UNEP

World Ocean Assessment | Overview

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A **Story Map** of this overview is available at http://arcg.is/1RxA1O2

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The complete World Ocean Assessment

Group of Experts of the Regular Process (Innis, L. and Simcock, A., Joint Coordinators) *The First Global Integrated Marine Assessment: World Ocean Assessment I.* United Nations Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects. United Nations, New York, NY, 2016. Can be downloaded at http://www.un.org/Depts/los/global_reporting/WOA_RegProcess.htm

Introduction

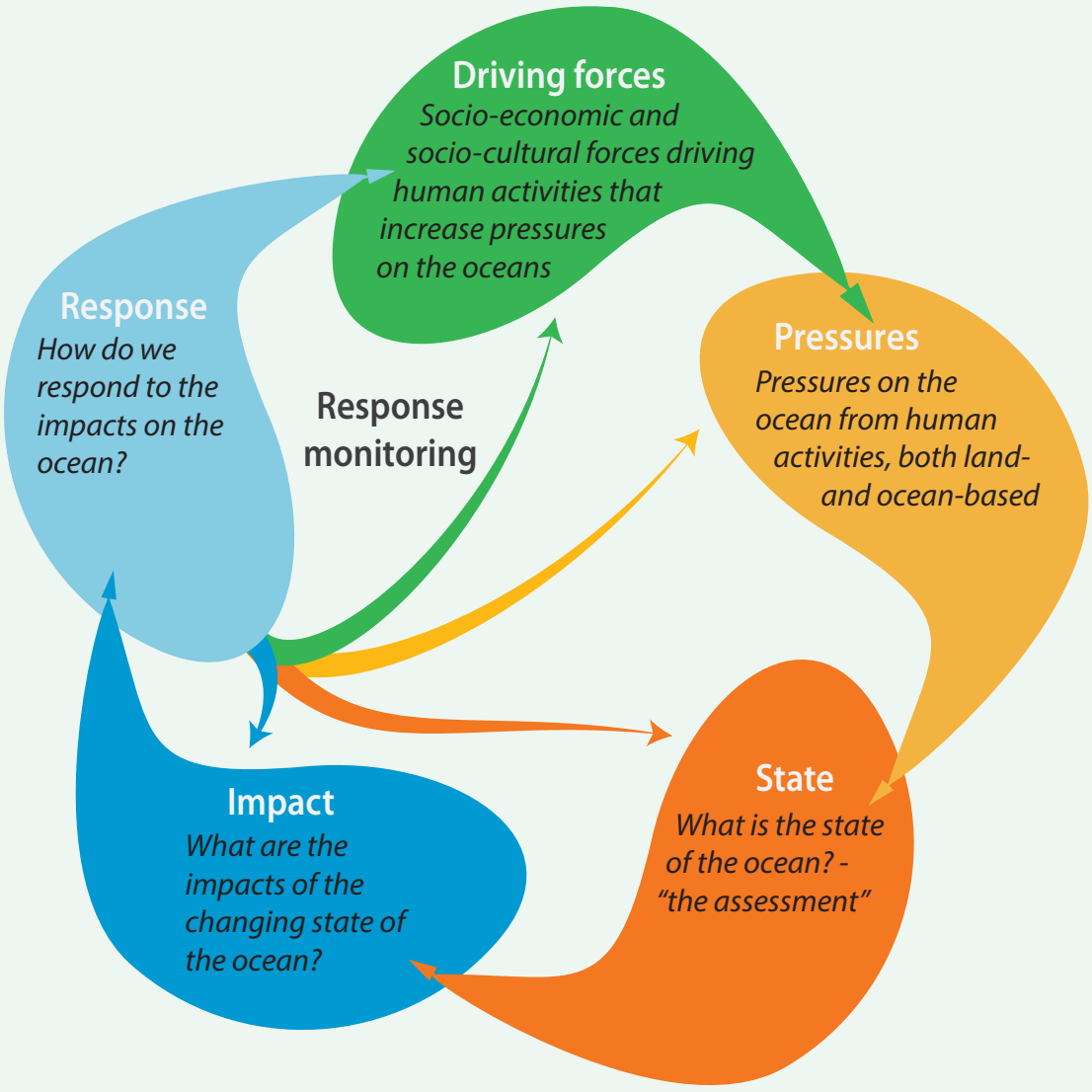
The first World Ocean Assessment (WOA) is a report on the state of the planet's oceans. It is the product of the first cycle of the Regular Process for global reporting and assessment of the state of the marine environment, including socio-economic aspects, which was established after the 2002 World Summit on Sustainable Development (Ref: page 2 of Summary). The Regular Process was set up to review the environmental, economic and social aspects of the world's oceans. Sanctioned by the United Nations, this first report was released at the end of 2015 and is the product of a review of hundreds of other national and regional assessments. It was written by a Group of Experts and involved more than 600 scientists, all nominated by United Nations Member States who worked together to complete the report. The findings indicate that the oceans' carrying capacity (its ability to sustain human activities and their impacts) is near or at its limit and urgent action on a global scale is needed to protect what remains (Ref: WOA Summary (A/70/112), page 40).

The assessment, though not a policy document, is intended to provide a scientific basis for action by governments, intergovernmental processes, policy-makers and others involved in ocean affairs. It offers a baseline for gauging the effectiveness of management and policy decisions and provides guidance in developing strategies and technologies to solve problems (Ref: WOA Preface by joint coordinators).

This overview looks at the results of the first WOA in a framework that distinguishes driving forces, pressures, states, impacts and responses (called the "DPSIR framework").[1] The DPSIR framework provides a structure to broadly examine the state of the world's oceans and reflects the relationship between the marine environment and human activity.

