FAO, 2011). It is a global indicator, covering about 57% of the global catch. There is currently no data available at country level because (i) fish migrates across areas beyond national jurisdictions; (ii) there can be political sensitivities; and (iii) it is data-intensive and technically demanding as it needs stock assessment (IAEG-SDG, 2016; UNSC, 2017c). Beyond the SDG framework, there are several targets for this indicator. For instance, the World Summit on Sustainable Development proposed reaching 100% by 2015 and the CBD (Aichi Target 6) implicitly propose attaining 100% by 2020 (IAEG-SDG, 2016) (Table 4).

The indicator for the target 14.5 is the "coverage of protected areas in relation to marine areas" (with data provided by UNEP-WCMC). This indicator could be complemented with an additional indicator that aims to recognise the variation of biodiversity importance (benefits) over space (see e.g. Brander *et al.,* 2015). This would help to inform the siting of MPAs, to ensure that adequate attention is given to areas that have highest biodiversity benefits and are under most threat (OECD, 2017a). In addition, a complementary indicator could also measure the effectiveness of protected areas in achieving their objectives, which ultimately depends on a range of management and enforcement factors (OECD, 2017a; OECD, 2017h; MEEM, 2017). In 2017, protected areas cover 13.2% of the marine environment under national jurisdiction (up to 200 nautical miles from shore),

[8] This is the official criteria defined by the UN for the development of SDG global indicators. In general terms, effective SDG 14 monitoring and implementation requires SMART SDG 14 targets and indicators (OECD, 2015b).

[9] Open information sources provide access to knowledge without the need to pay for the knowledge itself, although there may be marginal fees for access (membership in associations, attendance at conferences, subscriptions to journals) (OECD, 2008a).

0.25% of the marine environment beyond national jurisdiction and 5.3% of the total global ocean area.

Building on the United Nations global indicator framework, regional indicators should better reflect regional challenges. In this context the work of regional sea conventions e.g OSPAR, HELCOM and Barcelona are relevant as these conventions cover parts of the marine environment. The selected indicators should have (i) face validity, i.e. are related to the main thrust and intention of the relevant target; (ii) discriminatory power, i.e. show a range of performance among regional members while speaking to the country's reality; (iii) broad availability, covering at least 50-60% of countries for a relatively recent year; and (iv) high statistical quality, i.e. Computed according to internationally accepted standards, guidelines or good practices (OECD, 2017h). Examples of indicators available at the regional level are also provided below and in Table A9 in annex 7. [10] Such analysis will evolve as additional indicators are produced (UNEP, 2014b; Makarenko, 2016; Giraud, 2017; HELCOM, 2007).[11]

3.1. Examples of Indicators

SDG 14.1 - on marine pollution

Marine pollution originates from a number of land-based and marine sources, including discharges, agricultural and industrial run-off, urban outfalls, municipal and industrial wastewater, atmospheric deposition, illegal and indiscriminate dumping, accidents (e.g. oils spills) fishing operations, maritime transport and off-shore activities (e.g. seabed mining) (UN, 2017c; UNGA, 2017). As a result, there is relatively large number of indicators that are available to monitor target 14.1.[12] Depending on the indicator, only a small subset of countries may be able to provide the information, e.g. the European Union descriptor addressing eutrophication. Other indicators such as the gross phosphorus balance, measuring nutrient input with respect to nutrient output, do not show large variances among developed countries and may not be informative. The data on gross nitrogen balance, in contrast has sufficient variance to be an informative indicator on marine nutrient pollution (The Federal Government of Germany, 2016).

Marine pollution is largely land-based but also airborne and that make OECD's indicators on air emissions of nitrogen oxides, sulphur oxides and particulate matter useful (US EPA, 2015; OECD, 2015f). Shipping emissions in ports for instance, are substantial accounting for 0.4 million tonnes of nitrogen oxides, 0.2 million of sulphur oxides and 0.03 million tonnes of particulate matter (PM10) in 2011 (Merk, 2014; OECD, 2014). Response indicators such as wastewater treatment plants and pressure indicators such as marine litter can be particularly relevant to monitor marine pollution in coastal areas bordering large urban areas, especially in developing countries (UN, 2017b). Response indicators based on policy instruments to tackle marine pollution such as standards and taxes on (nitrogen oxides, sulphur oxides and particulate matter) should also be useful (OECD, 2016f; OECD, 2017d).

