



**GRIM CATCH**  
Plastic waste: netted between Livorno and Grosseto during the "Clean Archipelago" ecological campaign.

# The Mediterranean malaise

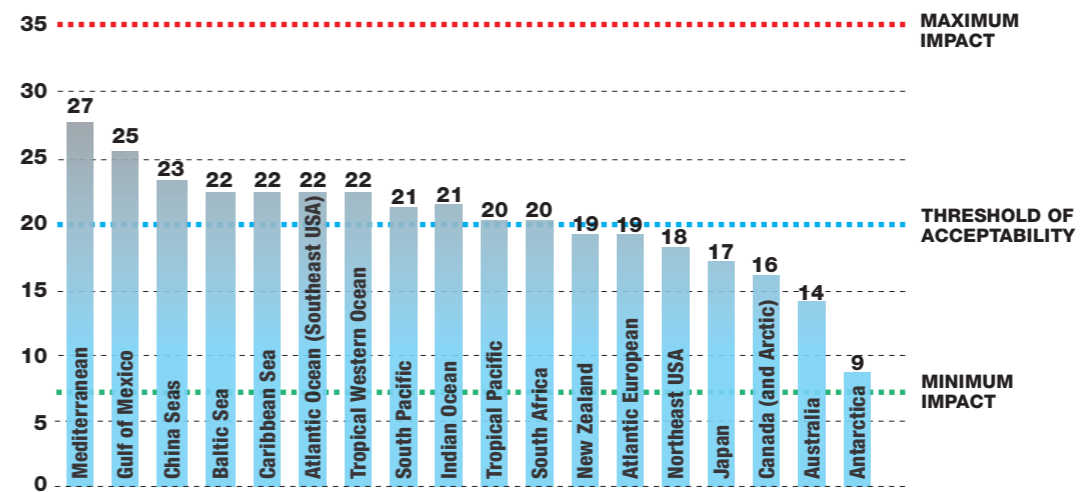
Man's destructive impact on the **Mediterranean** has been greater than on any other sea. Worse than the Gulf of **Mexico** or the **China** Seas. Here's **why** and here's what we can **do** about it.

by Vito Tartamella

**T**he ranking was merciless but unequivocal. Of all the oceans and seas on our planet, the most seriously ill is the Mediterranean. That is the assessment of the 360 scientists from around the world who took part in the impressive "Census of Marine life," a 10-year research project on Earth's marine biology.

Data in hand, the scientists used a scale of 1 to 5 to evaluate the impact of human activities on the ecosystem balance. The Mare Nostrum earned the dubious distinction of last place, with a total of 27 points out of a theoretical maximum of 35 (see table). Worse than the Gulf of Mexico and the China Seas, both notorious for their dismal health.

Why has our sea deteriorated to such a point? We asked Roberto Danovaro, Professor of Marine Biology and Ecology at the University of Marche, and one of the authors of the ranking, published in the scientific journal *PlosOne*. "The Mediterranean is an area of major bio-geographical interest," he says. "While its waters represent only 0.32% of the volume of ▶



**WORLD RANKING**  
A panel of 360 scientists rated the impact of 7 parameters on the world's seas, using a scale from 1 (minimum) to 5 (maximum): overfishing, loss of habitat, pollution, presence of alien species, temperature, hypoxia (oxygen deficiency) and acidification. The maximum level of impact would score 35, the minimum 7. The threshold of acceptability is 20, which is also the world average.

**INSPECTION**  
Greenpeace and CNR divers study the Tyrrhenian seabed in search of plastic waste. 7% of the 8 million tons that end up in the world's oceans every year build up in the Mediterranean.



© Lorenza Mascia/Greenpeace

all the world's oceans, they contain 7.5% of the known marine species, and this heritage is delicate. The Mediterranean is very much like a huge salt lake, with an average depth of 1,450 meters as compared to the oceans' average depth of 3,750 meters.