The levels of DPSIR framework

- Driving forces - Pressures - State (of the oceans) - Impacts - Responses



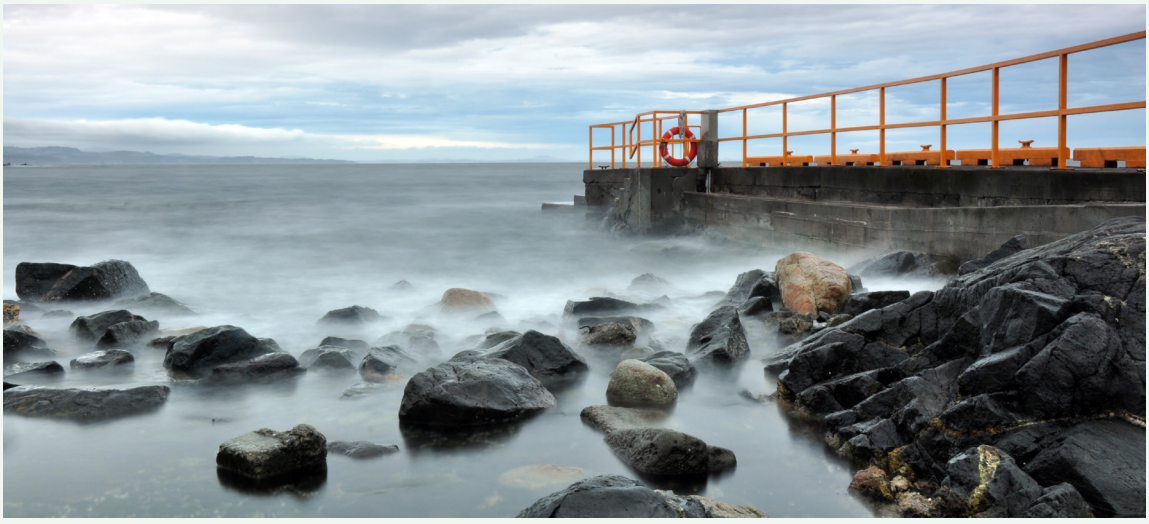
1. For more information on the DPSIR framework please see: http://www.grida.no/graphicslib/detail/dpsir-framework-for-state-of-environment-reporting_379f

In order to organize the complex task of assessing the environmental, social and economic aspects of the ocean, the WOA is divided into 10 themes (Ref: WOA Summary, pages 7 to 10 providing overview of themes).

The ten themes addressed in the World Ocean Assessment

Theme A	Impacts of climate change and related changes in the atmosphere
Theme B	Higher mortality and less successful reproduction of marine biotas
Theme C	Food security and food safety
Theme D	Patterns of biodiversity
Theme E	Increased use of ocean space
Theme F	Increasing inputs of harmful material
Theme G	Cumulative impacts of human activities on marine biodiversity
Theme H	Distribution of ocean benefits and disbenefits
Theme I	Integrated management of human activities affecting the ocean
Theme J	Urgency of addressing threats to the ocean

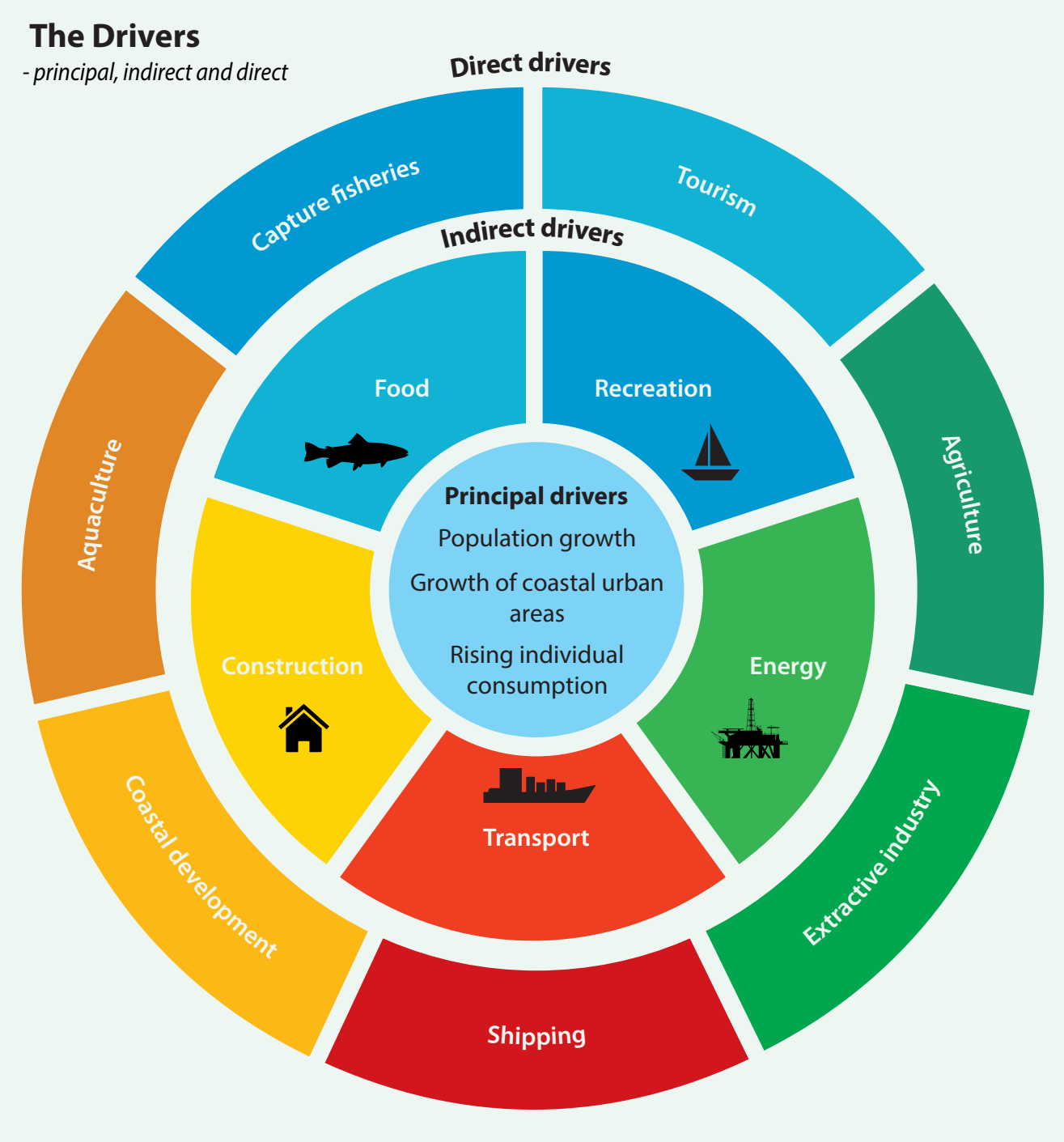
Ref: WOA Summary, pages 10 to 41 providing details on the themes.



Drivers
Forces of change

Human activity is causing widespread changes to the oceans' physical, chemical and biological systems. The major driving forces of change in the ocean are to be found outside the marine environment. Just as most of the major drivers of anthropogenic climate change are land-based, the main drivers of increased pressures on marine biodiversity and marine environmental quality also come from activities on the land. They include the demand for food for human populations, international trade in products from agriculture, and industries and coastal degradation (Ref: WOA Summary, page 39).

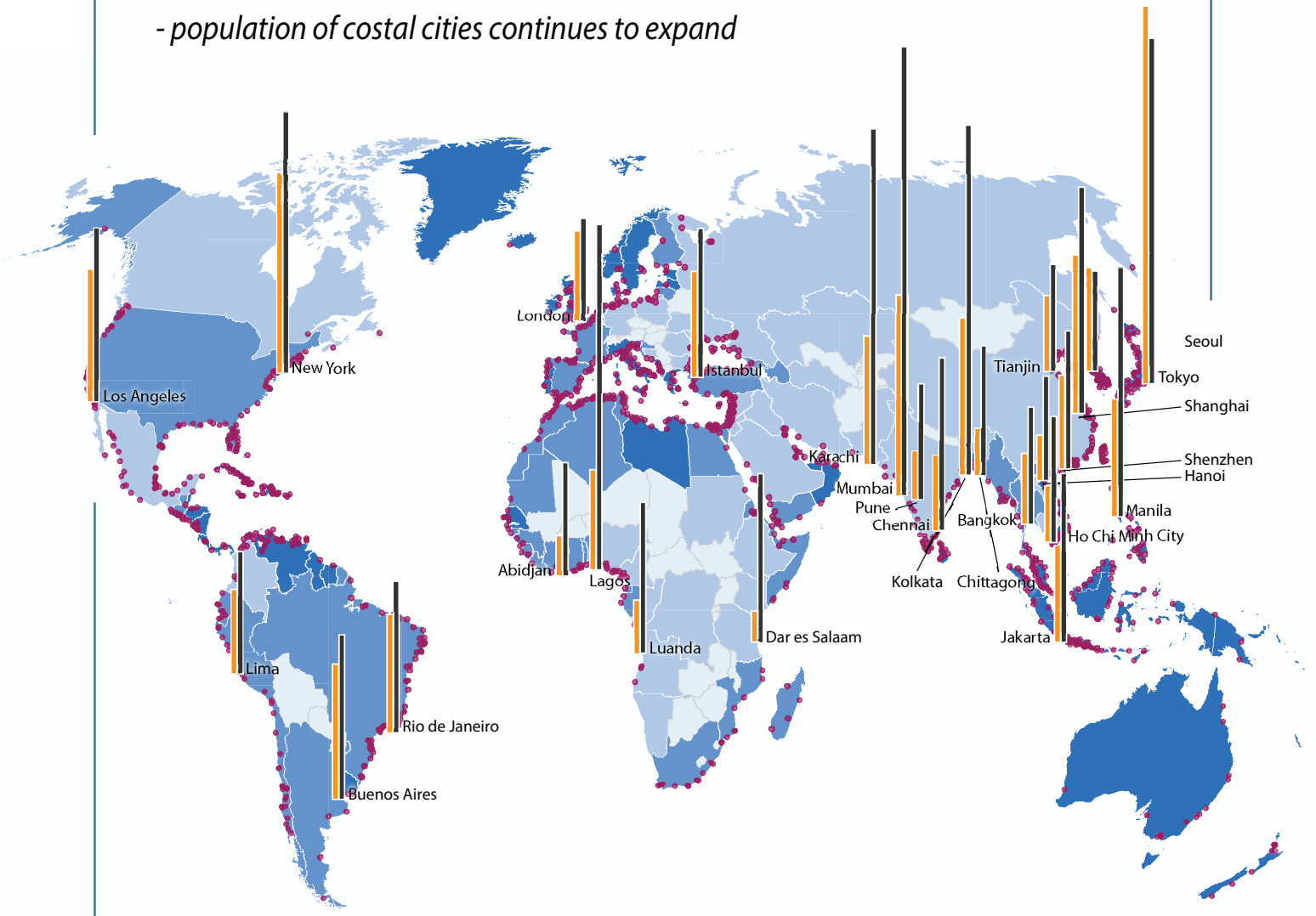
Drivers in the industrial sector come from industries such as agriculture, oil and mineral exploitation, shipping and aquaculture. The push for profitability and low cost production contribute to pollution and contamination (Ref: WOA Summary, pages 26 to 32, describing these drivers and their impacts on marine biodiversity).



Ref: extrapolated from WOA Summary ten themes.

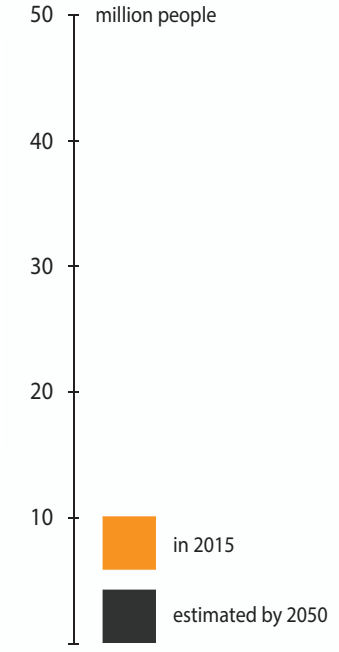
Our closeness to the oceans

- population of costal cities continues to expand



Percentage of population living within 100 km of the coastline

- over 70%
- 30 to 70%
- less than 30%
- none
- coastal city with more than 100,000 inhabitants

