Glossary

Abyssal plain
An abyssal plain is an extensive, flat, gently sloping or nearly level region at abyssal depths. *See also* Trenches.

Area
Article 1, paragraph 1, of UNCLOS defines the Area as "the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction." Article 136 of UNCLOS provides that "[t]he Area and its resources are the common heritage of mankind."

Atolls
Atolls are coral islands consisting of a ring-shaped reef, nearly or entirely surrounding a central lagoon. They occur in the warm waters of the tropics and subtropics. These low-lying and vulnerable landforms owe their origin to reef-building corals. The origin of atolls was explained by Charles Darwin as the result of subsidence (sinking) of a volcanic island.

Baseline
The baseline is the line from which the outer limit of a State's territorial sea is measured. The breadth of other maritime zones is also measured from the same line. The United Nations Convention on the Law of the Sea (UNCLOS) sets out several methods for determining the baselines, providing that coastal States may determine baselines by any of these methods (article 15):

- Normal baseline: "[e]xcept where otherwise provided in this Convention, the normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State" (article 5). "

- Straight baseline: "In localities where the coastline is deeply indented and cut into, or if there is a fringe of islands along the coast in its immediate vicinity, the method of straight baselines joining appropriate points may be employed in drawing the baseline from which the breadth of the territorial sea is measured" (article 7, paragraph 1). The remaining paragraphs of article 7 establish the criteria to draw straight baselines as follows: "2. Where because of the presence of a delta and other natural conditions the coastline is highly unstable, the appropriate points may be selected along the furthest seaward extent of the low-water line and, notwithstanding subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal State in accordance with this Convention. 3. The drawing of straight baselines must not depart to any appreciable extent from the general

direction of the coast, and the sea areas lying within the lines must be sufficiently closely linked to the land domain to be subject to the regime of internal waters. 4. Straight baselines shall not be drawn to and from low-tide elevations, unless lighthouses or similar installations which are permanently above sea level have been built on them or except in instances where the drawing of baselines to and from such elevations has received general international recognition. 5. Where the method of straight baselines is applicable under paragraph 1, account may be taken, in determining particular baselines, of economic interests peculiar to the region concerned, the reality and the importance of which are clearly evidenced by long usage. 6. The system of straight baselines may not be applied by a State in such a manner as to cut off the territorial sea of another State from the high seas or an exclusive economic zone."

- Archipelagic baselines: "[a]n archipelagic State may draw straight archipelagic baselines joining the outermost points of the outermost islands and drying reefs of the archipelago provided that within such baselines are included the main islands and an area in which the ratio of the area of the water to the area of the land, including atolls, is between 1 to 1 and 9 to 1" (article 47). The remaining paragraphs of article 47 establish the criteria to draw archipelagic baselines as follows: "2. The length of such baselines shall not exceed 100 nautical miles, except that up to 3 per cent of the total number of baselines enclosing any archipelago may exceed that length, up to a maximum length of 125 nautical miles. 3. The drawing of such baselines shall not depart to any appreciable extent from the general configuration of the archipelago. 4. Such baselines shall not be drawn to and from low-tide elevations, unless lighthouses or similar installations which are permanently above sea level have been built on them or where a low-tide elevation is situated wholly or partly at a distance not exceeding the breadth of the territorial sea from the nearest island. 5. The system of such baselines shall not be applied by an archipelagic State in such a manner as to cut off from the high seas or the exclusive economic zone the territorial sea of another State. 6. If a part of the archipelagic waters of an archipelagic State lies between two parts of an immediately adjacent neighbouring State, existing rights and all other legitimate interests which the latter State has traditionally exercised in such waters and all rights stipulated by agreement between those States shall continue and be respected. 7. For the purpose of computing the ratio of water to land under paragraph l, land areas may include waters lying within the fringing reefs of islands and atolls, including that part of a steep-sided oceanic plateau which is enclosed or nearly enclosed by a chain of limestone islands and drying reefs lying on the

perimeter of the plateau. 8. The baselines drawn in accordance with this article shall be shown on charts of a scale or scales adequate for ascertaining their position. Alternatively, lists of geographical coordinates of points, specifying the geodetic datum, may be substituted. 9. The archipelagic State shall give due publicity to such charts or lists of geographical coordinates and shall deposit a copy of each such chart or list with the Secretary-General of the United Nations."