[10] Annex 8 summarises SDG 14 indicators at the national level for France since this country has made some progress on this topic.

[11] Section on the "Marine Environment" of the OECD State of the Environment Questionnaire is awaiting a revision. Some data are available for reporting under MEA.

[12] Not every indicator is equally useful in stand-alone. For instance, even though a pressure indicator such as fertilizer consumption is closely related to policy measures, it may conflict with other SDGs addressing food production and poverty reduction, depending on how it is measured (Rickels *et al.,* 2016).

SDG 14.2 - on the management, protection and restoration of marine and coastal ecosystems

While having a pivotal role among SDG 14 targets, this target is often considered too broad and vague for guiding implementation (Loewe and Rippin, 2015). The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors (McLeod *et al.,* 2005). Ecosystem-based management has gained international popularity in recent years, but the lack of consensus on its definition has precluded the use of a universal implementation framework (Bianchi and Skjoldal, 2008).[13] Without integrated management of all the marine and coastal pressures, damage will be done to coastal ecosystems and their resilience will be reduced (UNGA, 2017). The percentage of coastal and marine development with formulated or implemented ICM and MSP based on an ecosystem approach can be a possible indicator (Rickels *et al*., 2016; UNEP, 2014a). MSP should be linked to ICM to respect the transitional character and interdependencies of coastal and marine systems (Visbeck *et al.*, 2013). (See also the other GGSD Forum conference Issues Paper "Marine Spatial Planning: Assessing net benefits and improving effectiveness" by Dr. Stephen Jay.) ICM and MSP provide useful policy arenas to frame and resolve spatial conflicts and conflicting interests in the pursuit of coastal resilience. Yet, there is criticism that current MSP models are not capable of addressing the questions MSP raises (Spalding, 2011).[14]

In any case, in certain regions such as the European Union, the overall variation of an indicator on formulated and adopted ICM and MSP plans is rather low (Rickels *et al*., 2016). An alternative could be to use indicators on the length of coastal modification and square kilometre of coastal reclamation or on the social and economic losses to hazardous events (OECD, 2016g; Makarenko, 2016). Baltic Marine Environment Protection Commission (HELCOM) proposes an indicator on the proportion of sea areas in a good environmental status with regards to eutrophication, hazardous substances and biodiversity (HELCOM, 2017). See (Annex 7) for detailed information on HELCOM indicators.

SDG 14.3 - on ocean acidification

The indicator for SDG target 14.3 can measure actions to minimise and address the impacts of ocean acidification (ICSU, ISSC, 2015). Carbon emission reductions are needed for mitigation. The level of marine acidity is determined by the rate of global carbon emissions; at least as long as local alkalinity management is not considered (Rickels *et al*., 2016). Policy instruments to tackle air pollution such as tax revenue from all CO2 emissions as a percentage of the gross domestic product and effective carbon rates can be useful as well (OECD, 2016f; UNGA, 2017; OECD, 2017d).

[13] There are a large number and variety of principles that make up this approach, as well as diversity in perspectives among key management players (Long *et al.,* 2015). The Conservation of Antarctic Marine Living Resources, for example, has a narrow set of ecological objectives, while the CBD integrates ecological, social and governance objectives (CCAMLR, 2001; CBD, 2011a). While the principles underlying ecosystem-based management will continue to develop, this should not delay its implementation (Long *et al.,* 2015). The International Council for the Exploration of the Sea, for instance, is reviewing which indicators they can supply building on their ecosystem overviews' assessments (ICES, 2016). While the assessments are mostly done using qualitative information, they should explore the quantitative approach for the next round of ecosystem overviews.

[14] Innovation in the management of the oceans' space would be particularly useful in four areas: the issue of the 'commons' and user rights, the need for institutional efficiency and flexibility, the necessary government coordination, and the engagement of all stakeholders at different governance scales, including concerned citizen groups (De Cacqueray, 2012; OECD, 2013a; OECD, 2013b; OECD, 2015c; OECD, 2016a).

The indicator for target 14.3 can also measure the impacts of ocean acidification (UNGA, 2017). Ocean acidification effects are not uniform and hence there is a need for local indicators (UN, 2017b). The choice of such indicators is not straightforward. Coral coverage, for instance, would not be the most appropriate indicator since it does not reflect the health of coral reef and coral cover degradation can also be a result of other pressures (Rickels *et al*., 2016). Since beaches are dependent on the production of sand from marine species producing carbonate minerals, a significant social and economic impact of a possible reduction in carbonate sand production is a cause of potential decrease in supply of sand (UN, 2017b).