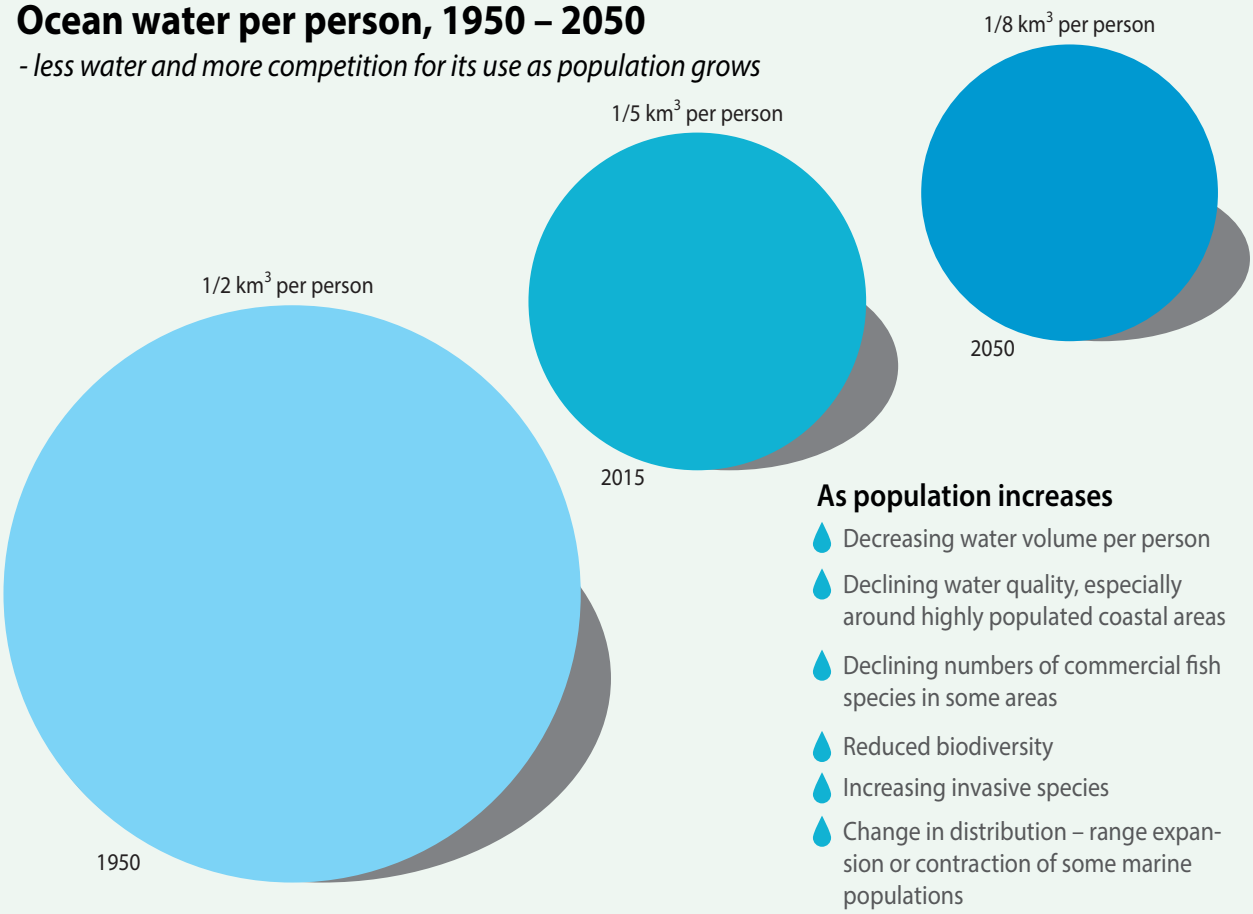


Source: Hoonrweg & Pope (2014), Burket et al. (2000), Natural Earth.

If we divide up the ocean among the current 7 billion human inhabitants of Earth, we each have only one fifth of a cubic kilometer of ocean. That relatively small amount of water generates half the oxygen we breathe in a year, all of the seafood that we consume, a third of the oil and gas we burn, as well as other commodities that we use. Our ever-growing population is the ultimate driver for increased use of these resources and access to ocean space.

Ocean water per person, 1950 – 2050

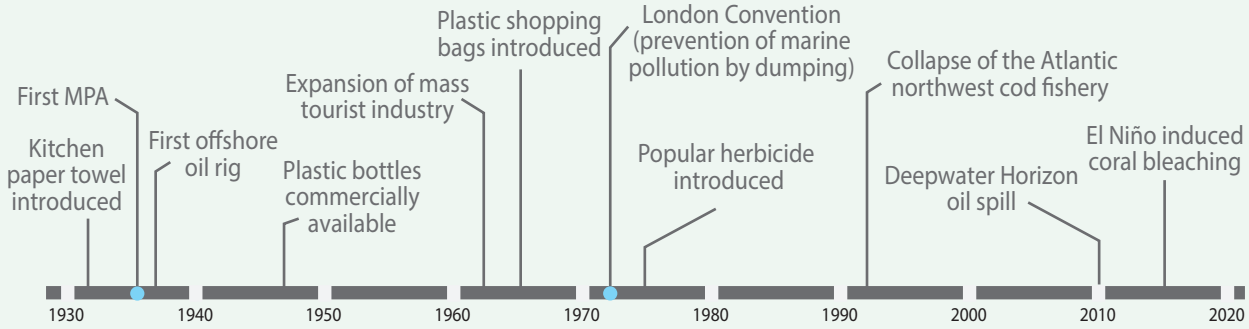
- less water and more competition for its use as population grows



As population increases

- Decreasing water volume per person
- Declining water quality, especially around highly populated coastal areas
- Declining numbers of commercial fish species in some areas
- Reduced biodiversity
- Increasing invasive species
- Change in distribution – range expansion or contraction of some marine populations

Timeline of some of the key pressures, impacts and responses related to the WOA themes



