Issue Paper Annexes

A preliminary assessment of indicators for SDG 14 on "Oceans"
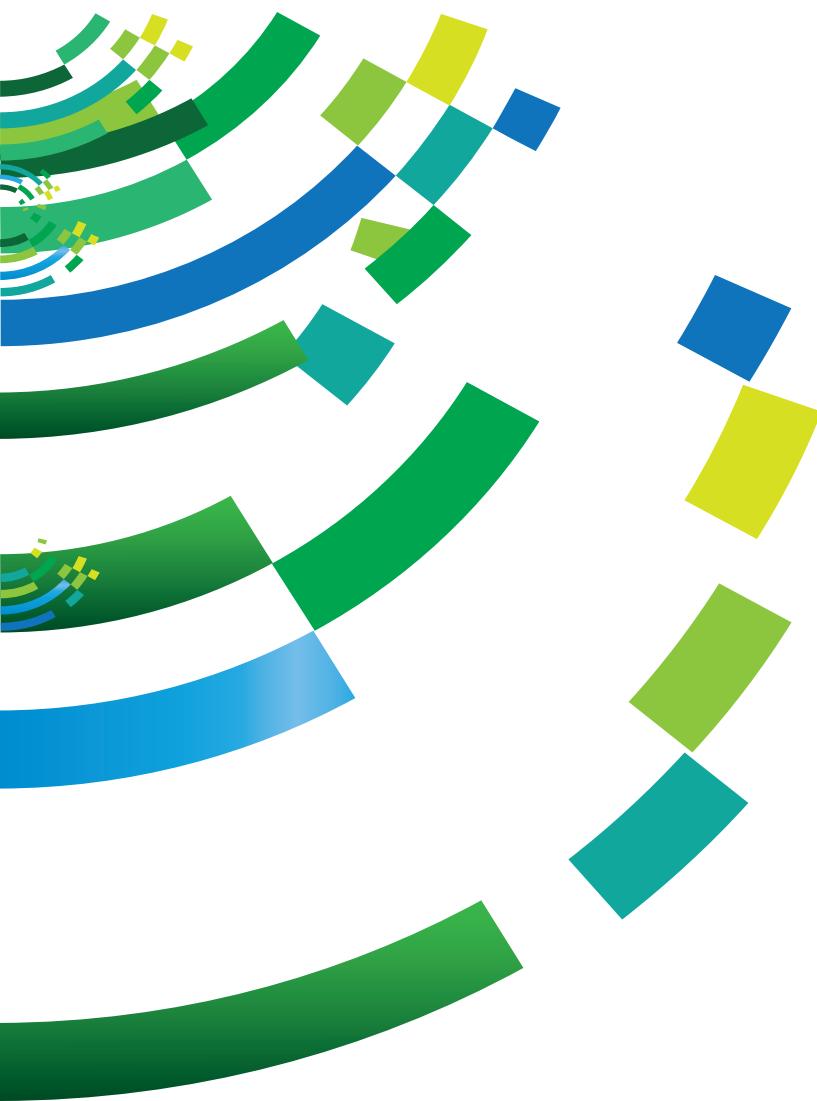
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Annex 1. Ocean-related Millennium Development Goals (MDGs) 7 targets and indicators

The SDGs build and expand on the MDGs, a global-goal setting process with a series of time-bound and quantified targets for the period 2000-2015 (UN, 2000). MDGs sought to act as a policy lever to direct development cooperation from the global North to address issues of poverty in the global South (Houghton, 2014). The emphasis of the MDGs was on the human dimensions of poverty such as hunger, education, child mortality and maternal health. These goals included MDG 7 on ensuring environmental sustainability which contains ocean-related elements, including three indicators (Table 2).

While the MDGs mobilised action on critical development issues, addressing poverty requires a much broader focus (UN, 2013). Among other factors, the MDGs fell short by not integrating the economic, social and environmental aspects of sustainable development as envisaged in the Millennium Declaration (UN, 2000). As a result, environment and development were not sufficiently brought together, practitioners devoting substantial but often separate efforts to interlinked problems (UN, 2013). Nonetheless, the ocean-related targets and indicators in MDG 7 reflect the need to protect and preserve the natural resource base for sustainable development (Houghton, 2014). These ocean-related indicators are used to monitor SDG 14 targets within a broader framework that encompasses the different dimensions of sustainable development.

Table A1. Ocean-related targets and indicators of the MDG 7

MDG target or indicator	
Target 7.A	Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources
Target 7.B	Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss
Indicator 7.4	Proportion of fish stocks within safe biological limits
Indicator 7.6	Proportion of terrestrial and marine areas protected
Indicator 7.7	Proportion of species threatened with extinction

Source: Houghton (2014).

Annex 2. SDG 14 targets: Main spatial scales of intervention

Table A2. SDG 14 targets: Main spatial scales of intervention

Target	Main spatial scales of intervention
14.1	Subnational, national, transnational
14.2	Subnational, national, regional
14.3	National, regional, global
14.4	Subnational, national, regional
14.5	Subnational, national, transnational, global
14.6	National
14.7	Subnational, national, regional
14.a	National, regional, global
14.b	Sub-national, national, regional
14.c	Regional, global

Notes: The transnational intervention level applies when the watershed or the marine protected area are shared between two or more countries.
Source: Author's elaboration.

Annex 3. Links among the SDG 14 targets and between SDG 14 and other SDGs targets

Before developing context-specific regional and national indicators, it is important to understand the nature of interdependencies among the SDG 14 targets and between SDG 14 and other SDGs targets, since some targets can reinforce each other, while others may have offsetting effects (Unger *et al.,* 2017). Concerning the SDG 14 targets, there are potential trade-offs between targets 14.7 and 14.b that promote economic activities, and targets 14.2, 14.4 and 14.6 that seek to conserve oceans' ecosystems. Target 14.a on scientific knowledge and technology transfer has the potential to benefit many of the other SDG 14 targets (Le Blanc *et al.*, 2017). Targets 14.2 (integrated policy and management) and 14.c (rule of law) have a pivotal role among the SDG 14 targets (Table A3).