SDG 14.4, 14.6 and 14.b - on the sustainable development of fisheries

There are three targets, 14.4, 14.6 and 14.b which explicitly focus on the sustainable development of fisheries, including trade-related aspects (UNCTAD, 2017a; UNCTAD, 2017b). Regarding the target 14.4 on effective regulation of fishing, reported global commercial catches have risen over time and are at about 80 million tons annually. In addition, there are large amounts of unreported artisanal and IUU fishing catches (UN, 2017c).

There is a close relationship between targets 14.2 and 14.4 since there is a need to have an ecosystem approach to fisheries to integrate exploitation and conservation (Worm *et al.,* 2009). The technical interactions (e.g. bycatch in mixed species fisheries) and the biological interactions (e.g. predator-prey relationships) should be integrated when providing advice on fisheries stock (Cury *et al*., 2011; Pikitch *et al.,* 2012). Whatever the choice, the indicator framework for this target should be as simple as possible, preferably based on a single metric (Augustyn *et al*., 2014; MEEM, 2017).

Target 14.4 builds on the MDGs and can be quantified through the maximum sustainable yield weighted by the catch in a given country. Whenever available, this indicator is usually preferred to the safe biological limits statistic, since under the latter fish stock renewal is not warranted (EC, 2013; MEEM, 2017). Other issues associated with the indicator on the safe biological limits are that countries share fish stock and it is difficult to assess the situation where some fish stocks are below the safe biological limit and others are not (Rickels *et al.,* 2016). The maximum economic yield is a more conservative measure than the maximum sustainable yield and is used in countries such as United States, Australia and South Africa (MEEM, 2017).

SDG 14.5 - on conserving at least 10% of coastal and marine areas

MPA coverage, MPAs with management plans and MPAs effectiveness are all relevant indicators for SDG target 14.5. In particular, management effectiveness is one of the most important problems of MPAs due to insufficient resources, multiple jurisdictions, conflict between different activities and users, and lack of awareness (UNGA, 2017). So far, HELCOM proposes the percentage of MPAs having management plans or measures in place (HELCOM, 2017). The OECD has developed harmonised indicators on MPA extent, broken down by IUCN management categories, drawing on the work of UNEP-WCMC (OECD, 2017f).

SDG 14.6 - on fisheries subsidies

Fisheries subsidies can have tangible benefits, but can also contribute to overcapacity and overfishing, and can be trade distorting (UNGA, 2017). The international consensus to discipline subsidies is hampered by their technical complexity, political sensitivity and the limited transparency

on the nature of the measures (Hege *et al.,* 2014; UN, 2017b).[15] As a result, data estimates for fisheries subsidies show large differences (UNCTAD, 2017a).[16] The OECD has developed a classification system for support, and released an inventory of USD 7 billion of budgetary support delivered in 2015 (OECD, 2017c). As it is updated annually, this Fisheries Support Estimate (FSE) database could form the basis of an indicator of progress for target 14.6. The database provides information on transfers to fishers, expenditures on general services and costs recovery charges.

The FAO defines small-scale, artisanal fisheries as those that are household based, use relatively small amounts of capital and remain close to shore. However, due to the diverse nature of small-scale fisheries in different countries, there is no globally agreed definition (IAEG-SDG, 2015). Besides, such type of data is rarely included in national catch statistics (UN, 2017c). In fact, this target mainly concerns SIDS and LDCs because of the role of small-scale fisheries in food security.[17] In many developing countries, small-scale fisheries provide more than 60% of the protein intake (UNGA, 2017).

Trade-related indicators can be useful since small-scale fisheries stakeholders often cannot adapt to, and benefit equitably from, opportunities of global market trends (UN, 2017c). Small-scale fisheries increasingly face significant non-tariff barriers (UNCTAD, 2017b). The Ocean Health Index indicator on artisanal fishing opportunities is a possible indicator since it assesses whether people who need to fish on a small, local scale have the opportunity to do so (Halpern *et al.,* 2012). Given that sustainable fisheries not only involve small-scale fisheries, the International Council for the Exploration of the Sea indicator on fishing mortality could also be considered (Rickels *et al.,* 2016).

