

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Target 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

Indicator 14.a.1: Proportion of total research budget allocated to research in the field of marine technology.

Institutional information

Organization(s):

Intergovernmental Oceanographic Commission of UNESCO

Concepts and definitions

Definition:

Definitions and mechanisms used in the development of the SDG indicator 14.a.1 are based on the IOC Criteria and Guidelines on Transfer of Marine Technology- IOCCGTMT (originally published and endorsed by IOC Member States in 2005, these guidelines provide an internationally agreed definition of what is understood by the term marine technology. These Guidelines have been referenced in various UN General Assembly Resolutions and specifically in the formulation of SDG target 14.a). These are further explained in the Global Ocean Science Report (GOSR) referenced below.

Marine technology as defined in the IOCCGTMT refers to instruments, equipment, vessels, processes and methodologies required to produce and use knowledge to improve the study and understanding of the nature and resources of the ocean and coastal areas. Toward this end, marine technology may include any of the following components:

- a) Information and data, in a user-friendly format, on marine sciences and related marine operations and services;
- b) Manuals, guidelines, criteria, standards, reference materials;
- c) Sampling and methodology equipment (e.g., for water, geological, biological, chemical samples);
- d) Observation facilities and equipment (e.g. remote sensing equipment, buoys, tide gauges, shipboard and other means of ocean observation);
- e) Equipment for in situ and laboratory observations, analysis and experimentation;
- f) Computer and computer software, including models and modelling techniques;
- g) Expertise, knowledge, skills, technical/scientific/legal know-how and analytical methods related to marine scientific research and observation.

Indicator 14.a.1 shows the annual national research budget allocated by governments in the field of marine technology, relative to the overall national governmental research and development budget in general.

Unit: percentage; raw data in national currency. The proportion can be calculated, and if needed, data can be converted by the international agency into USD.

Rationale:

Sustained investment in research and development (R&D), including ocean research, remains essential to advance knowledge and to develop new technology needed to support modern economies. The ocean economy yields various benefits in terms of employment, revenues and innovation in many domains. Its current developments are largely based on decades of science and R&D investments by governments around the world. Baseline information on ocean science funding, as delivered by the indicator 14.a.1 can be used as a starting point for more directed, tailored investment and new capacity development strategies, and to support the case for ensuring maximum impact of ocean research, for example through marine technology and knowledge transfer from government-funded marine and maritime R&D projects. Annual (2009-2013) baseline information for 24 countries is presented in the GOSR (Isensee, K., Horn, L. and Schaaper, M. 2017. The funding for ocean science. In: In: IOC UNESCO, Global Ocean Science Report—The current status of ocean science around the world. L. Valdés et al. (eds). Paris, UNESCO, pp. 80–97).

Concepts:

The concepts used for the definition and calculation of the indicator 14.a.1 are based on similar concepts used in the UNESCO Science Report (2010, 2015). These reports present GERD data (gross domestic expenditure on research and experimental development) as a share of GDP (gross domestic product) and further provide the R&D (research and development) expenditure by sector of performance in % (Table S2 in the 2015 report). In addition UIS publishes science field specific R&D, e.g. natural science (<http://data.uis.unesco.org/>).

The definitions and classifications used to collect R&D data are based on the 'Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development' (OECD).

Comments and limitations:

Due to the fact that no agreed mechanism to assess ocean science capacity existed until the first edition of the Global Ocean Science Report, national reporting mechanisms are scarce and/or are not harmonised. However, with the framework of 14.a and the new reporting mechanism in place, global and regional technology and knowledge transfer can be conducted in a resource- and need-adapted manner based on global inventories and comparisons.

Methodology

Computation Method:

Indicator 14.a.1 = National governmental research expenditure in marine technology / National governmental R&D expenditure

National governmental R&D expenditure data are assessed annually by the UNESCO Institute for Statistics (UIS).

National governmental ocean science expenditures are envisaged to be assessed biannually via the GOSR data portal (IOC-XXIX/2 Annex 10).

The development of the GOSR data repository/data portal will take place in close collaboration with UIS and IOC (at Headquarters and at the IOC Project Office for IODE, Oostende, Belgium).

Disaggregation:

National data set with updated every two years, possibility for regional and global aggregation

Treatment of missing values:

- [At country level](#)

In case countries do not provide data, no estimate will be calculated.

- [At regional and global levels](#)

For regional and global estimates/averages, only data received from Member States will be taken into account, missing values are not imputed or otherwise estimated.

Regional aggregates:

Each national contribution is weighted equally to calculate average values for the regional and global estimates.

Sources of discrepancies:

As this indicator only takes into account data submitted by Member States, there are no discrepancies between estimates and submitted data sets.

Methods and guidance available to countries for the compilation of the data at the national level:

- No particular guidance for the national data compilation exists as the organization of ocean science differs among Member States. Ways introduced to obtain relevant data are through IOC national focal points (IOC official national designated Coordinating Bodies for Liaison with the IOC) consult the respective ministry responsible for ocean science to obtain the data; IOC focal points contact universities and institutions individually.
- 1. IOC is an intergovernmental body of 148 Member States, the IOC national focal points may act as national coordinating bodies for relevant government departments, universities and research institutions actively involved in marine science and technology and other related aspects of ocean affairs.
- The novelty of the GOSR and therefore also the data it contains required the IOC secretariat to collect the data via IOC national focal point until now. Future data collections are expected to be a mixture of direct requests to NSOs, as new national reporting mechanisms are now installed allowing them to provide the required information (e.g. Colombia, Canada, Italy; document IOC-XXIX/2 Annex 14), questionnaires to the IOC national focal points and collaboration with National Oceanographic Data Centres. The GERD (gross domestic expenditure on research and development) data are obtained from the UNESCO Institute for Statistics, based on information directly provided from NSOs.