It is possible to broadly identify the links between SDG 14 and SDGs targets according to the ecosystem services provided by the oceans such as food and energy provision, climate stability, and terrestrial and coastal ecosystems, i.e. SDGs 2, 3, 6, 7, 11, 12, 13 and 15, or through the societal transformation processes associated with institutions, financing, capacity-building and transparency, i.e. SDGs 1, 8, 9, 12, 16 and 17 (ICSU, ISSC, 2015). Some links may involve trade-offs. For instance, there is potential for trade-offs between healthy oceans, i.e. SDG 14, food security, i.e. SDG 2 and economic growth and job creation, i.e. SDG 8 (OECD, 2015b). The links from economic activity, i.e. SDGs 8, 9 and 11, to SDG 14 are in the form of pollution, ocean acidification, and pressure on marine resources (Le Blanc *et al.*, 2017).

Table A3. Main links among SDG 14 targets and between SDG 14 targets and other SDGs

SDG 14 target	Links with SDG 14 targets	Links with other SDGs
14.1	**14.2** 14.7 14.b	SDGs 1 2* 3 **6** 8* 9* 11* 12 13 **15*** 16
14.2	14.4 **14.5** 14.6 14.7* 14.a 14.b* 14.c	SDGs 1 **2*** 3 4 5 7* 8* 9* **11*** 12 13* 15* 16 17
14.3	**14.a** 14.c	SDGs 1 2 4 7 8* 9* 11* **13***
14.4	14.6 14.7* 14.a **14.c**	SDGs 1* **2*** 3 5 8* 12* 13* 16 17
14.5	**14.2** 14.a 14.b* 14.c	SDGs 1* 2* 3 4 5 7* 8* 9* 10* 11* 13* 15 **16**
14.6	14.4 14.7* **14.c**	SDGs 1* 2* 4 **8*** 10* 12 13* 16 17
14.7	14.2* 14.4* 14.a **14.b**	SDGs **1** 2 3 4 5 6 **7*** 8* 9 10 11 12 16
14.a	14.2 **14.c**	SDGs 2 **3** 4 5 7 **9** 13
14.b	14.2* 14.4* **14.7**	SDGs 1 2 4 5* 8 9 **10** 11 16 17
14.c	**14.2** 14.4 14.6	SDGs 1 2 5 8 13 16 **17**

Notes: Illustration of the potentially strong links between SDG 14 targets (first and second columns), and between SDG 14 targets and the other SDGs (first and third columns). *: Indicates potential for trade-offs. The text in bold indicates the SDG targets with strongest links.
Source: Author's elaboration based on ICSU, ISSC (2015), ICSU (2017), FAO (2017) and Le Blanc *et al.,* (2017).

Some important impacts of climate change such as sea level rise, ocean warming, and changes in ocean circulation and salinity are not part of the SDG 14 targets, but should be incorporated in local discussions on targets since they impact a wide range of SDGs (ESCAP, 2016). In addition, potential synergies such as those between SDG 14 and SDG 12 on sustainable production and consumption, e.g. through seafood certification systems, could remain unexploited if they are not properly identified (Unger *et al.* 2017).

One way to integrate context-specific trade-offs and synergies between SDG 14 and other SDGs, is to add the relevant ocean-related data as part of the other SDGs indicators. The Baltic Marine Environment Protection Commission (HELCOM) has reported how its indicators can be useful to monitor SDGs 2, 6, 9, 11 and 12 (Table A4). These complex links between SDG 14 and other SDGs are useful to identify all the relevant stakeholders when exchanging on the local nature of SDGs targets (Le Blanc *et al.*, 2017). Besides, they reveal that there should be a stronger collaboration between the scientific and policy communities to appropriately identify the most important local trade-offs (Rice and Garcia, 2011).

Table A4. An illustration of the contribution of ocean-related data to other SDGs: HELCOM

SDG target	SDG indicator	HELCOM indicator
2.4. By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	Status of implementation of the provisions of part ii of annex iii "prevention of pollution from agriculture" of the Helsinki Convention (as reported in the HELCOM Explorer)
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated	Proportion of wastewater treated according to the requirements of HELCOM Recommendation 28E/5 on municipal wastewater treatment
	6.3.2 Proportion of bodies of water with good ambient water quality	
6.5. By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0-100)	Proportion of transboundary rivers catchment areas with operational agreements on coordination of river management plans
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	9.4.1 Co2 emission per unit of value added	Trend in annual emissions from ships (nitrogen oxides, CO2, sulphur oxides); proportion (number of) (sizeable) ships in the Baltic sea using alternative fuels
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	11.6.1 percentage of urban solid waste regularly collected sand with adequate final discharge with regard to the total waste generated by the city	See HELCOM indicator under SDG 6.3
	11.6.2 annual mean levels of fine particulate matter (e.g. pm2.5 and pm10) in cities (population weighted)	
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	12.4.1 number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement	Indicators on hazardous substances (Hexabromocyclodecane (HBCDD), polybrominated biphenylethers (PBDE), radioactive substances, white-tailed eagle productivity)
	12.4.2 hazardous waste generated per capita, proportion of hazardous waste treated and by type of treatment	

Source: HELCOM (2017).

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Annex 4. Indicative correspondence of SDG 14 indicators to SEEA definitions

The United Nations System of Environmental-Economic Accounting (SEEA) provides formal definitions and guidance for measuring capital stocks. In the capital approach, capital stocks are measured by state indicators (Rickels *et al.*, 2016). Pressure and response indicators can be nevertheless, included to approximate the dynamics of the capital stocks. Under this approach, the strong and weak sustainability concepts determine the extent to which the various types of (economic, human, social and natural) capital stocks can be substitutes (UNECE, 2009). As a matter of example, the Ocean Health Index aggregate indicator allows for substitution among the different capital stocks and hence, can be considered as an indicator for weak sustainability (Halpern *et al.*, 2012).

These substitution constraints define requirements on possible pathways for increasing economic activities, in the same vein as the safe minimum standards (Visbeck *et al.*, 2014). For instance, when the different forms of non-critical natural capital can be aggregated, the indicator can be the aggregate value of marine resource stock or the net depletion of marine resources. A separate indicator can be included for each other form of critical natural capital, e.g. greenhouse gas emissions (flow), water quality (stock) and nutrition loading to water bodies (flow), and habitat fragmentation (stock) and conversion of natural habitats to other uses (flow) (UNECE, 2009).