UNCLOS also establishes the methods to draw the baselines in the presence of reefs (article 6); mouths of rivers (article 9) and bays (article 10), provided that certain conditions are met. In addition, UNCLOS regulates the effect of the outermost permanent harbour works (article 11), roadsteds (article 12) and low-tide elevations (article 13) on baselines.

Beach

A beach is a type of shore and is an area on which the waves break and over which shore debris, such as sand, shingle and pebbles accumulate. A beach includes backshore and foreshore. The foreshore is often defined as the area covered and uncovered by the tides.

Bioerosion

Bioerosion is an important process in reefs, with bioeroders, such as algae, sponges, polychaete worms, crustaceans, sea urchins, and boring molluscs (e.g., *Lithophaga*), reducing the strength of the framework and producing sediment that infiltrates and accumulates in the porous reef limestone

Biological pump

The biological pump is the process of active biological uptake of CO2 into the biomass and skeletons of plankters (the individuals that collectively form plankton).

Bruun Rule

The Bruun Rule is a simple heuristic that uses the slope of the foreshore and conservation of mass to predict the extent to which sea-level rise will cause erosion and net recession landwards for many beaches.

Canyon

Submarine canyons are defined as "steep-walled sinuous valleys with V-shaped cross sections and axes sloping outward as continuously as river-cut land canyons, with relief comparable to even the largest land canyons".

Clausius-Clapeyron relationship

The Clausius-Clapeyron relationship is the water-holding capacity of the atmosphere, which increases by 7 per cent for every degree Celsius of warming.

Contiguous Zone

According to article 33 of UNCLOS, "[i]n a zone contiguous to its territorial sea, described as the contiguous zone, the coastal State may exercise the control necessary to: (a) prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or territorial sea; (b) punish infringement of the above laws and regulations committed within its territory or territorial sea." In addition, according to the same provision "[t]he contiguous zone may not extend beyond 24 nautical miles from the baselines from which the breadth of the territorial sea is measured."

Continental shelf

'Continental shelf' in this Assessment refers (unless stated otherwise) to the geomorphic continental shelf (as shown in Figure 1) and not to the continental shelf as defined in Article 76 of UNCLOS. The geomorphic continental shelf is usually defined in terms of the submarine extension of a continent or island as far as the point where there is a marked discontinuity in the slope and the continental slope begins its fall down to the continental rise or the abyssal plain. UNCLOS provides that "The continental shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance." This definition is refined in Article 76, paragraphs (4) to (7).

Continental rise

A submarine feature which is that part of the continental margin lying between the continental slope and the deep ocean floor; simply called the rise in the UNCLOS.

Continental slope

The continental slope is that part of the continental margin that lies between the continental shelf and the continental rise floor.

Deep sea

In this Assessment "deep sea" refers to the sea floor of deep-water areas that are beyond (that is, seawards of) the geomorphic continental shelf. It is the benthic zone that lies in deep water (generally >200 metres water depth).

Dead-weight tonnage

Dead weight tonnage is the measure of how much weight a ship can safely carry. It is the aggregate of the weights of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew.

Downwelling and upwelling

Where surface ocean currents move seawater toward coasts, the water is forced to sink, in the process known as coastal downwelling. Coastal upwelling occurs where surface waters are moved away away from the coast: that water is replaced by water that wells up from below. Upwelling and downwelling also occur in the open ocean where winds cause surface waters to move away from a region (leading to upwelling) or to converge toward a region (leading to downwelling).

Ecosystem

The Millennium Ecosystem Assessment defines an ecosystem as "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit"

Ecosystem services

The Millennium Ecosystem Assessment (2005) classified ecosystem services as: provisioning services (e.g., food – including food traded in formal markets and subsistence trade and barter - pharmaceutical compounds, building material); regulating services (e.g., climate regulation, moderation of extreme events, waste treatment, erosion protection, maintaining populations of species); supporting services (e.g., nutrient cycling, primary production) and cultural services (e.g., spiritual experience, recreation, information for cognitive development, aesthetics).

El Niño/Southern Oscillation

The name "El Niño/Southern Oscillation" (ENSO) refers to the way in which the ocean system of the tropical and subtropical Pacific can, in some years, produce a significant warming of the sea off the western coast of North and South America, often greatest off Peru, in the middle of the southern hemisphere summer.

Enclosed and semi-enclosed seas

Article 122 of UNCLOS defines an enclosed or semi-enclosed sea as a "gulf, basin or sea surrounded by two or more States and connected to another sea or the ocean by a narrow outlet or consisting entirely or primarily of the territorial seas and exclusive economic zones of two or more coastal States."

Estuary

An estuary is the tidal mouth of a river, where the seawater is measurably diluted by the fresh water from the river.

Euphotic zone

This is the layer below the ocean's surface that receives enough light for photosynthesis to occur. This is usually taken to be where photosynthetically active radiation [PAR] is more than 1 per cent of the surface intensity.

Exclusive economic zone

UNCLOS provides that "The exclusive economic zone is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this Part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other States are governed by the relevant provisions of this Convention". UNCLOS further provides that "The exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.", and that "In the exclusive economic zone, the coastal State has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; (b) jurisdiction as provided for in the relevant provisions of this Convention with regard to: (i) the establishment and use of artificial islands, installations and structures (ii) marine scientific research; (iii) the protection and preservation of the marine environment; (c) other rights and duties provided for in this Convention."

Expendable Bathythermograph

An Expendable Bathythermograph (XBT) is a device that, using electronic solid-state transducers, registers and reports temperature and pressure while it free-falls through the water column. Mechanical Bathythermographs (MBTs) are their mechanical predecessors, that were lowered on a wire suspended from a ship, used a metallic thermocouple as transducer.

Fjord and ria areas

Fjord and ria areas are long narrow inlets into the land from the sea (in the case of fjords, between high cliffs), with depth usually diminishing landwards.

Freshwater flux

Freshwater fluxes into the ocean include: direct runoff from continental rivers and lakes; seepage from groundwater; runoff, submarine melting and iceberg calving from ice sheets; melting of sea ice; and direct precipitation, which is mostly rainfall but also includes snowfall.

Gross primary production (GPP)

Gross primary production is the rate at which photosynthetic plants and bacteria use sunlight to convert carbon dioxide (CO_2) and water to the high-energy organic carbon compounds used to fuel growth.

Gyres

Gyres are circular patterns of currents in ocean basins. In the centre of a gyre the seawater moves less than the seawater in the currents around it. There are five

major gyres: in the North and South Atlantic Ocean, in the North and South Pacific Ocean and in the Indian Ocean.

Harvest Control Rule

In the context of fisheries management, this rule has been defined as “An agreed rule (algorithm) that describes how harvest is intended to be controlled by management in relation to the state of some indicator of stock status. For example, a harvest control rule can describe the various values of fishing mortality which will be aimed to be achieved at corresponding values of the stock abundance".

High Seas

Article 86 of UNCLOS defines the high seas as “all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State.”

Hydrological cycle

The Earth’s hydrological cycle (or water cycle) is the process by which water evaporates from the Earth’s surface and is then precipitated as rain, hail or snow. It also includes the processes by which water moves from place to place across land and sea.

Indian Dipole

The Indian Ocean Dipole is an irregular oscillation of sea-surface temperatures: the western part of the equatorial Indian Ocean becomes alternately warmer and then colder than its eastern part. These changes affect the climate of the countries that surround the Indian Ocean.

Isobath

An isobath is an imaginary line representing the horizontal contour of the sea-bed at a given depth.

Large marine ecosystems

Large marine ecosystems (LMEs) are regions of the ocean encompassing coastal areas from river basins and estuaries out to the seaward boundaries of continental shelves and the outer margins of the major current systems. These areas are characterized by their distinct bathymetry, hydrography, productivity and food webs. The term often refers to the set of 64 LMEs identified by the United Nations Environment Programme’s Regional Seas Programme for analytical purposes.