SDG 14.7 - on economic benefits to SIDS and LDCs

Coastal livelihoods and economics, tourism and recreation from the Ocean Health Index can provide some proxy indicators to monitor target 14.7 on the economic benefits to SIDS and LDCs (Halpern *et al.,* 2012). In several developing countries, the ocean-based economy can be about 10% of the gross domestic product (Rickels *et al*., 2016). Meanwhile, tourism represents over one quarter of the gross domestic product in many SIDS (UNGA, 2017). To account for fisheries sustainability, fishing conforming to the Marine Stewardship Council standards can be compared to the total wild capture production as reported by the FAO. In addition, the OECD has data on official development assistance to fisheries and tourism. This indicator should be assessed against 14.4 (stronger regulation of fisheries), 14.5 (increasing the size of MPAs) and 14.6 (reducing subsidies for fisheries).

SDG 14.a - on scientific knowledge and marine technology

Although the formulation of target 14.a is quite broad, indicators on specific activities can be used as proxies for monitoring. To measure technology diffusion, indicators on the growth of species occurrence records, accessible through the Global Biodiversity Information Facility or technology diffusion in fisheries from the OECD's Agricultural and Fisheries Statistics are available. The OECD's

[15] There is a lack of consensus on basic concepts, definitions and prohibitions, official data is fragmented and often information is non-comparable, and there are insufficient incentives for all nations to cooperate regardless of levels of depletion (UNCTAD, 2017b).

[16] Since countries can implement substitutes to subsidies by reforming subsidies to different forms, complementary indicators can also be useful (IAEG-SDG, 2015; ICSU, ISSC, 2015). For instance, the indicator landings exceeding total allowable catch can measure how well fisheries regulations are enforced in the European Union (Rickels *et al*., 2016).

[17] Significant numbers of women work on small-scale fisheries and hence disaggregated data would be particularly useful.

Fisheries and Aquaculture Innovation Platform has data on research networks on the marine environment. The OECD Development Co-operation Directorate produces data on official development assistance to fishery research, waste management and disposal, and on flood prevention and control.

To capture whether scientific capacities and advice are part of the policy design, it is possible to use indicators such as the number of marine monitoring stations relative to the exclusive economic zones and the total allowable catches exceedance of scientific advice (Rickels et al., 2016). The public spendings on R&D in fisheries and shipbuilding from the OECD's Agricultural and Fisheries and Science, Technology and Innovation Statistics (OECD, 2017e) could also be indicators for scientific capacities. Indicators on technology transfer could be included in targets 14.7 and 14.c and on scientific capacities in the SDG 17 (Rickels *et al*., 2016; UN, 2017b).

SDG 14.c - on the rule of law

The legal framework for the oceans is complex and a wide range of international and regional legal instruments exist (UNGA, 2017). An indicator for target 14.c could reflect the participation of the different countries in the relevant legal instruments. The United Nations Statistical Commission proposed an indicator on the number of countries ratifying and implementing a range of protocols and conventions.[18] For European countries, an alternative indicator on the participation rate in international sea protocols has been proposed, and regional sea protocols fully covering the countries at stake (Rickels *et al.,* 2016) (Table A9 in annex 7). Effective enforcement of the provisions remains a challenge, particularly in SIDS and LDCs.

[18] The United Nations Statistical Commission proposed an indicator on the number of countries implementing either legally or programmatically the provisions set out in Regional Seas protocols, and ratifying and implementing the International Labour Organisation Maritime and Fisheries Conventions, progress by countries in the level/degree of implementation of the provisions of the Code of Conduct for Responsible Fisheries and associated guidelines and plans, as reported in the biannual questionnaire surveys, and the number of countries ratifying and implementing the International Maritime Organisation environmental conventions, e.g. the International Convention for the Prevention of Pollution from Ships, the London Convention/Protocol, and the Ballast Water Management Convention.

4. Possible areas for future OECD work relevant to SDG 14 indicators

This Section puts forward four recommendations for possible future OECD work that could contribute to SDG 14 indicators. Already available OECD indicators, as well as those that will be available in the short-term are discussed. First, contributing to SDG 14 through its work on measurement and indicators could be considered by the OECD. The second recommendation includes developing innovative approaches for SDG 14 data collection, based on new technologies and real-time data. Thirdly fostering common approaches, methodologies and conceptualizations for the valuation of marine ecosystem services and inclusion of marine/maritime activities in national accounts can be considered. A final recommendation focusses on using SDG indicators to inform a review process that takes stock of progress and provides incentives for best practice and peer learning.