Beyond the general interest of being able to interpret the SDG 14 indicators within a comprehensive framework that is compatible with macro-economic indicators and the budgeting process, 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 (CBD, 2016a). A first list of indicators can be available in the short-run including those that can be measured in monetary terms, i.e. 14.6 (dollar value of negative fishery subsidies against 2015 baseline), 14.7 (fisheries as a % of the gross domestic product), 14.a (budget allocation to research in the field of marine technology) and 14.b (proportion of national fishery production by country that are catches by small medium fishery businesses) (Table A5). Other indicators can be available such as those related to production and consumption, i.e. 14.1 (nitrogen use efficiency, hazardous waste generation and the percentage of wastewater safely treated), and those related to biophysical systems, i.e. 14.3 (CO2 emissions per unit of value added). In other cases, the same data source for SDG and SEEA indicators can be proposed, e.g. for 14.4 (proportion of fish stocks within biologically sustainable levels) and 14.5 (coverage of protected areas in relation to marine areas).

Table A5. Indicative correspondence of SDG 14 indicators to SEEA definitions

AtKisson Group "Green Economy Indicators"	Relevance to SEEA accounts	United Nations Commission of Experts of Environmental-Economic Accounting (UNCEEA) secretariat comments on IAEG-SDG Indicators	Remarks
INDICATORS IN TERMS OF MONEY			
14.6 Dollar value of negative fishery subsidies against 2015 baseline	Yes	Indicator could be aligned with the SEEA where possible. Although the SEEA Central Framework does not provide a definition for negative or potentially environmental damaging subsidies, it provides a measurement framework to record the subsidies for environment protection and resource management purpose. Further disaggregation may be needed for negative fishery subsidies depending on how they are defined	Potentially environmentally harmful subsidies are "subsidies... for resource management purpose". They can be recorded in an appropriate Environmental Protection Expenditures Account

AtKisson Group "Green Economy Indicators"	Relevance to SEEA accounts	United Nations Commission of Experts of Environmental-Economic Accounting (UNCEEA) secretariat comments on IAEG-SDG Indicators	Remarks
14.7 Fisheries as a % of gross domestic product	Yes	No change to indicator name suggested. The System of National Accounts and SEEA Central Framework provide information on the contribution to the gross domestic product of fisheries	No comments
14.a Budget allocation to research in the field of sustainable marine technology as a % of all research in field of marine technology	Yes	Indicator should be aligned with the SEEA, but there is a need to further develop the term "sustainable marine technology", because currently it is not available in the Classification of Environmental Activities	Another area where Environmental Protection Expenditures Account would be helpful
INDICATORS MEASURED IN TERMS OF PLANS AND POLICIES			
14.2 Percentage of coastal and marine development with formulated or implemented integrated coastal management/ maritime spatial planning plans (that are harmonized where applicable), based on an ecosystem approach, that builds resilient human communities and ecosystems and provides for equitable benefit sharing and decent work	No		
14.b Proportion of national fishery production by country that are catches by small medium fishery businesses or Progress by countries in adopting and implementing legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries	Maybe		It should be considered as a subdivision of fish catches in fisheries accounts
14.c Number of countries implementing either legally or programmatically the provisions set out in regional seas protocols and ratification and implementation of the International Labour Organisation maritime and fisheries conventions	No		
INDICATORS MEASURED IN TERMS OF PRODUCTION AND CONSUMPTION			
14.1 Nitrogen use efficiency composite indicator	Maybe	In SEEA, efficiency indicator relates the use of input to the related economic output. Nitrogen use efficiency indicators can be categorized as intensity indicators (i.e. ratio of the nitrogen use to the measure of economic activity such as volume of agriculture product) or the productivity indicators (reverse of intensity)	Unclear proposal

AtKisson Group "Green Economy Indicators"	Relevance to SEEA accounts	United Nations Commission of Experts of Environmental-Economic Accounting (UNCEEA) secretariat comments on IAEG-SDG Indicators	Remarks
14.1 Percentage of wastewater safely treated	Yes	Total Wastewater Generated subject to primary/ secondary/ tertiary treatment / Total Wastewater Generated. Safely treated should be defined according to SEEA treatment ladders. Disaggregation according to the International Standard Industrial Classification of all Economic Activities	Added in this paper
14.1 Treatment of waste, generation of hazardous waste, hazardous waste management, by type of treatment	Yes	Not addressed in UNCEEA comments	Not addressed in UNCEEA comments. Added in this paper
INDICATORS MEASURED IN TERMS OF THE PLANET (BIOPHYSICAL SYSTEMS)			
14.3 Average marine acidity (pH) measured at agreed suite of representative sampling stations	No		
14.3 CO2 emissions per unit of value added	Yes		Beyond the terminology simplification (CO2eq being the right concept), the distinction between "net" emissions and other anthropogenic losses of carbon is not done here (soil sealing, soil erosion, some "involuntary" forest fires...). It is done in Ecosystem Natural Accounts - Quick Start Package. Added in this paper
14.4 Proportion of fish stocks within biologically sustainable levels	Yes – SEEA is a user of the data	Fish stocks - The International Standard Statistical Classification of Fishery Commodities provides an exhaustive list of fish products categorized by 12 major groups. Biologically sustainable level: Sustainable yield is the surplus of excess of animals or plants that may be removed from a population without affecting the capacity of the population to regenerate itself (SEEA 2012 Central Framework)	Developed in the Food and Agriculture Organisation SEEA-Agriculture/ Forestry/Fisheries

AtKisson Group "Green Economy Indicators"	Relevance to SEEA accounts	United Nations Commission of Experts of Environmental-Economic Accounting (UNCEEA) secretariat comments on IAEG-SDG Indicators	Remarks
14.5 Coverage of protected areas in relation to marine areas	Yes – SEEA is a user of the data	This indicator should be defined as coastal and MPAs as a percentage of total coastal and marine area. Reference done to the SEEA Land use classification	In this domain, the SEEA is the user of data and classifications produced by others, at national level and compiled into international databases, in particular the International Union for Conservation of Nature and United Nations Environment Programme's World Conservation Monitoring Centre (World Data Base on Protected Areas). The indicator target is marine areas. A clear distinction is needed between coastal marine areas and open sea. Last, the SEEA Land Use classification covers only land and inland water, not the marine coastal areas

Notes: Table based on the UNCEEA secretariat analysis and the AtKinson Group Blue Paper presentation, building on the United Nations Statistical Commission indicators (March 2016) (UNCEEA, 2015; AtKinson, 2016). In the AtKinson Group typology, "people" are indicators expressed in terms of human beings, "money" are indicators expressed in terms of their monetary value, "plans and policies" are indicators that check for the presence of a plan, policy, law, etc., and/or its level of implementation, "production and consumption" are indicators expressed in units related to the flow of energy and materials in the global economy, and "planet" are indicators measuring the actual physical systems of the Earth, such as water, land, and species.