Because it is shallow, its waters warm more rapidly than any other ocean. Change, however, is very slow. It takes about 80 years for the Mediterranean to be totally renewed through new water entering via the Strait of Gibraltar. These factors make it much more vulnerable to the impact of human activity." The Mediterranean is a sort of "ocean in miniature" and can show us how other seas and oceans deteriorate due to human activity. But how exactly did the Mediterranean malaise come about? There are five causes.

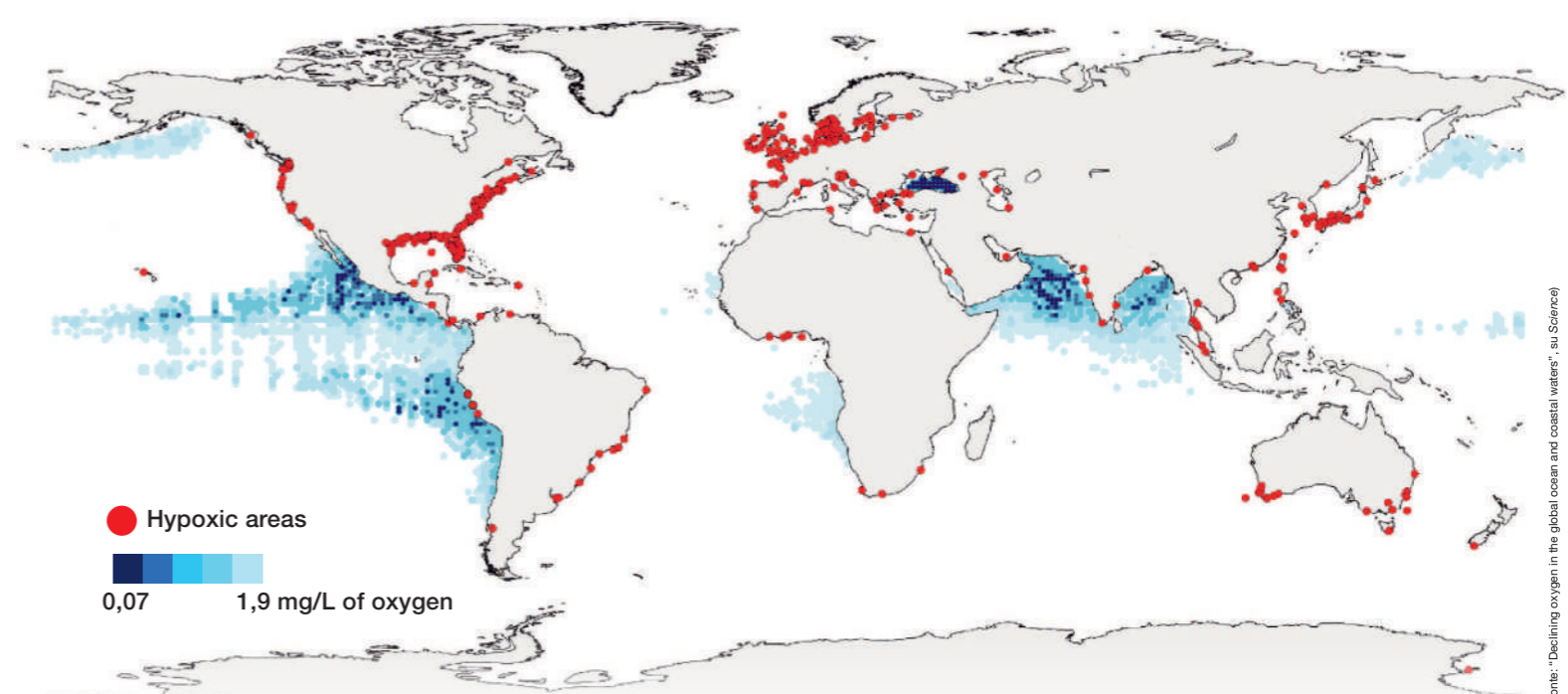
The Mediterranean is one of the busiest seas in the world, with 15% of all maritime activity and 30% of all oil tankers passing through it. Most of the pollutants, however, actually come from rivers and those coastal cities that do not treat their sewage. Even today, 12% of the Italian population does not have access to sewage treatment facilities, to such an extent that the European Union has opened a number of non-compliance proceedings against Sicily, Calabria, Lombardy and Campania in particular (data source: Utilitalia) with hefty fines. Effluents release quantities of heavy metals into the sea - Egypt alone discharges 5 to 14 tons of mercury and lead pharmaceuticals (which kill vital bacterial populations), as well as nitrogen ▶