Recommendation 1. Contributing to the SDG 14 through OECD's work on measurement and indicators.

With its information base on the environment, green growth and related topics, the OECD can already contribute to several SDG 14 indicators and is well positioned to produce improved and new data for monitoring progress (Table 5). In particular, the OECD is carrying out an update of the FSE database. It is also developing new indicators to monitor policies to fight IUU fishing to contribute to targets 14.4 and 14.6. The OECD is producing harmonised indicators on MPA extent broken down by IUCN management categories, responding to demands to fill this information gap, drawing on the work of the UNEP's World Conservation Monitoring Centre (OECD, 2017f). The OECD database on Policy Instruments for the Environment (oe.cd/pine) includes some ocean/marine-related policy instruments and could be further developed to capture such policies more systematically. Many of the statistics that are currently available have been included in the OECD Green Growth Indicators database (OECD, 2017d) and in the Environment Statistics database. Depending on the availability of improved data, further indicators could be developed and included in future editions of these and other OECD databases and in related publications (Tables A13 and A14 in annex 9).

Since marine pollution comes to a large extent from land-based sources, data and indicators on pressures such as nitrogen effluents from wastewater in coastal areas and micro-pollutants entering water sources could be further developed by the OECD (OECD, 2012). It is expected that investments in wastewater treatment in developed countries will stabilise, while surface and groundwater quality be restored in most OECD countries by 2050. But, some concerns remain related to diffuse sources of pollution such as runoffs from urban rainwater or agriculture water uses. The situation is projected to deteriorate in non-OECD countries. Micro-pollutants such as medicines, cosmetics, cleaning agents and biocide residues entering water sources are an emerging concern in many developed and developing countries. In addition, the OECD database on Policy Instruments for the Environment includes relevant information, for instance, on taxes on coastal wastewater discharge and on disposable plastic bags, charges on water effluents, grants for salt marshes and tradable permits in the context of fisheries. The database could be better exploited for monitoring SDG14 targets and further expanded to better account for policy instruments directed at prevention of pollutant infiltration, cleaning up of soil and water bodies and oceans and the marine environment more generally.

Table 5. SDG 14 and examples of relevant OECD work on data and indicators

SDG 14 Target	Existing OECD data and indicators	Data and indicators that the OECD could develop
14.1 marine pollution	Nutrient N, P balance Air emissions of nitrogen oxides, sulphur oxides, particulate matter Water quality River quality Wastewater treatment (% of population connected) Standards- nitrogen oxides, sulphur oxides, particulate matter Taxes – nitrogen oxides, sulphur oxides, pesticides, fertilizers	Nitrogen effluents from wastewater Micro-pollutants Plastic waste generation and recycling % of coastal urban population connected to a wastewater treatment system (cf. "Marine Environment" section of the State of the Environment Questionnaire) Expenditures and policies on prevention of pollutant infiltration, cleaning up of soil and water bodies
14.2 marine ecosystems	Number of threatened species (% of known species) based on an OECD questionnaire in line with the Red List of threatened species	Length of coastal modification Extent of coastal reclamation Direct social and economic costs in coasts and the oceans caused by (natural) disasters Number of countries having adopted and implementing maritime spatial plans Number of countries applying the ecosystem-based management approach Marine relevant policy response indicators based on the OECD Policy Instruments for the Environment database.
14.3 ocean acidification	CO_2 emissions (Production-based CO2 productivity Consumption-based CO2 productivity) SOx emissions (total, shipping) Fuel consumption or sales in shipping Tax revenue (% gross domestic product) - all CO2 emissions Effective carbon rates Fossil fuel support	Policy instruments directed at emissions from shipping Effective carbon rates and fossil fuel support accounting for maritime transport
14.4 IUU fishing	-	Indicators to monitor expenditures to fight IUU fishing, subsidies that potentially benefit IUU activities, and adoption of best management practices - forthcoming
14.5 conservation	Marine Protected Areas by IUCN management category, based on United Nations Environment World Conservation Monitoring Centre data	Land cover in coastal areas (wetlands, mangroves, …)
14.6 subsidies	Total budgetary support provided to the fishing sector	Change in composition of support to fishers—share of most harmful forms of support in total –forthcoming
14.7 development	Official development assistance (ODA) flows to fisheries and tourism sectors	ODA to sustainable fisheries, aquaculture and tourism as well as ocean conservation and sutainable use Existing data collected on ODA for tourism data could be filtered for marine relevance.
14.a science	Fisheries: Technology development and diffusion (based on patent data) Fisheries: R&D spending Shipbuilding: R&D spending Research networks Official development assistance to waste management and disposal; to flood prevention/ control; to fishery research + ocean conservation and sustainable use	Environmentally-relevant marine technology development and diffusion Environmentally-relevant R&D spending in marine sectors
14.b research	-	Small-scale fishers in seafood value chains Fish-related non-tariff measures for small-scale fishers
14.c technology	-	Participation rate in international and regional marine agreements

Notes: Some of the indicators listed are only indirectly relevant to SDG14, but provide important background information.

The OECD has started a project with the U.S. on how Pollutant Release and Transfer Registers (PrTR), i.e. a database to store information on emissions of pollutants at facility level, can be used to measure progress with meeting the SDGs (OECD, 2017g). It currently focuses mainly on SDG 12.4 (environmental sound management of chemical and waste) and not on SDG 14.1 as this database does not contain information on the destination of pollutants. Such work could be nevertheless complemented to track chemical pollution on freshwater and oceans.

The emissions on sulphur oxides are included in the Environment Statistics database. The impact of the sulphur emission requirements for shipping in the sulphur emission control areas (SECAs) in Northern Europe and North America introduced in 2015 on global trade flows has been negligible. The global sulphur cap of 0.50% for 2020, as decided by the International Maritime Organisation (IMO), will have a more significant effect on shipping costs, which could increase between 20% and 85% (OECD/ITF, 2016). The relatively large margin is due to the uncertainty surrounding the availability of low-sulphur ship fuel. In addition, the Science, Technology and Innovation, and the Development Co-operation Directorates could expand their databases on innovation and official development assistance to account for the weight of a more comprehensive range of marine activities, beyond fisheries, with focus on actives that are environmentally-relevant and promote sustainable management practices.

The OECD is working on improving the evidence base on the costs of natural disasters to align the different data gathering processes with the SDGs. This work concerns the urban delineation of disaster losses, i.e. SDG 11 that seeks to significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global GDP caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations (OECD, 2016g). This work could be extended to account for the direct social and economic costs in coastal zones and the oceans caused by disasters.

The OECD could contribute to the harmonisation of measurement methodologies. The lack of international harmonisation of measurement methodologies can have implications for interpretation and comparability. The use of marine ecosystem-based indicators by Regional Seas entities is disparate in terms of the different indicators, systems and terminology employed (UNEP, 2014a). The analysis of these indicators highlights different levels of specificity, different rationales for indicator selection, different levels of sophistication and for some parameters the use of qualitative indicator statements. For instance, Regional Seas entities have shared information on target 14.1 on marine pollution (chlorophyll-a and beach litter), and on target 14.2 (integrated coastal zone management).[19]

The most promising areas of work for the availability of indicators in the short-term building on national statistical and environmental monitoring systems are pollution flows (marine pollution from agriculture and other sources, wastewater treatment in coastal areas), land cover accounts (the OECD as a user of such land cover datasets, could continue developing methodologies for policy-relevant indicators, see OECD, 2017i), and environmental protection and resource management

[19] The Regional Seas entities that have shared information are HELCOM, the Mediterranean Action Plan, the Northwest Pacific Action Plan, the Regional Organization for the Protection of the Marine Environment, the Black Sea Commission, The Convention for the Protection of the Marine Environment of the North-East Atlantic, the Caribbean Environment Programme and the South Pacific Regional Environment Programme.

expenditures accounts, expanding on the OECD work and questionnaire on environmental expenditures, for instance (prevention of pollutant infiltration, cleaning up of soil and water bodies, and protection and rehabilitation of species and habitats) (OECD/Eurostat, 2005; OECD, 2008b; CBD, 2016a). There is a strong demand for expenditure data to i.a, identify financing gaps and to assess the effectiveness of policies (see the CBD financial reporting framework). The United Nations Development Programme's BioFin (biodiversity finance) project is working with 30 developing countries to help identify expenditure, financing gaps, and to develop biodiversity financing strategies. The OECD could extend its environmental indicators, including land cover, policy response and other expenditure data, as well as relevant data on official development assistance finance flows.