Source: Author elaboration based on CBD (2016a).

Annex 5. SDG 14: Indicators for considering the interactions and policy effects

Table A6. Indicators to inform selected interactions in relation to SDG 14

	Interaction	Indicators for consideration	Data sources
Potential trade-off	Harnessing the potential of aquaculture for meeting increased demand for food (SDGs 2.1-2) without generating negative environmental externalities	• Production of main species groups of fish for human consumption from inland aquaculture and marine and coastal aquaculture (tonnes) • Fish-in-fish-out ratio • Fishmeal inclusion rate in aquaculture feeds (%) • Production of fish meal and fish oil (Mt, product weight)	• OECD Agriculture Statistics: Fisheries • OECD Environment Statistics: Water • OECD Agri-Environmental Indicators • OECD-FAO Agricultural Outlook • The State of World Fisheries and Aquaculture, FAO
Potential trade-off	Developing coastal industries (SDG 9) without generating marine litter and debris (SDG14.1)	• Oil spillage (tonnes) • Prevalence of microplastics on fishing resources	• Global Marine Oil Pollution Information Gateway, UNEP • Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, sponsored by IMO, FAO, UNESCO-IOC, UNIDO, IAEA, UN, UNEP, UNDP • Global Partnership on Marine Litter, UNEP

Source: OECD (2017b).

Table A7. Indicators to inform selected policy effects in relation to SDG 14

	Policy effect	Indicators for consideration	Data sources
Elsewhere	Transboundary water decision-making impacts on people in all countries	• Cumulative Human Impact Index (risk based on hazard) • Sea Level Rise Index (risk based on exposure) • Human Development Index (risk based on vulnerability) • Exclusive Economic Zones (million km2) • Areas beyond national jurisdiction (million km2)	• Transboundary Water Assessment Programme Ocean Observing and Climate Systems, United Nations
	Fisheries access agreements can affect the sustainability of fish stocks (SDGs 14.4 and 14.6) and the viability of the fisheries sector, including small-scale artisanal fishers (SDG14.b), in other countries	• Number of fisheries access agreements between OECD and developing countries • Share of fish tonnage landed within maximum Sustainable Yield (%) • Share of world marine fish stocks that are overfished; fully fished; underfished (%) • Areas beyond national jurisdiction (million km2)	• OECD Fisheries Reviews • The State of World Fisheries and Aquaculture, FAO

	Policy effect	Indicators for consideration	Data sources
	Tariff escalation on fish and fish products can harm exporters in other countries (SDGs 17.10-12)	• Tariff rates on fish and fish products • Trade in fish (millions of tonnes): — Developed country exports and imports — Developing country exports and imports • OECD-FAO Agricultural Outlook • Tariff Analysis Online, WTO • Tariff Download Facility, WTO Financial support to fisheries (SDG14.6) can contribute to overcapacity and overfishing, including in other countries • Financial Support to Fisheries (USD): — Transfers to individual fishers — Net general Services — Cost recovery charges • Fishing fleet (number of vessels) • Fish landings, volume (tonnes)	• OECD-FAO Agricultural Outlook • Tariff Analysis Online, WTO • Tariff Download Facility, WTO • OECD Financial Support to Fisheries database • OECD Fisheries Reviews • The State of World Fisheries and Aquaculture, FAO
Later	Ratifying the FAO Agreement on Port State Measures can reduce IUU fisheries, including in other countries (SDG14.4)	• Number of countries having ratified the FAO Agreement on Port State Measures	• FAO
	Marine protected areas can help ensure the conservation and sustainable use of ocean ecosystems (SDGs 14.2 and 14.5)	• Marine protected areas (%) • Indicators on Terrestrial and Marine Protected Areas (OECD, forthcoming)	• OECD Environment Statistics • UNEP-WCMC's World Database on Protected Areas

Source: OECD (2017b).

Table A9. SDG 14 available regional indicators: An illustration

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
14.1	Red List Index (impacts of pollution)	MEA - UICN, Bird Life International	Disaggregate by marine	National	Pressure	Global	No
	Trends in Loss of Reactive Nitrogen to the Environment	MEA - International Nitrogen Initiative and Nitrogen Footprint		National	Pressure	Global	Yes
	Trends in nitrogen deposition	MEA -International Nitrogen Initiative	Indirect	National	Pressure	Global	No
	Cumulative Human Impacts on Marine Ecosystems	MEA - National Centre for Ecological Analysis and Synthesis		National	Pressure	Global	Yes
	Clean waters	MEA - Ocean Health Index project	The degree to which coastal waters are free of contaminants, such as chemicals, eutrophication, harmful algal blooms, disease pathogens, and trash	National	State	Global	Yes
	Gross N Balance	Eurostat	Gross Nitrogen Balance per hectare utilised agriculture area (kg of nutrient per ha)	National	Pressure	European Union	Yes
	Plastic waste generation	Eurostat	Annual plastic waste generation (industrial and household) in kg/head	National	Pressure	European Union	Yes
	Recovery rate of plastic packaging	Eurostat	Plastic packaging waste recovery/ plastic packaging waste generated	National	Response	European Union	Yes
	Status of eutrophication	HELCOM	Chlorophyll-a, nitrogen/DIN, phosphorus/DIP, water clarity, oxygen debt	National	Pressure	HELCOM	Yes
	Progress in achieving Maximum Allowable Level of inputs of nutrients (N and P) in individual sub-basins of the Baltic Sea	HELCOM		Sub-basins	Response	HELCOM	Yes