Macronutrients and micronutrients

Macronutrients are elements needed in relatively large quantities for photosynthesis. They include calcium, carbon, nitrogen, magnesium, phosphorus, potassium, silicon and sulphur. Micronutrients are elements needed in lesser

quantities and provide the necessary co-factors for metabolism to be carried out. They include iron, copper and zinc.

Mangroves
Mangroves are one of several genera of tropical trees or shrubs which produce prop roots and grow along low-lying coasts into shallow water. The term is also used for the habitats in which mangrove genera grow.

Marine wetlands
Marine wetlands are areas of salt marsh, fen or shallow water, whether natural or artificial, permanent or temporary, with water that is static or flowing. The Convention on wetlands of international importance, especially as waterfowl habitat (Ramsar Convention)[1], includes areas of marine water the depth of which at low tide does not exceed six metres.

Meridional overturning circulation
The meridional overturning circulation is a system of surface and deep currents linking all ocean basins. It transports water (and, with it, heat) salt, nutrients and other substances around the globe, and connects the surface ocean and the atmosphere with the deep sea. *See also* Thermohaline circulation.

Micronutrients *see* macronutrients

Mid-ocean ridges
Mid-ocean ridges are geologically active chains of submarine mountains formed by plate tectonics. In some ocean basins (for example, the Pacific), they are located away from the centre. Most are linked into a 70,000-kilometre long chain encompassing the whole globe.

Natural capital
Natural capital is usually defined as the stocks of natural assets, including rocks, soil, air, water and all living things. Ecosystem services are derived from this natural capital. In the marine context, natural capital contrasts with human-made capital like ports and navigation systems.

Nautical mile
A nautical mile is defined as 1,852 metres (approximately 2,025 yards, or 1.15 miles).

Net primary production (NPP)
Net primary production is Gross Primary Production (GPP) less the respiratory release of CO_2 by photosynthetic organisms, i.e., the net photosynthetic fixation of inorganic carbon into autotrophic biomass.

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[1] United Nations Treaty Series, volume 996-I, No.14583.

Ocean acidification:

When CO_2 reacts with water, it forms carbonic acid, which then dissociates and produces hydrogen ions. The extra hydrogen ions link with carbonate ions (CO_3^{2-}) to form bicarbonate (HCO_3^-). In this process, the pH and concentrations of carbonate ions (CO32-) decrease. As a result, the carbonate mineral saturation states also decrease. The water thus becomes more acid and less basic (alkaline). Due to the increasing acidity, this process in the ocean is commonly referred to as "ocean acidification". (pH is a numeric scale used to specify the acidity or basicity of a water-based solution, calculated as the negative logarithm to base 10 of the activity of the hydrogen ions).

Ocean acidification hotspots

Although the average oceanic pH can vary on interglacial time scales, the changes are usually on the order of ~0.002 units per 100 years; however, the current observed rate of change is ~0.1 units per 100 years, or roughly 50 times faster. Regional factors, such as coastal upwelling, changes in riverine and glacial discharge rates, and sea-ice loss have created "Ocean acidification hotspots" where changes are occurring at even faster rates.

Ocean currents

Ocean currents are continuous, directional movements of seawater generated by forces such as wind, the Coriolis effect from the rotation of the Earth, differences in temperature and salinity of different parts of the ocean and the effects of mixing bodies of seawater with these different qualities. They are distinct from tides, which are caused by the gravitational effects of the moon and the sun. In the upper ocean, the effects of wind and Coriolis effect predominate. In deeper water, the main driver is the thermohaline circulation.

Oxygen minimum zones

Oxygen minimum zones are the places in the ocean where oxygen saturation in the water column is at its lowest. Such zones typically occur at midwater depths (200-1000 m).

Phenology

Phenology is the study of the timing and duration of cyclic and seasonal natural phenomena (e.g., spring phytoplankton blooms, seasonal cycles of zooplankton reproduction), especially in relation to climate and plant and animal life-cycles.

Precautionary Approach

Principle 15 of the 1992 Rio Declaration on Environment and Development[2] provides "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". In the context of fisheries management, the Food and Agriculture Organization of the United Nations has defined it as "A set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resource, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong".

Reef

A reef is a solid structure either of rock, or created by accumulations of organisms (often corals) – a "biogenic reef". Reefs rise from the seabed, or at least clearly form a substantial, discrete community or habitat which is very different from the surrounding seabed. The structure of a biogenic reef may be composed almost entirely of the reef-building organism and its tubes or shells, or it may to some degree be composed of sediments, stones and shells bound together by the organisms. Reefs which either reach close to the sea surface or are exposed at low tide are of particular importance as coastal structures.

Reference Points

In the context of fisheries management, "reference points" are defined as "Benchmarks against which the abundance of the stock, the fishing mortality rate or economic and social indicators can be measured in order to determine its status. These reference points can be used as limits or targets, depending on their intended usage."

Runoff

Runoff is the sum of all upstream sources of water, including continental precipitation, fluxes from lakes and aquifers, seasonal snow melt, and melting of mountain glaciers and ice caps.

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[2] A/CONF.151/26.

Salinity

Salinity refers to the level of dissolved salts in seawater. It varies significantly from place to place. On average, it is around 35 grams of salts per litre. In the Red Sea and the Persian Gulf, the most saline major sea areas, it reaches an average 40 grams of salts per litre, because of the high rate of evaporation and the low rate of freshwater inflow.

Salt marshes

Salt marshes are intertidal, coastal ecosystems that are regularly flooded with salt or brackish water and dominated by salt-tolerant grasses, herbs, and low shrubs. They occur in middle and high latitudes worldwide.

Seamounts

Seamounts are predominantly submerged volcanoes, mostly extinct, rising hundreds to thousands of metres above the surrounding seafloor.

Sedimentation

Sedimentation is the consolidation of loose sediments that have accumulated in water or in the atmosphere. The sediments may consist of rock fragments or particles of various sizes (conglomerate, sandstone, shale), the remains or products of animals or plants (certain limestones and coal), the product of chemical action or of evaporation (salt, gypsum, etc.) or a mixture of these materials.

Solubility pump

The solubility pump is the process of physical air-sea flux of atmospheric CO_2 at the ocean surface.

Southern Ocean

The Southern Ocean is defined as all the ocean area south of 60°S.

Steric

Steric refers to density changes in seawater due to changes in heat content and salinity.

Stratification

Ocean stratification occurs when water masses with different properties (such as oxygenation, salinity or temperature) form layers that limit mixing between the water masses.

Territorial sea
Article 2 of UNCLOS provides that "[t]he sovereignty of a coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea." Article 3 of UNCLOS provides that "[e]very State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with [UNCLOS].

Thermohaline circulation
The thermohaline circulation is a process driven by differences in the density of water water due to temperature ("thermo") and salinity ("haline") in the various parts of the ocean. Currents driven by thermohaline circulation move much slower than surface currents.

Tidal flats
Tidal flats are marine wetlands that are in the zone between high and low tides.

Ton
In this Assessment, the metric ton of 1,000 kilograms is used.

Toxic Algal Blooms
Toxin-producing algae are a diverse group of phytoplankton species with two characteristics in common: (1) they produce toxins which harm people and ecosystems; and (2) their initiation, development and dissipation are governed by species-specific population dynamics and oceanographic conditions.

Trenches
Trenches are long, narrow, characteristically very deep and asymmetrical depressions of the seafloor, with relatively steep sides. *See also* abyssal plain.

Upper ocean
In this Assessment, the term "upper ocean" is used to describe both the epipelagic zone (between the surface and 200 metres depth) and the mesopelagic zone (between 200 and 1000 metres depth). The euphotic zone lies within the epipelagic zone (*see* "euphotic zone").

Water column
The water column is the vertical continuum of water from sea surface to sea-bed.

Water cycle (*see* Hydrological cycle)