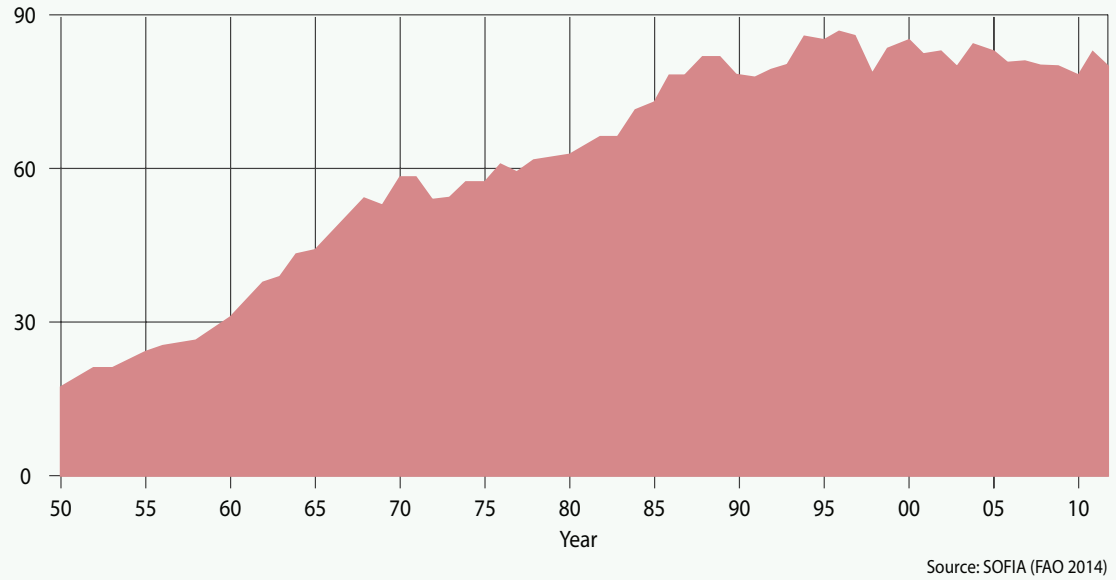
Source: Introduction to Summary of WOA, page 1 and themes addressed in the WOA.

Pressures
Activities that put pressure on the environment

Our growing population means increased human activity and a greater use of the ocean every year (e.g. increases in fishing, ship transport, marine based tourism, exploitation of non-living resources, etc.). Human activities exert 'pressures' on the environment through production or consumption processes (Ref. Summary of WOA, Theme E, page 8).

Evolution of world's capture of marine species

- in million tonnes

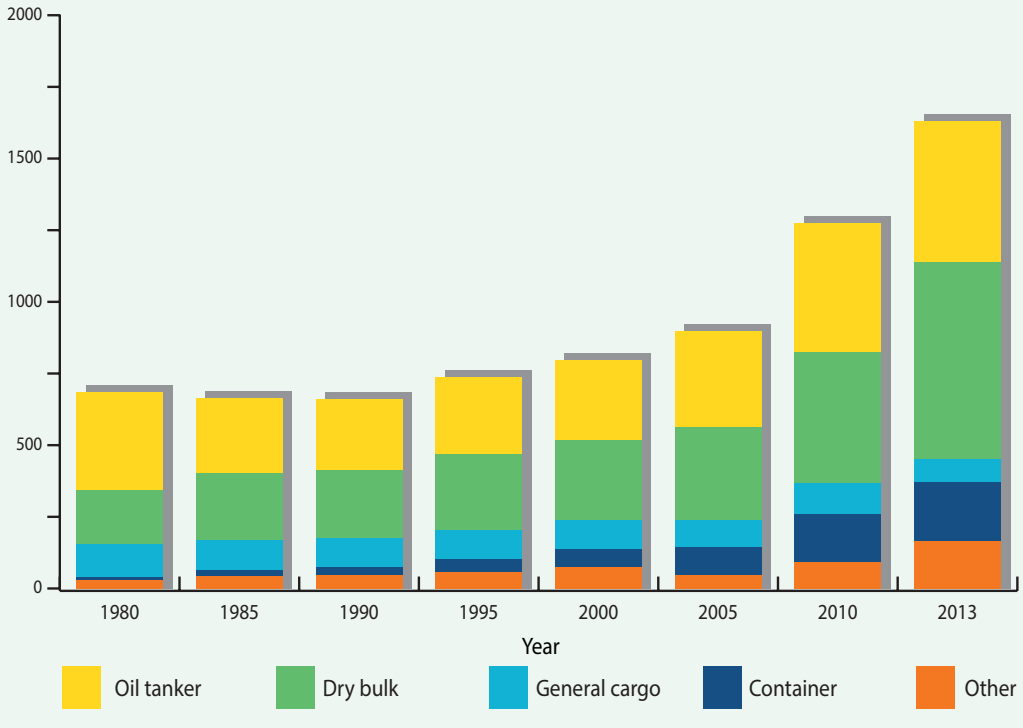


Source: SOFIA (FAO 2014)

Example of increase in pressures through consumption in the fisheries sector (Ref. WOA Summary, page 16).

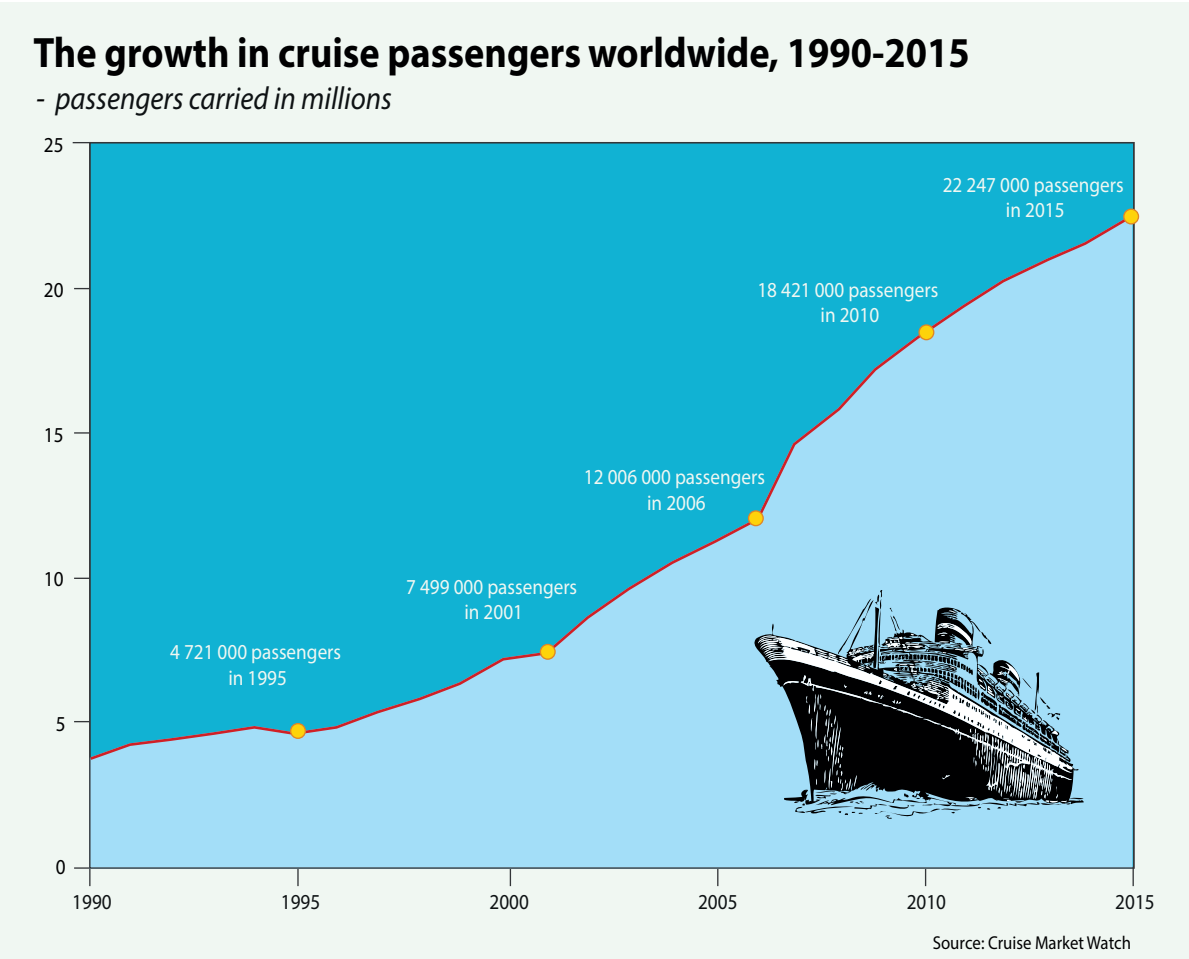
Total size of the world´s fleet of ships 1980 – 2013

- the world's fleet of ships has been increasing rapidly since 2000



Source: UNCTAD, 2013

Example of increase in pressures through global growth of shipping fleets (Ref. WOA Summary, pages 23 to 24).



Example of increase in pressures through global growth of cruise passengers (Ref. WOA Summary, page 29).

There are well-documented cases where habitats, lower-trophic-level productivity, benthic communities, fish communities and seabird or marine mammal populations have been severely altered. They are affected by pressures from overfishing, pollution, nutrient loading, physical disturbance or the introduction of non-native species. However, many effects on biodiversity, particularly at larger scales, are the result of the cumulative and interactive effects of multiple pressures from multiple drivers. It has repeatedly proved difficult to disentangle the effects of the individual pressures which impedes the ability to address individual causes. (Ref. WOA Summary, page 32).

Land based and marine industry sources of pollution

- selected pressures and impacts

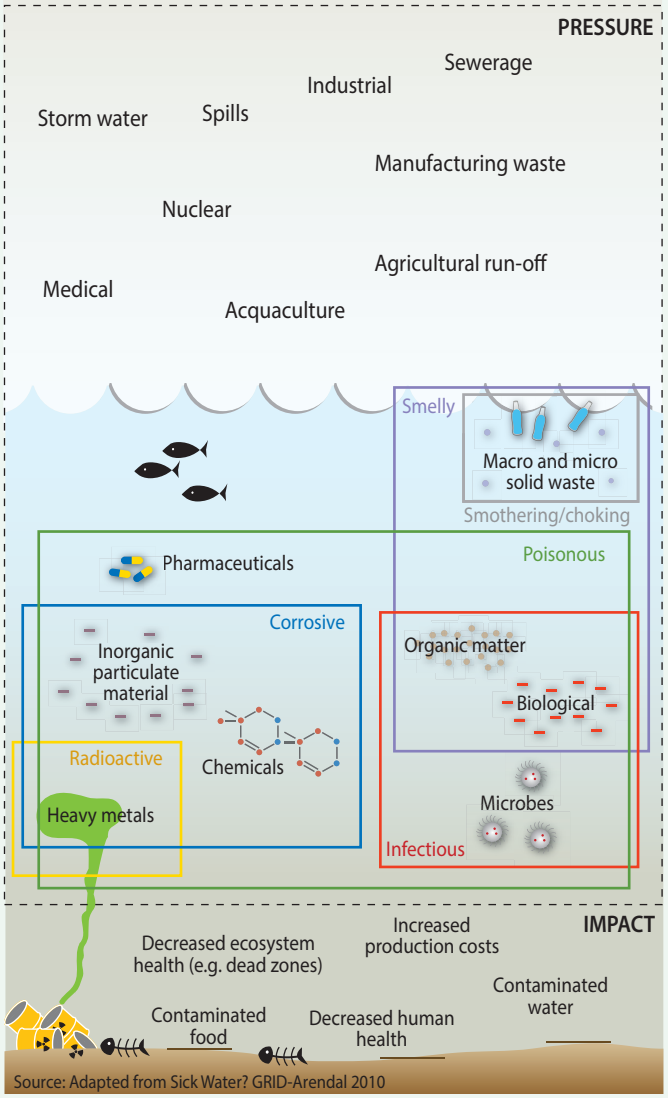


Illustration of selected pressures and impacts with regard to pollution (Ref. WOA Summary, pages 26 to 29).

Multiple pressures interact cumulatively in ways that are poorly understood but that can amplify the effects expected from each individual pressure (Ref: WOA Summary page 33).