**1 OVERFISHING:** Our sea is home to some of the fish most in demand on the market: species that live on the seabed, such as sole, turbot, cod, hake or red mullet and caught by trawling, and those whose habitat is the open sea, such as tuna or sardines. Industrial fishing techniques, however, have decimated fish populations, especially the larger species such as tuna, swordfish, grouper and shark (blue shark is often sold as swordfish). Worldwide, fishing has been in decline for over a decade. Today, 7% of marine species have become extinct, and the populations of 1 species in 3 have been drastically reduced, decreasing on a global scale by more than 90%. "A massacre that has had dramatic consequences on how ecosystems function," comments Danovaro.

**2 HABITAT DESTRUCTION:** Trawling, illegal fishing practices, such as date mussel harvesting, and infrastructure construction (ports, barriers, undersea pipelines and offshore platforms) have inflicted heavy damage on the seabed and its myriad life forms. In Italian waters alone, compared to 60 years ago, 25% of the Posidonia meadows and 80% of the macroalgae forests (Cystoseira) have been lost, depriving many species of their habitat, just as 60% of tropical coral reefs have been destroyed or damaged. On the global scale, it has been estimated that over 70% of marine environments have undergone significant changes since pre-industrial times.

**3 POLLUTION:** maritime shipping contaminates the sea through the spillage or dumping of noxious substances.

**30% of oil tankers** transit through the Mediterranean and untreated effluents flow into the sea:  
**12% of Italy's sewage** is untreated



(Fonte: "Declining oxygen in the global ocean and coastal waters" su Science)

## AN AREA AS WIDE AS EUROPE WITH NO OXYGEN (OR LIFE)

The water has turned brown, and on the surface float rotting algae, feces and dead fish. This is a "dead zone", a stretch of ocean where the oxygen content is so low (below 0.2 mg / L) that it prevents any form of life. There are over 400 such dead zones in the world, covering a total area of over 245,000 km<sup>2</sup> - the size of the United Kingdom. The largest dead zone is located in the Arabian Sea, where it covers nearly the entire Gulf of Oman, over a surface area of 165,000 km<sup>2</sup>. The second largest can be found in the Gulf of Mexico. During certain periods, dead zones have also formed in the northern Adriatic Sea. These areas form due to the warming of the sea, which decreases the solubility of

oxygen in the water, combined with an excessive influx of nutrients (nitrogen and phosphorus, used in agriculture or livestock) transported by rivers. This causes algae to proliferate unchecked, thereby further depleting oxygen. In short, dead zones expand as a direct or indirect result of human activity. Moreover, the situation is likely to get worse. In research recently published in Science, Denise Breitburg, a marine ecologist at the Smithsonian Environmental Research Center, estimates that hypoxia zones, i.e. areas where the level of oxygen is minimal (below 2 mg / L: see map), cover a total of 4.5 million km<sup>2</sup>, an area the same size as the European Union.

**THE 400 "HYPOXIC ZONES"**  
These are the marine areas across the globe where oxygen levels are below 2 mg/liter: life is at risk below this level. The blue areas indicate the "minimum oxygen zones" at a depth of 300 m. A healthy sea contains 8 mg of oxygen per liter of seawater. Below 0.2 mg/L, life is nearly absent.



**THE LAST RESORT**  
Incinerator at the mouth of the Besos River near Barcelona (Spain): many industries are often not connected with purification plants.

Moreno Paffone

# The remedy? