

World Oceans Day 2016

Mundus maris



Information Sheet

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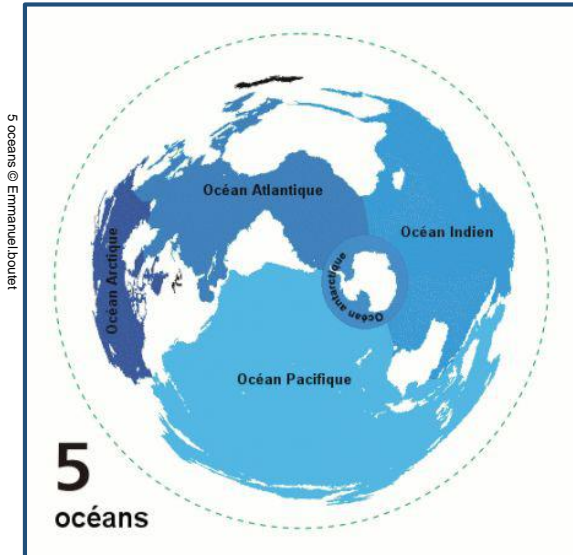
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A world to discover

What is the Ocean ?



5 océans © Emmanuel Boulet

The surface of the planet is covered by a wide uninterrupted expanse of salt water which is called "World Ocean" or simply Ocean. Continents occupy a smaller part of the planet than the seas. Indeed, the World Ocean represents approximately 71% of the globe (360 million km²). This is one reason why we call our Earth, the Blue Planet. The average depth of the oceans is 3,800 meters (while for the land surfaces the average elevation is rather 850 meters). However, the maximum depth is in the Mariana Trench (Northeast Pacific): this is 11 000 m deep!

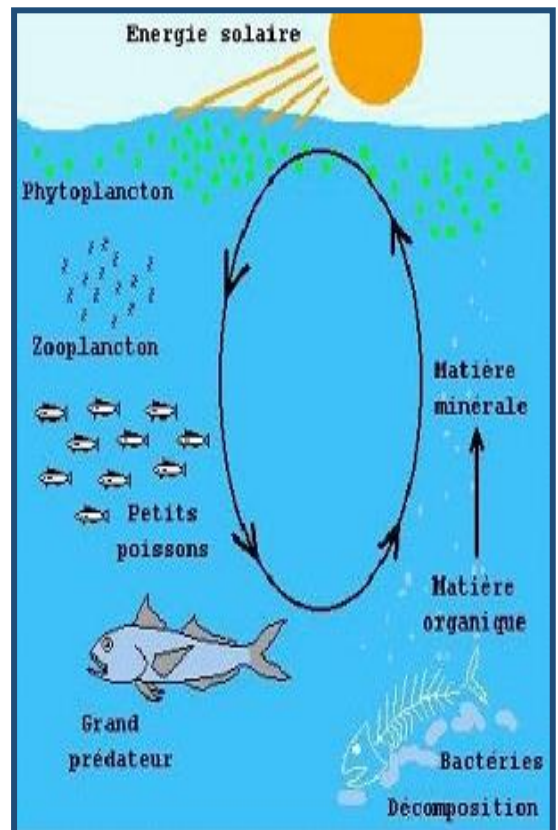
Only 5% of the oceans have been explored by humans. We do not yet have the technology to push far enough to venture into every corner of the sea. The oceans are so vast that even machines able to reach extreme depths, can not fathom them fully.

Every second, breath we take is from the ocean. Marine ecosystems contribute in a high percentage of services which allow us to live and to sustain our civilisation (food, climate, temperature balance and much more).

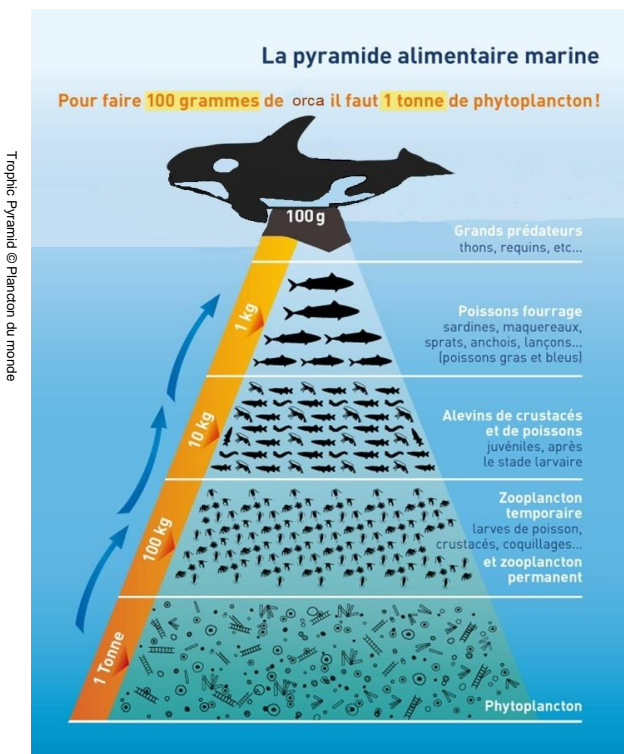
What is an ecosystem ?

An ecosystem is a space in which different species live and interact with one another and with their physical environment. We distinguish different trophic levels within such a system. At the bottom are plants (macro-algae on rocky shores and shallow water and microscopic algae (phytoplankton) that transform the energy of the sunlight through photosynthesis into organic matter, just like plants do on land. Plants are therefore confined to the upper part of the ocean to a depth where sunlight can still penetrate. We call phytoplankton and other plants producers and attribute to them level one of the food web.

We call all animals consumers, as they depend directly or indirectly on eating plants. The small zooplankton animals consuming phytoplankton directly are assigned level 2 in the food web, the larger zooplankton, fish larvae and small fish, squid and other animals feeding on zooplankton are defined as level 3 in the food web. Large fish feeding on small fish are at trophic level 4. Humans, some fish eating marine mammals and birds may consume at trophic levels between 3 and 5, the latter at the tip of the food web.



All organisms need energy to maintain their bodies, escape predators or adverse environmental conditions, reproduce, and move. The biomass of consumers must therefore be smaller than the biomass of the plant producers. Broadly speaking, each trophic level of the food web is only 10% of the next lower level. We therefore also talk about a trophic pyramid. If plants at level 1 had a weight equal to 100,000, zooplankton at level 2 would be approximately 10,000, small fish and squids at level 3 1,000, big fish at level 4 would be 100.



Plants and animals that are not eaten by others sink to the bottom and are eaten by scavengers, such as shrimps or crabs, or decomposed by bacteria and fungi. The minerals released help fuel the primary production in the photic zone. That happens when the water is shallow, if deep mineral-rich water “wells up” along the western coasts of the continents or when whales feeding in deep waters in polar seas defaecate at the surface, thus fertilising surface waters and nurture a robust food web.

Having a high biomass of long-lived big animals high in the food web that can feed on and “connect” many species across several trophic levels makes a marine ecosystem stable and more resilient to external strains (heavy fishing, climate change, pollution). Overexploited ecosystems with disrupted connections between trophic levels lose their ability to bounce back in the face of such pressure and produce less than stable and robust systems. Ecosystems suffering from long-lasting pressure can change irreversibly and can not provide the same services as healthy ones.

Terrestrial life goes back some 400 million years, marine life is much older: 3.8 billion years. That explains at least in part the immense diversity of marine creatures.

Amazing marine and other aquatic species



Nudibranch
(marine snail)



Moon fish



Dumbo octopus



Eneptniastes
(sea cucumber)



Bat fish



Angler fish



Goblin shark



Napoleon emperor



Bluefin tuna



Harp sponge
(carnivorous, deep sea)



Revenant fish
(deep sea family Ophioproctidae)



Puffer fish



Leafy sea dragon
(seahorse)



Football Fish



Manta Ray



Squidworm



Horse shoe crab
(Limulus)



Lion fish



Blobfish



Banggai cardinal fish

We know but a small fraction of all marine species. One of the best investigated groups are fish. www.fishbase.org documents almost 33,000 species known to science. So far about 226,000 species of marine plants and animals have been described, but scientists estimate their real number at between 700,000 and one million.

The principal threats to the ocean

For a long time, we thought that the ocean was so vast, we could never do any serious harm to it.
We were wrong !

Overfishing



Overfishing example © Fatima Maho

Too many industrial fishing vessels take more fish than the marine ecosystems can be replenished naturally. Moreover, often times they catch fish that are too small to reproduce, they use fishing gear that destroy the natural habitat (e.g. bottom trawls the scrapes through the sea floor destroying anything on its path), and discard large quantities of unwanted catch at sea leaving them dead or dying – a huge waste (shrimpers discard up to 90% of their total catch). According to the Food and Agriculture Organization (FAO), 75% of all fisheries are overexploited or fully exploited, hardly any are underutilised.

A recent scientific study showed that, "If overfishing continues at current rates, we will not have the current types of fish and the fisheries in our oceans by 2050". Overfishing changes the structure and function of marine ecosystems. Independent scientific reconstruction of marine catches of all countries show that 50% more is caught than what countries report to FAO for global catch statistics! Since a 130 million peak in 1996, production is declining. Particularly industrial catches decline from overfishing. Illegal and unregistered catches are still high. Small-scale fisheries important for food security are still gradually increasing. It's a case for improving local, national and global statistics for better management progressiveness.

Pollution

By some estimates, almost 35 million tons of plastic waste find their way into the ocean every year,.

Several garbage patches exist in the Pacific where trash congregates to varying degrees in places where rotating currents and winds converge to accumulate marine debris. Such gyres are observed in other oceans too. Over time, bigger pieces of plastic break down into microparticles which are confounded with food, thus ingested by zooplankton and other marine organism.

The plastic captures pollutants and releases softeners used during production which will then poison the entire food web including fish we eat! Marine birds and whales die from starvation with a stomach full of plastic. Plastic bags are, meanwhile, confounded for jellyfish by dolphins, birds and sea turtles, which will then suffocate when swallowing them.



Plastics kill birds © RegardSurLeMonde

Eutrophication



Excess of organic substances © Nature22

The excess of organic substances produced by humans, such as fertilizers in agricultural run-off, leads to a reduction of dissolved oxygen available in the ocean. This will then lead to the overdevelopment of algae, so-called "blooms". Sometimes these blooms also contain toxic algae provoking ciguatera outbreaks. These algae blooms sink to the bottom uneaten and their decomposition by bacteria consumes all oxygen. That will create "dead zones" that kill most other living species and impede resettlement. Some 450 dead zones have been counted on our planet. In the Baltic Sea, we have one of the biggest: it measures 40 000 km². Another big and growing one is in the Gulf of Mexico off the Mississippi Delta.

Climate change - Warming



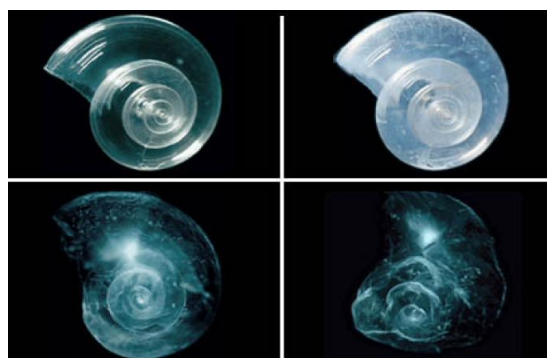
Global warming ©Buzzeotti

Global warming is predominantly the result of human activities. It grew significantly with the accelerated material cycles, particularly fossil fuels, since the industrial revolution. The level of greenhouse gases in the atmosphere has continued to increase and currently reaches short-term peaks of 480 parts per million of CO₂. The global rise in temperatures melts the glaciers and sea ice around the world, though heat uptake by the ocean initially buffers the worst effects. Warming creates already measurable sea-level rise, higher than models predicted,

because of thermic expansion of seawater and more freshwater influx from glaciers. That's a risk for ocean circulation. It also affects marine ecosystems with mobile species (such as fish) moving already polewards by an average of 0.8 km/year. It also means, less oxygen is dissolved in the water – you get gasping fish, particularly in the tropics.

Climate change - Acidification

Another aspect of climate change is ocean acidification. As the Southern Ocean alone has taken up some 40% of human CO₂ emissions, we are starting to see acidification of the seas. The increase of acidity requires all marine animals with calcareous skeletons to spend more energy holding their bodies together. Among the most affected organisms are phytoplankton, our oxygen producers, molluscs who already tend to have thinner shells, reef building corals and others. Some zooplankton species are no longer even capable of making shells, causing their death. This acidification can also affect fish. An increase in species morbidity and mortality was spotted in the most affected regions.