Recommendation 2. Developing innovative approaches for SDG 14 data collection

Data should be more reliable, frequent and disaggregated enabling more effective, targeted and innovative public policies (OECD, 2015d; SDSN, 2015a). Numerous developing countries' statistical offices were unable to collect, analyse and disseminate data for reporting on the 48 MDGs indicators (Loewe and Rippin, 2015). Since the number of SDG indicators is much higher at 244, there is a risk of focusing on less critical or easier to achieve targets (Rickels *et al.,* 2016). Accountability discussions on SDGs should call for the need to support the data revolution. Earth observations, for instance are relevant for SDG 14.1, 14.3 and 14.5 indicators.

Technologies like blockchain which facilitates secure online transactions show promise for tracing fish from the boat to the supermarket (target 14.4). Initiatives like Google's Global Fishing Watch and Pew Charitable Trusts' Project Eyes on the Seas are using real-time data from vessel transponders and satellite imagery to spot illegal fishing and enable law enforcement (targets 14.4 and 14.5). Drones offer timely data on ocean conditions and fish stocks at a small fraction of existing costs. Such non-traditional sources of data, especially big data have been under-utilized (Maaroof, 2015; see annex 10 on big data and SDG 14). The OECD could further contribute to this research agenda by identifying and assessing, with relevant public and private stakeholders, using promising data sources that have been so far under-utilized in producing official statistics. (OECD, 2015e; OECD, 2016a).

Recommendation 3. Fostering common approaches in valuation of ecosystem services in national accounts to implement SDG 14 in synergy with other goals

The concept of ecosystem services can support the implementation of the SDG 14 in synergy with other goals (Ntona and Morgera, 2017). It can serve as an organising principle to consider multi-scale and cross-sectoral synergies and trade-offs (van der Belt *et al.,* 2016). The normative goal underpinning ecosystem services is to maintain long-term sustainability, as well as local and immediate enhancement of human well-being within the carrying capacity of the biophysical system (UN, 2016b). This relationship between environmental change and human welfare should be further scrutinised through the lens of equity, an element which was not adequately taken into consideration by the Millennium Ecosystem Assessment (Lele, 2013).

The poor quantification of the value of marine ecosystems restricts the capacity of SIDS and coastal communities to be financially rewarded for their efforts towards sustainable management and conservation of ecosystems (Rustomjee, 2016). Inter-generational equity and the recognition of the intrinsic value of biodiversity are relevant for target 14.4; the equitable management of MPAs is

relevant for target 14.5 (CBD, 2011b; Wolfrum and Matz, 2000). Besides, the services provided by coastal and marine ecosystems should be linked to a number of SDGs, e.g. SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good wealth and well-being) and SDG 6 (clean water and sanitation) (Wood and DeClerck, 2015).

The OECD could foster common approaches, methodologies and sharing of best practices in the valuation of marine ecosystem services and the integration of marine and maritime activities into national accounts. Based on a review of the conceptual work on the valuation of ecosystem services and of national initiatives in this area, the OECD could also investigate how this knowledge can be applied to the valuation of marine ecosystem services. As part of this work, the OECD is convening a workshop on new approaches to evaluating the ocean economy on 22-23 November 2017. (OECD, 2016h).

Recommendation 4. Providing incentives for best practice and peer-learning on SDG 14 indicators
As the OECD has a long history of engagement with major UN processes on human development, financing for development, environmental sustainability and climate change, it is committed to assist countries to generate evidence, identify good practices, develop standards and help and design and implement policies. This can be done through the use of hallmark OECD approaches (*e.g.* peer reviews and learning; monitoring and statistical reporting; policy dialogue; soft law). https://www.oecd.org/dac/OECD-action-plan-on-the-sustainable-development-goals-2016.pdf. In line with its action plan on SDGs, the OECD will continue to contribute to the development and enhancement of the UN-led Global Indicator Framework for the SDGs, drawing on existing OECD expertise, and help to close data gaps by developing methodologies and capacities in support of the internationally agreed SDG monitoring and evaluation initiatives. In this regard, the OECD can provide further incentives for best practice and peer learning on SDG 14 indicators.
https://www.oecd.org/dac/Better%20Policies%20for%202030.pdf

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