State
Condition and trend

The increased use of resources and ocean space are adversely affecting the state of the ocean. On all measures the ocean is changing – the waters are warming and becoming dangerously more acidic, commercial fish species have been in decline for decades, and coastal waters are experiencing increased pollution from both land based activities and from marine industries like aquaculture. Levels of heavy metals and other toxic substances in some marine mammals and fish are making them unfit for human consumption and starkly illustrate the continuing contamination of once pristine ocean waters (Ref: WOA Summary e.g., pages 10, 18, 20,31).

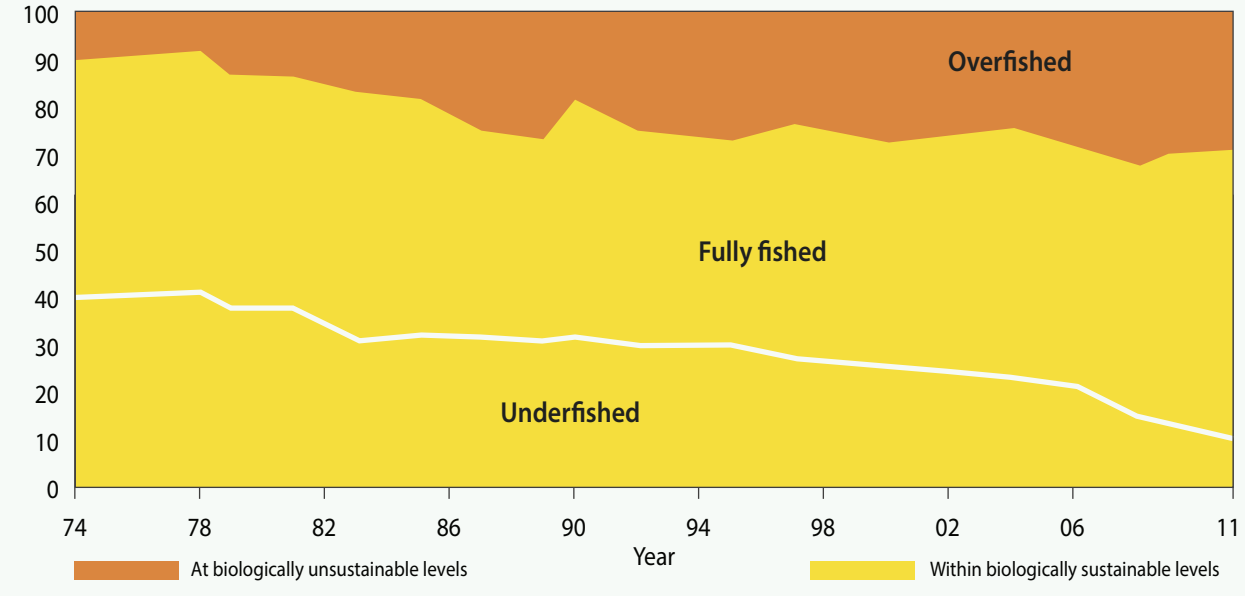
Many parts of the ocean are already seriously degraded and the footprint of human impact is expanding. If the problems are not addressed, there is a major risk that they will combine to produce a destructive cycle of degradation in which the ocean can no longer provide many of the benefits humans currently enjoy (Ref: WOA Summary, page 40).

As an example, this year Australia's Great Barrier Reef experienced its worst recorded episode of bleaching. This is attributed to warmer than average water temperatures associated with a major El Niño event over the southern summer. Surveys reveal at least 1000 km of the reef has been affected with large areas of coral likely to die.[2] The damage to coral reefs can have wide ranging impact on not only the ecology but also on society and the economy in a region heavily reliant on reef tourism (Ref: WOA Summary, page 41).

Fully bleached and fluorescent bleached corals, Great Barrier Reef, January 2015.

Global trends in the state of the world marine fish stock, 1974-2011

- in percentage of stocks assessed



Source: SOFIA (FAO 2014)

Illustration of condition and trend from the fisheries sector (Ref: WOA Summary page 19).

2. Pratchett M,and Lough J. (2016). Coral Bleaching Taskforce: more than 1,000 km of the Great Barrier Reef has bleached. The Conversation, April 6 2016 https://theconversation.com/coral-bleaching-taskforce-more-than-1-000-km-of-the-great-barrier-reef-has-bleached-57282

Impact
What it means for people and their environment

Some of the most pressing impacts of the declining state of the ocean relate to food security and food safety (Ref: WOA Summary, pages 19 & 20). Fish and marine invertebrates provide 17% of the world's protein. Global fish biomass is, on average, declining due to less effective management, and while many fisheries may still be productive, prospects are poor. However in Europe, North America and Oceania major commercially exploited fish stocks are stable, with the prospect that reduced exploitation rates should achieve rebuilding of the biomass in the long term.