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Progress in reaching the Country allocated Reduction Targets (N and P) by the individual HELCOM countries	HELCOM		National	Response	HELCOM	Yes
	Pollution hot spots	HELCOM	Progress of individual countries in removal of hot spots from the HELCOM list	National	Response	HELCOM	Yes
	Hazardous substances	HELCOM	Hexabromocyclododecane (HBCDD), polybrominated biphenylethers (PBDE), radioactive substances, white-tailed eagle productivity	National	State	HELCOM	No
	Nutrient N - P balance	OECD, Agriculture statistics, Green Growth Indicators (for N)	Nutrient balance Nitrogen, Phosphorus (kg of nutrient per ha of agricultural land)	National	Pressure	OECD	Yes
	Air emissions of nitrogen oxides and particulate matter	OECD, Environment Statistics	Disaggregated indicators on nitrogen oxides and particulate matter	National	Pressure	OECD, accession candidates	Yes
	Air emissions of sulphur oxides	OECD, Environment Statistics		National	Pressure	OECD and Russia	Yes
	Standards - nitrogen oxides, sulphur oxides and particulate matter	OECD, Environment Statistics	Environmental Policy Stringency Index, emission limit values	National	Response	OECD, BRIICS and Indonesia	Yes
	Taxes - nitrogen oxides and sulphur oxides	OECD, Environment Statistics	PINE database, Environmental Policy Stringency Index	National	Response	OECD, BRIICS and Indonesia	Yes
	Wastewater treatment (% of population connected)	OECD, Environment Statistics		National	Response	OECD	Yes
	River quality	OECD, Environment Statistics	Water quality of selected rivers	National	Pressure	OECD	No

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Water quality	OECD Compendium of Agri-environmental Indicators	This indicator contains: Share of agriculture in total emissions of nitrates in surface water, share of agriculture in total emissions of phosphorous in surface water, share of agriculture in total emissions of nitrates in coastal water, share of agriculture in total emissions of phosphorous in coastal water, share of monitoring sites in agricultural areas where one or more pesticides are present in surface water, share of monitoring sites in agricultural areas where one or more pesticides are present in groundwater	National	Pressure	OECD	Yes
14.2	Protected area coverage of marine ecoregions	MEA - JRC, UNEP-WCMC	% of estuary, etc. classified as highly eutrophic (FOBES)	National	Response	Global	Yes
	Red List index (reef-building corals)	MEA - UICN, Bird Life International		National	Pressure	Global	No
	Living planet index	MEA – WWF, Zoological Society of London	Disaggregate by marine	National	State	Global	Yes

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Proportion of sea areas in a good environmental status	HELCOM	Based on the integrated assessment of status of open sea and coastal areas with regard to eutrophication (see 14.1), hazardous substances (se 14.1) and biodiversity, utilizing HELCOM quantitive core indicators. For biodiversity: status of biodiversity (assessed using, e.g. key coastal fish species and waterbirds in the breeding and wintering season, seal abundance and distribution); number of threatened species, habitats and biotopes in the Baltic Sea as baseline, the evaluation will be based on the outcome of the next HELCOM Red list assessments; indicator on harbour porpoise distribution and abundance is under development; status of implementation of individual commitments in the HELCOM Baltic Sea	National	State	HELCOM	No
	Status of biodiversity	HELCOM	Assessed using key coastal fish species and waterbirds in the breeding and wintering season, seal abundance and distribution	National	State	HELCOM	No
	HELCOM Red List assessment	HELCOM	Number of threatened species, habitats and biotopes in the Baltic Sea	National	State	HELCOM	Yes
	Number of countries having maritime spatial plans coherent across boarders and applying the ecosystem approach	HELCOM		National	Response	HELCOM	Yes

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Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Status of implementation of individual commitments in the HELCOM Baltic Sea Action Plan (HELCOM Explorer)	HELCOM		National	Response	HELCOM	Yes
	Number of threatened species (% of known species)	OECD, Environment Statistics, Green Growth Indicators	Disaggregate by marine	National	State	OECD, accession candidates and G20	Yes
14.3	Red List index (reef-building corals)	MEA - UICN, Bird Life International		National	Pressure	Global	No
	Natural product	MEA - Ocean Health Index project	Ocean acidification affects natural products	National	State	Global	Yes
	Carbon emissions	Eurostat	CO2 kg/capita	National	Pressure	European Union	Yes
	Production-based CO2 productivity; Consumption-based CO2 productivity	OECD, Green Growth Indicators		National	Pressure	OECD, G20 and other (100 countries)	Yes
	Fuel sales data in shipping	IEA	Million tonnes. Can be disaggregated by international, domestic and fishing	National	Pressure	Global	No
	Tax revenue (% of gross domestic product) – energy	OECD, Environmental Statistics, Green Growth Indicators	All CO2 related taxes, Policy Instruments for the Environment (PINE) database	National	Response	OECD and non-OECD (21)	Yes
	Effective carbon rates	OECD, Green Growth Indicators	CO2 taxes (based on carbon content), taxes on energy use and price of tradable emissions permits	National	Response	OECD, accession candidates and G20	Yes
	Fossil fuel support	OECD, Green Growth Indicators	Budgetary and tax expenditure	National	Pressure	OECD, accession candidates and G20	Yes
14.4	Marine trophic index	MEA - Sea Around Us	It provides a measure of whether fish stocks, especially of large bodied fish, are being overexploited	National	Pressure	Global	Yes
	Marine Stewardship Council engaged fisheries (Tonnage)	MEA - Marine Stewardship Council	Can be compared this to total wild capture production as reported by the FAO	National	Response	Global	Yes

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Red List Index for seabirds	MEA - UICN, Bird Life International	Species in Trade database Convention on International Trade in Endangered Species of Wild Fauna and Flora	National	State	Global	No
	Food provision	MEA - Ocean Health Index project	Amount of seafood captured or raised in a sustainable way	National	State	Global	Yes
	Living planet index	MEA – WWF, Zoological Society of London	Disaggregate by marine	National	State	Global	Yes
	Red List Index (impacts of fisheries)	MEA – UICN, BirdLife International	Trends in the status of birds and mammals worldwide driven only by the negative impacts of fisheries or the positive impacts of measures to control or manage fisheries sustainably	National	State	Global	No
	Number of fish species threatened	MEA - UICN		National	State	Global	No
	Percentage of fish stocks overexploited or collapsed by exclusive economic zone	Sea Around Us		National	State	Global	Yes
	Fish stock biomass above BMSY – BMSY: The biomass that would provide the highest long-term average catch (or maximum sustainable yield, MSY) of a fish stock	International Council for the Exploration of the Sea	The reference BMSY is spawning stock biomass not total biomass	National	State	International Council for the Exploration of the Sea	Yes
	Fish stocks within safe biological limits	OECD, Green Growth Indicators drawn on the International Council for the Exploration of the Sea data		National	State	OECD, accession candidates and G20	Yes
14.5	Protected area coverage of key biodiversity areas	MEA - BirdLife International, IUCN, UNEP-WCMC	Disaggregate by marine	National	Response	Global	Yes
	Biodiversity	MEA - Ocean Health Index project	The conservation status of native marine species (SPP) and key habitats (HAB) that serve as a proxy for the suite of species that depend upon them	National	State	Global	Yes

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Protected areas management effectiveness	MEA – University of Queensland, UNEP-WCMC	Disaggregate by marine	National	Response	Global	Yes
	Marine trophic index	MEA - Sea Around Us	It provides a measure of whether fish stocks, especially of large bodied fish, are being overexploited	National	Pressure	Global	Yes
	Percentage of area of each country's exclusive economic zone in MPAs	Natura 2000, EEA, OECD, Green Growth Statistics		National	Response	European Union OECD	Yes
	Percentage of HELCOM MPAs having management plans or measures in place	HELCOM		National	Response	HELCOM	Yes
	Land cover (wetlands, mangroves)	OECD, Green Growth Indicators	Coverage of protected areas in relation to marine areas, including in individual sub-basins of the Baltic Sea and EEZ	National	State	OECD, accession candidates and G20	Yes
	Reefs at risk index	World Resources Institute	Trends in critical habitat	National	State	Global	Yes
14.6	Coverage of protected areas (marine)	MEA – UNEP - WCMC		National	Response	Global	Yes
	Food provision	MEA - Ocean Health Index project	Amount of seafood captured or raised in a sustainable way	National	State	Global	Yes
	Total budgetary support provided to the fishing sector	OECD, Eurostat		National	Response	OECD and non-OECD (5) European Union	Yes
	Landings exceeding total allowed catch (in metric tons)	International Council for the Exploration of the Sea	Excess landing over total catch relative to total allowable catch (in tons)	National	Pressure	Inter. Council for the Explo. of the Sea	Yes
14.7	Protected areas management effectiveness	MEA – University of Queensland, UNEP-WCMC	Disaggregate by marine	National	Response	Global	Yes
	Coastal livelihoods and economics	MEA - Ocean Health Index project		National	State	Global	Yes

Target	Regional indicator						
	Name	Comment	Source	Disaggregation*	Type	Coverage	Open access
	Tourism and recreation		MEA - Ocean Health Index project	National	State	Global	Yes
	Marine trophic index	It provides a measure of whether fish stocks, especially of large bodied fish, are being overexploited	MEA - Sea Around Us	National	Pressure	Global	Yes
	Marine Stewardship Council engaged fisheries (tonnage)	Can be compared to total wild capture production as reported by the FAO	MEA - Marine Stewardship Council	National	Response	Global	Yes
	Red List Index (impacts of fisheries)	Trends in the status of birds and mammals worldwide driven only by the negative impacts of fisheries or the positive impacts of measures to control or manage fisheries sustainably	MEA – UICN, BirdLife International	National	State	Global	No
	Official development assistance to fisheries and tourism		OECD, DAC Statistics	National	Response	DAC Members to all developing countries	Yes
14.a	Growth in species occurrence records accessible through Global Biodiversity Information Facility	An increase in the value of this indicator means that a larger volume of records documenting the spatial and temporal occurrence of species is being shared by holders of biodiversity data, in formats that make them free for use by researchers and policymakers via the Internet	MEA - Global Biodiversity Information Facility	National	Response	Global	Yes
	Number of marine monitoring stations relative to the exclusive economic zone	Scientific capacities to monitor the status of marine waters	Inter. Council for the Explo. of the Sea, EIONET, EEA	National	Response	European Union	Yes
	Total allowable catches exceedance of scientific advice (in metric tons)	Proxy in how scientific findings and recommendations are considered in policy making	International Council for the Exploration of the Sea	National	Response	Inter. Council for the Explo. of the Sea	Yes
	Fisheries: Technology development and diffusion	The number of inventions that seek patent protection through national, regional or international routes	OECD, Agriculture and Fisheries Statistics	National	Response	OECD and non-OECD (48)	Yes
	Fisheries: Research and development spending	Budgetary expenditures in research and development on total budgetary Fisheries Support Estimate	OECD, Agriculture and Fisheries Statistics	National	Response	OECD and non-OECD (4)	No

Target	Regional indicator						
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Shipbuilding: Research and development spending	OECD, Science, Technology and Innovations Statistics	Subsidies	National	Response	13 OECD and non-OECD countries	No
	Research networks	OECD, Fisheries and Aquaculture Innovation Platform	OECD Better Policies for Better Lives Initiatives regarding research coordination - Networks, consortium, forum, etc.	National	Response	International	Yes
	Official development assistance to waste management and disposal	OECD, DAC Statistics, Green Growth Indicators	In the water and sanitation sector	National	Response	DAC Members and all developing countries	Yes
	Official development assistance to flood prevention/ control	OECD, DAC Statistics, Green Growth Indicators		National	Response	DAC Members and all developing countries	Yes
	Official development assistance to fishery research	OECD, DAC Statistics		National	Response	DAC Members and all developing countries	Yes
14.b	Artisanal fishing opportunities	MEA - Ocean Health Index project		National	State	Global	Yes
	Fish mortality (FMSY)	International Council for the Exploration of the Sea	Ratio of actual fishing mortality (F) to the level that would provide maximum sustainable yield (FMSY)	National	Pressure	International Council for the Exploration of the Sea	Yes
14.c	Marine trophic index	MEA - Sea Around Us	It provides a measure of whether fish stocks, especially of large bodied fish, are being overexploited	National	Pressure	Global	Yes
	Red List Index (impacts of fisheries)	MEA – UICN, BirdLife International	Trends in the status of birds and mammals worldwide driven only by the negative impacts of fisheries or the positive impacts of measures to control or manage fisheries sustainably	National	State	Global	No

| Target | Regional indicator | | | | | | |
	Name	Source	Comment	Disaggregation*	Type	Coverage	Open access
	Participation rate in international marine agreements	Wolfram Alpha	The marine environmental agreements include the Convention of Biological Diversity, the Convention on the International Trade in Endangered Species of Wild Flora and Fauna, the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the United Nations Convention on the Law of the Sea, the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter, the International Convention for the Prevention of Pollution from Ships, the International Convention for the Regulation of Whaling, and the Convention on Fishing and Conservation of the Living Resources of the High Seas.	National	Response	Global	Yes