Quality assurance

- IOC national focal points and experts from UIS assist in the data quality assessment, comparing indicator values with the national expenditure for Natural Sciences (UIS), this allows the identification of discrepancies. In the future new values will be compared to previously obtained information. In case of discrepancies, the IOC secretariat will consult the data providers individually.
- Combination of: Automated quality control by data portal; National quality control; IOC.

Data Sources

Description:

Data sources: biannual direct submission to the GOSR data portal (currently in development) and the GOSR questionnaire biannual.

The questionnaire used for the first edition of the GOSR will be reviewed by the Editorial Board of the GOSR as well as by UIS in 2017/2018 prior to the next data collection exercise. Assessment from 2018 on will be conducted with an improved questionnaire.

As mentioned previously the novelty of the GOSR and required the IOC secretariat to collect the data via its national focal point until now. Future data collections are expected to be a mixture of direct requests to NSOs, as new national reporting mechanisms are now installed allowing them to provide the required information (e.g. Colombia, Canada, Italy; (document IOC-XXIX/2 Annex 14), questionnaires to the IOC national focal points and collaboration with National Oceanographic Data Centres. The GERD (gross domestic expenditure on research and development) data were obtained from the UNESCO Institute for Statistics, based on information directly provided from NSOs.

Collection process:

- (I) National Counterparts:
As mentioned in the previous paragraph the official counterparts are the IOC focal points and well as National Oceanographic and Statistical Data Centres.
- (II) Validation and consultation process by IOC Secretariat.
These counterparts are invited to provide metadata information for the data provided.

Data Availability

Description:

The table below shows the result of research budget allocated to research in the field of marine technology. The first assessments include information for 25 countries for the time period from 2009-2013 (or for a sub-set of these years). These data were published in the Global Ocean Science Report (2017).

Table 1. Percentage national governmental research expenditure in marine technology of GERD for countries which provided information regarding ocean science expenditure via the GOSR questionnaire (sources GERD,: UIS, 2015; ocean science expenditure: GOSR questionnaire, 2015; average non-weighted). Note: green fields indicate a percentage higher than 1.5 and yellow fields indicate percentages higher than 0.5.

Country	Percentage (%) governmental research expenditure in marine technology of GERD					
	Average 2009-2013	2009	2010	2011	2012	2013
Argentina	0.16	0.11	0.14	0.15	0.23	
Australia	0.74		0.72	0.76		
Belgium	0.07	0.10	0.07	0.05	0.05	
Canada (DFO)	0.54	0.51	0.54	0.60	0.54	0.53
Chile	0.20	0.36	0.11	0.15	0.20	
Colombia	0.39	0.40	0.39	0.43	0.36	0.35
Croatia						4.73
Ecuador	0.03	0.02	0.03	0.05		

Finland	0.14	0.14	0.16	0.00	0.20	0.20
France						0.79
Germany						0.40
India	0.77	0.61	0.77	0.92		
Italy	0.88	0.69	0.75	0.87	1.04	1.04
Japan	0.09	0.11	0.07	0.08	0.08	0.11
Kuwait	0.16	0.16	0.18	0.19	0.19	0.06
Morocco			0.37			
Norway	3.18	2.69		3.28		3.58
Republic of						
Korea	0.44	0.62	0.40	0.41	0.44	0.32
Romania	0.50	0.47	0.35	0.51	0.54	0.65
Russian						
Federation	0.04	0.03	0.04	0.04	0.03	0.04
Spain (IEO)	0.28		0.37	0.37	0.36	0.28
Thailand				2.02		
Trinidad &						
Tobago	1.81	1.03	1.63	2.36	2.20	
Turkey	0.07		0.06	0.04	0.07	0.09
USA					2.55	

Time series:

To date data are available for the years 2009-2013.

Calendar

Data collection:

The next data collection is planned in 2018 for the years 2014-2016.

Data release:

Expected dates of release of new data: End of 2018 for the years 2014-2016.

Data providers

IOC focal points

NSOs

UIS

Data compilers

Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)

UNESCO Institute for Statistics (UIS)

References

IOC-UNESCO (2017), Global Ocean Science Report—The current status of ocean science around the world, L. Valdés et al. (eds), UNESCO Publishing, Paris

Isensee, K., Horn, L. and Schaaper, M. 2017. The funding for ocean science. In: In: IOC-UNESCO, Global Ocean Science Report—The current status of ocean science around the world. L. Valdés et al. (eds). Paris, UNESCO, pp. 80–97.

GOSR report (relevant chapters 2 and 4)

<http://en.unesco.org/gosr>

UNESCO Science Report 2010, 2015

https://en.unesco.org/unesco_science_report

IOC Assembly Decisions: IOC-XXIX/5.1. and IOC-XXIX/9.1.)

http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=19770

IOC-XXIX/2 Annex 14

http://ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=19589

R&D relevant data

<http://data.uis.unesco.org/>

Definition/Concepts: Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development' (OECD)

<http://www.oecd.org/sti/inno/frascati/manual/proposed-standard-practice-for-surveys-on-research-and-experimental-development-6th-edition.htm>

IOC Criteria and Guidelines on the Transfer of Marine Technology

<http://unesdoc.unesco.org/images/0013/001391/139193m.pdf>

Related indicators

Links to SDG 17, SDG 5;

Targets: to all other SDG 14 targets as science is crucial to protect and conserve the oceans' resources.