Acidification of ocean and sea shell ©Thalassa

Invasive species

Because of human transport, traffic and deliberate translocation, exotic species are introduced into habitats and places, where they do not occur naturally. This happens, when ships, particularly large cargo ships and tankers, empty their ballast tanks filled with seawater taken in far away seas. Many of the exotic species then become invasive as there are no natural predators to keep them in check. Example: the introduction of green crabs from Europe causes havoc in the US. The Black Sea fisheries, meanwhile, have almost disappeared as a result of introduced comb jellies from the Americas. This jellyfish eats fish larvae and has no natural enemies. Some specimens, like the Japanese ghost shrimp can even tackle the hulls of ships. Finally, the Arctic, which was untouched until then, began to be colonized by sea squirts.

Oil spills

Shoreline pollution from petroleum spills certainly remains the most visible and infamous of the threats to the sea. Man-made oil spills are a danger to the ocean. The most spectacular happen as a result of shipping or oil platform accidents. They are expected to increase as more offshore platforms are built, particularly in difficult environmental conditions, such as in great depth and in polar regions. Deepwater Horizon was a particularly serious accident, whose effects are still felt. But chronic pollution from transshipment and ordinary platform operations release greater amounts of petroleum into the environment than more visible accidents. Some components of petroleum are highly toxic to marine life and also humans. The lighter components escape into the atmosphere, the heavier components form tar bands at the sea bottom and along shores.

Some shocking numbers about human pressures on the oceans

As we have seen, humans pose a threat to the oceans. Here are some numbers to get a measure of the pressure we exercise on the seas...




❖ Marine catches peaked in the mid 1990 at about 130 million tons. They are 50% higher than what governments report to FAO for compiling world statistics..



❖ There are several big garbage patches in the Pacific (not only one). Trash congregates to varying degrees in places where circular ocean currents and winds converge to accumulate marine debris.



❖ Overfishing and illegal practices are diminishing catches every year since 1996



❖ Only about 4% of the global ocean are currently protected, some only on paper. The internationally agreed target is at least 10% by 2020.




❖ Seafood accounts for at least 15% of proteins consumed by half of humanity



❖ More than 70% of the largest cities are close to the ocean.



❖ Only 6% of world catches are legalized MSC, the only label for responsible fishing



❖ To produce 1 kg of farmed salmon it takes about 5 kg of small fish, much of which could also have been consumed directly by humans.

What to do for a healthy ocean and a healthy planet?

7 small gestures of everyday life

1. I leave the seabed alone. When diving, I take care not to damage corals with my fins and I do not bring them as "souvenirs" to the surface. Do not forget that corals are animals! In addition, I stay out of MPAs so that ecosystems in poor condition can recover. The 2010 Conference of the Parties (COP) of the Convention on Biological Diversity (CBD) in Aichi, Japan, decided to expand marine protected areas to 10% of the ocean by 2020.
2. I respect the paths along the coast. These trails allow us to enjoy the riches of the coast without disturbing the flora and fauna living there. I do not walk in the dunes: they preserve our coast and protect us; in turn, we should not tear out the plants that grow there.
3. I do not leave my trash on the beach. In summer, the bins on the beaches often flow over: to prevent waste from ending up in the ocean, I take the litter home and I separate it prior to disposal! Also, I do not use plastic bags, I prefer bags made of fabrics.



Campagne anti-pollution : Le poissons mange vos mégots, vous mangez ensuite le poissons ©Surfrider



Campagne anti-pollution : Le poissons mange vos ordures, vous mangez ensuite le poissons ©Surfrider

4. As with fruits and vegetables, I eat adult fish that is in season. I respect the reproductive cycles and the welfare of marine species. In order to help fight overfishing, I look for labels and minimum sizes to buy only sustainably produced fish. Also, I buy fish only, if I know that labour standards have been met

(Consumer guide :
<http://fishbase.de/tools/SeaFoodGuide/search.php>
for seafood advisories for several countries).

5. I ask our politicians to stop overfishing by not giving bad subsidies, but also by denying access to markets for illicit catches. This fights illegal fishing. Conversely, leaving small and very large female fish in the water, is essential for boosting genetic quality and productivity of the resource.

6. I sail green! **Seafarers**, opt for green reflexes! Follow these three simple rules: do not throw garbage overboard, avoid toxic products to polish your vessel and use an anti-overflow device not to spill fuel into the water. For **fishermen**: I promote low impact fisheries, particularly artisanal fisheries with passive gears (ban trawlers).
7. In summer, sunscreens create an impenetrable oily layer on the surface of the water, which hampers the vital exchange between the ocean and the atmosphere. So I choose not to attack the sea. I will protect myself from the sun with an organic product, mineral cream or by wearing a T-shirt.

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