Notes: The acronym "MEA" in the data sources signals that the SDG 14 indicators are also used for reporting in at least one key MEA. (*): National disaggregation means the indicator is applicable for national use and some national data exists. Eurostat data is available at: http://ec.europa.eu/eurostat/. BIP data is available at: https://www.bipindicators.net/, except FAO data available at https://unstats.un.org/sdgs/indicators/database/. OECD data is available at: https://data.oecd.org/. HELCOM data available at: http://www.helcom.fi/baltic-sea-trends/data-maps/ and http://maps.helcom.fi/website/HELCOMexplorer/index.html. World Resources Institute data is available at: http://www.wri.org/publication/reefs-risk-revisited. EEA data is available at: https://www.eea.europa.eu/data-and-maps. Sea Around us data is available at: http://www.seaaroundus.org/data/#/eez. The International Council for the Exploration of the Sea data is available at: http://www.ices.dk/marine-data/dataset-collections/Pages/default.aspx. Jaxa data is available at: http://www.eorc.jaxa.jp/ALOS/en/kyoto/mangrovewatch.htm. UNEP (2014a and 2014b), Makarenko (2016), Rickels *et al*. (2016), Sachs *et al*. (2016), Giraud (2017) and HELCOM (2017).

Source: Author's elaboration based on SDSN (2015a),

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Annex 7. National indicators: France

SDG 14 indicators in France are shared in this annex since this country has made some progressed on this topic. The selection of national SDG 14 indicators is based on the available global and regional indicators complemented when necessary by national indicators relevant for national policies or for national stakeholders. According to the French National Statistical Office, the SDG national indicators should be (i) political relevant; (ii) of high statistical quality according to the Code of Practice; (ii) easy to communicate; (iii) already available or available in medium-term; and (iv) limited in number (around 100 in total to facilitate the communication), but contribute to a well-balanced dashboard on the different themes (Plateau, 2017). The French National Statistical Office shared in March 2017 a first data base of 110 SDGs indicators.

The full set of the SDG 14 indicators fall under the responsibility of the French Ministry of Ecology, Energy and Sea (CGDD, 2016a). In contrast, the indicators for each of the other SDGs fall under the jurisdiction of several authorities. Concerning the SDG 14, there are a number of scoreboards for tracking public policies on sustainable development in France. These scoreboards can provide indicators which can be integrated with, or complementary to, SDG 14 indicators since they reflect the implementation of sustainable development in the oceans in France (Table A10).

The SDG 14 national indicators can be classified as "statistical indicators" (corresponding to the global indicators 14.1.1-14.5.1, 14.7.1 and 14.a.1) or "public policy assessments" (corresponding to the global indicators 14.6.1, 14.b.1 and 14.c.1) (Table A11). To enable public policy assessments, evaluation matrices should be completed and the resulting information should be aggregated. Statistical indicators can be further classified as "available" (corresponding to the global indicators 14.4.1 and 14.5.1), "proxy" (corresponding to the global indicator 14.2.1), or "non-available" (corresponding to the global indicators 14.1.1, 14.3.1, 14.7.1 and 14.a.1).

Table A10. (Non-exhaustive) list of French scoreboards for tracking public policies on sustainable development associated with the SDG 14

Scoreboard	Characteristics of indicators
National Strategy on the Ecological Transition for Sustainable Development 2015-2020	72 indicators Annual report to Parliament
National Biodiversity Strategy 2011-2020	80-90 indicators National Observatory on Biodiversity
Climate Change indicators	24 indicators National Observatory on the Effects of Global Warming
Strategy on Management and Creation of MPAs	Scoreboard at the French Biodiversity Agency

Source: CGDD (2016a).

Table A11. SDG 14 national indicators in France (March 2017)

Global indicator	National indicator		
	Type	Name	Source
14.1.1	Statistical indicator-Non-available		
14.2.1	Statistical indicator - Proxy	**Coverage of protected areas in relation to marine areas: France**	MEA - French Biodiversity Agency*
		Sites under European (Natura 2000) or international (Ramsar) engagements	MEA - National Museum of Natural History**
		Ramsar Convention sites : Marine area	
		Natura 2000 sites : Marine area	
14.3.1	Statistical indicator-Non-available		
14.4.1	Statistical indicator - Available	**State of fish stocks in the north-east Atlantic and the Mediterranean (with respect to safe biological limits)**	MEA - European Environmental Agency (EEA), data from the International Council for the Exploration of the Sea (ICES)***
		Stocks within safe biological limits	
		Stocks outside safe biological limits	
		Stocks for which the state is unknown	
14.5.1	Statistical indicator - Available	**Coverage of protected areas in relation to marine areas: France**	MEA - French Biodiversity Agency****
14.6.1	Public policy assessment		
14.7.1	Statistical indicator-Non-available		
14.a.1	Statistical indicator-Non-available		
14.b.1	Public policy assessment		
14.c.1	Public policy assessment		

Notes: The acronym "MEA" in the data sources signals that the SDG 14 indicators are also used for reporting in at least one key MEA. *: Data available at : SOeS : Indicateurs SNTEDD 2015-2020 : Part des eaux marines françaises en aires marines protégées. ** : Data available at : Base de données EIDER. *** : Data available at : SOeS : L'essentiel sur pêche et agriculture - Les ressources halieutiques. **** : Data available at : SOeS : Indicateurs SNTEDD 2015-2020 : Part des eaux marines françaises en aires marines protégées.
Source: CGDD (2016a) and INSEE (2017).

The available indicators are identical to the SDG 14 global indicators requested by the IAEG-SDGs. The proxy indicators are close to the SDG 14 global indicators, while being more adapted to the French context. Resources have to be invested to produce the SDG 14 indicators that are not available at the national level. International institutions can provide statistical support for the estimation of certain of these indicators.

In 2010, France already subscribed to an objective of zero subsidies harmful to sustainable fishing (Aichi target 3). France carried out an evaluation of harmful fishing subsidies for the year 2008 (Sainteny, 2012). According to this evaluation, there are seven types of harmful subsidies at a total cost of 253.4 million euros; 55% of public aid to professional fishing is harmful to biodiversity. The achievement of a zero subsidy harmful to biodiversity in the fisheries sector by 2020 poses a real challenge (Hege *et al.,* 2014).