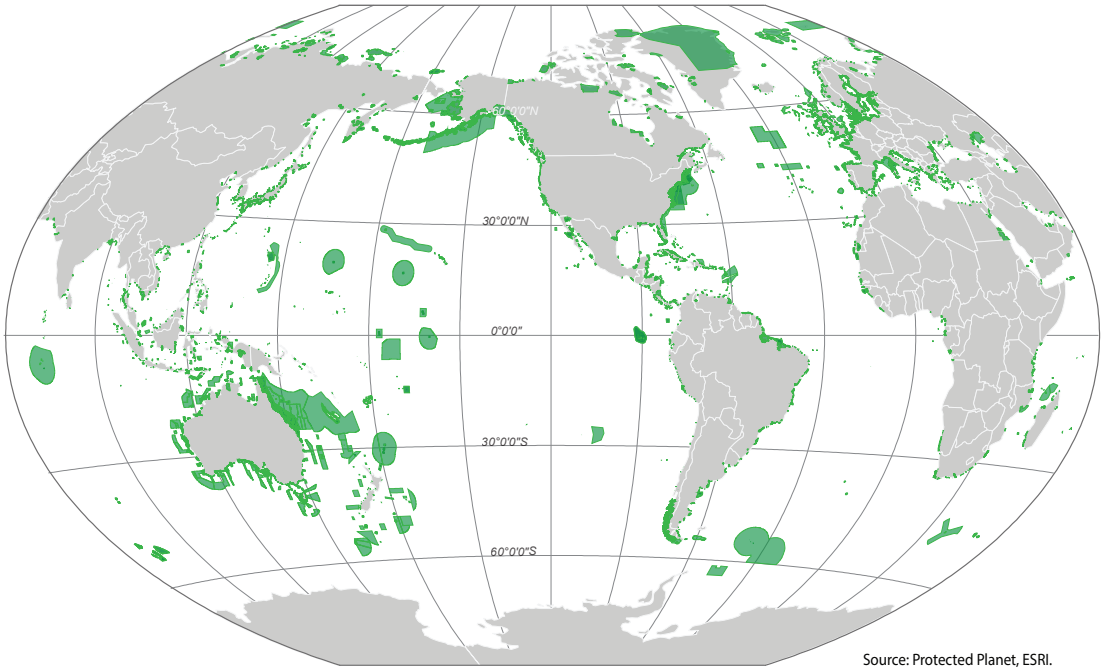
More and more people rely on fish and aquaculture for food and income. It is estimated that 58 to 120 million people are employed in fishing related jobs, with 90% of these jobs in small-scale fishing (Ref: WOA Summary, page 36). In assessing the social and economic impacts of increasing pressure on the oceans, it is necessary to consider how different parts of the world and different parts of society are gaining benefits (or losing benefits) as a result of human activities (Ref: WOA Summary, page 35). The changes in ocean conditions affect many ecosystem services indirectly. For example, some models predict that the warming ocean will increase the fish biomass available for harvesting in higher latitudes and decrease it in equatorial zones. This will shift provisioning services to benefit the middle and moderately high latitudes (which are often highly developed) at the expense of low latitudes, where small-scale (subsistence) fishing is often important for food security (Ref: WOA Summary, page 35).

Response
What we are doing and should do

The WOA assessment encourages us to ask the question "how far will we go before we put in place adequate responses to global problems?" We do not need to stop all use of the oceans, but we must effectively manage use to ensure sustainability of the oceans, for present and for future generations. Some responses have been put in place in some locations and are perhaps stabilizing, or in some cases, reversing the negative impacts. These include regulation on dumping of wastes and other matter and release of ballast water, the establishment of marine protected areas, better agricultural practices and improvements in fuel efficiency in cargo ships.

Some of the specific threats (such as the intensification of typhoons and hurricanes and changes in the stratification of seawater) are linked with the problems of climate change and acidification and can only be addressed as part of these much bigger issues. (Ref: WOA Summary, page 41)

Global marine protected areas



Source: Protected Planet, ESRI.

A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland (Malvinas), South Georgia (Georgias del Sur) and South Sandwich (Sandwich del Sur) Islands.

Examples of addressing threats to the ocean

- Responses for reducing inputs of hazardous substances, waterborne pathogens and nutrients;
- Preventing maritime disasters due to the collision, foundering and sinking of ships, and implementing and enforcing international agreements on preventing adverse environmental impacts from ships;
- Improving fishery management;
- Managing aquaculture;
- Controlling tourism developments that will have adverse impacts on the future of the tourism industry in the locality where they occur;
- Controlling solid waste disposal that can reach and a ect the marine environment;
- Improving the control of o shore hydrocarbon industries and o shore mining;
- Establishing and maintaining marine protected areas.

(Ref: WOA Summary, page 42)

Knowledge gaps
Information we need now

The report highlights the lack of information we have in some parts of the world for making science-based decisions. It also emphasizes the need for capacity-building to fill knowledge gaps and to undertake national integrated marine assessments that can support decision-making. There are experts available in most developing countries who could contribute to an assessment, but there exists a capacity gap for undertaking assessments. This means that many developing countries were unable to provide information and input for the first assessment and this is a fundamental challenge for the international community (Ref: WOA, Chapter 53).

The information that we need to understand the ocean can be divided into four main categories: (a) the morphology of the seafloor; (b) the composition and circulation of ocean water; (c) the biota of the ocean; and (d) the ways in which humans interact with the ocean (Ref: WOA Summary, page 42).

An integrated assessment by definition needs to include environmental, social and economic information relevant to human activities, and all the components of relevant ecosystems, with input and information from a variety of geographic locations. The WOA Group of Experts considered that integrated assessment methodology required further development and refinement (Ref: WOA Summary, page 49).

The sustainable use of the ocean cannot be achieved unless there is coherent management of all human activities affecting it (Ref: WOA Summary, page 9).

The complete First Global Integrated Marine Assessment – ***World Ocean Assessment I*** – can be viewed at www.un.org/Depts/los/global_reporting/WOA_RegProcess.htm

Knowledge gaps in understanding the ocean

Categories	Knowledge gaps	Capacity building gaps
Morphology of the seafloor	Detailed coastal bathymetry; Impact of ocean acidification on coral reefs and beaches; Relationship between the physical ocean and marine biota.	Bathymetric, geophysical and biological survey capacity; Skilled analytical and technical capacity.
The composition and circulation of the ocean water	Atmosphere ocean interactions to understand ocean acidification; Primary production in the ocean.	Remote sensing capacity.
Ocean biota	Update of Census of Marine Life data base; Assessments of plankton, fish stocks, marine mammals, turtles and seabirds.	Data management capacity; Fisheries management capacity including enforcement.
Human ocean interactions	Improved monitoring of shipping noise, land-based inputs and diseases; Non-living resource exploitation including offshore hydrocarbon and mining industries; Waste disposal and marine debris, integrated coastal zone management and marine ecosystem services and their economic value.	Capacity for public authorities to create appropriate regulations to safeguard social and environmental interests; Capacity in implementing ecosystem based management approaches.

Actions

Aggregating and intergrating information

Synthesizing complex biological, chemical, physical and socio-economic components of the marine environment, in order to evaluate conditions, impacts and responses.

Communicating key messages to policy makers and society

Ref/Source: WOA Summary, pages 43 to 46.

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