The French SDG 14 indicators in Table 7 should evolve over time (INSEE, 2017). In particular, the SDG 14 national indicators corresponding to the global indicator 14.2.1 should include proxy data on the effectiveness of MPAs in terms of the management and the ecological status. The SDG 14 national indicator

corresponding to the global indicator 14.4.1 should include proxy data on the maximum sustainable yield (MEEM, 2017). In addition, SDG 14 indicators could account for sub-national specificities (Table A12).

Table A12. The differentiated impact of different factors on biodiversity in French ecosystems

	Habitat fragmentation and destruction	Pollution	Over-exploitation of biotic resources	Climate change	Alien species
Marine environment – Channel, North Sea, Atlantic	↗	→	↘	↗	↗
Marine environment – Mediterranean	↗	→	→	↗	↗
Marine environment - Overseas	→	↗	→	↗	↗
Coasts	↗	→	→	↗	↗

Notes: Current impacts are reported through colours (red: strong; orange: intermediate; yellow: moderate) and current trends are reported through arrows (increasing, decreasing and constant). The table reflects the point of view of experts based, as much as possible, on available data.
Source: CGDD (2016b).

The IAEG-SDGs have raised the need for disaggregated data at global and national levels according to age, gender, migration status, income level, ethnical group, handicap and other features. Such a level of disaggregation has to be integrated into the data collection, which requires additional investments. In France, the processing of personal data including information on ethnical or racial origins is prohibited (INSEE, 2015). If United Nations organisations estimated such data directly, this could raise issues about data quality (CGDD, 2016a).

Annex 8. SDG 14 and OECD Green Growth Indicators

Table A13. SDG 14 and OECD Green Growth Indicators

SDG 14 Target	Green Growth Headings			
	Economic opportunities and policy measures	The natural asset base	The environmental dimension of quality of life	The environmental and resource productivity of the economy
Indicators included in the OECD Green Growth Indicators				
14.1				Nutrient N balance
14.2		Number of threatened species (% of known species) based on an OECD questionnaire in line with the Red List Index		
14.3	Tax revenue (% gross domestic product) - all CO_2 emissions Effective carbon rates Fossil fuel support			Production-based CO_2 productivity Consumption-based CO_2 productivity
14.4		Fish stocks within safe biological limits based on the International Council for the Exploration of the Sea data		
14.5		MPAs based on United Nations Environmental Programme's World Conservation Monitoring Centre data Land cover (wetlands, mangroves)		
14.a	Official development assistance to waste management and disposal; to flood prevention/ control			

Table A14. SDG 14 related aspects that could be further developed in OECD work on indicators

SDG 14 Target	Green Growth Headings			
	Economic opportunities and policy measures	The natural asset base	The environmental dimension of quality of life	The environmental and resource productivity of the economy
14.1	Standards* - nitrogen oxides, sulphur oxides, particulate matter Taxes* - nitrogen oxides, sulphur oxides, pesticides Policy instruments* - ocean/marine-related Expenditures and policies on prevention of pollutant infiltration, cleaning up of soil and water bodies		Wastewater treatment (% of population connected)* % of coastal urban population connected to a wastewater collecting system	Air emissions of nitrogen oxides*, particulate matter* Emissions of sulphur oxides from maritime shipping* Water quality* Nitrogen effluents from wastewater Micro-pollutants : Waste Plastics: Waste Plastics: Recycling
14.2	Number of countries having adopted and implementing maritime spatial plans Number of countries applying the ecosystem-based management approach	Length of coastal modification Square kilometre of coastal reclamation	Direct social and economic costs in coasts and the oceans caused by disasters	
14.4	Indicators to monitor policies to fight IUU fishing (including IUU subsidies) - forthcoming	New survey - ongoing		
14.5		More reliable and harmonised indicators on MPAs, based on the work of United Nations Environment Programme's World Conservation Monitoring Centre – forthcoming in 2017		
14.6	Time series of change in budgetary support to fisheries – forthcoming Change in composition of support to fishers – share of most harmful forms of support in total– forthcoming			

Notes: *: Already available OECD statistics.

Annex 9. Big data and SDG 14 indicators

There is an exponential increase in the volume and production of data matched by a growing demand for data from all parts of society, though with strong global inequalities in access to and use of data (PARIS21, 2015). To respond to the demands of the complex development agenda, especially in the context of the SDGs, the data revolution refers to profound changes in statistical ecosystems (HLG-PCCB, 2016). These changes involve multiple producers and consumers of data such as the statistical offices, the private sector and civil society, using new technologies, and seeking to improve the production and diffusion of data and to increase the support for statistics systems, including relevant aspects of big data and open data initiatives (IEAG-DRSD, 2014).

Big data is very relevant for SDG 14, particularly regarding marine pollution, ocean acidification, marine protected areas (MPAs) and threats to biodiversity due to IUU fishing. Although there is no fixed definition for big data, these data sets are so large or complex that traditional data processing applications are inadequate. Big data is characterised by the volume from various sources needing large storage, the velocity at which it is generated, the variety of unstructured formats needing additional processing, and the value or meaning not being immediately apparent (Maaroof, 2015; UNESCAP, 2015). In the context of the SDG 14, earth observation (remote sensing, in-situ monitoring) is relevant for targets 14.1, 14.2, 14.3, 14.4, 14.6, 14.7 and 14.a, and can produce direct measures that can be relevant for the indicators 14.3, 14.5, 14.6 (GEO, 2017a). Salinity, sea-surface temperature and additional auxiliary satellite data enable to work out the pH of seawater and provide accurate information on ocean acidification (target 14.3).

Other indicators that can be useful for SDG 14 are the coverage of MPAs and their overlay with key biodiversity areas (target 14.5), and the not yet available global mangrove watch (target 14.5). The Marine Park Authority in Australia uses remotely-sensed water quality information of total suspended sediments and chlorophyll-a for compliance monitoring against guideline values in the Great Barrier Reef (target 14.1) (GEO, 2017b). Initiatives such as 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). Using Google's earth images, local and regional data on catch volumes, and data about types of fish caught, it is possible to find mismatches between officially reported catch data and estimates including fish catches using weirs (Al-Abdulrazzak and Pauly, 2013) (target 14.4).

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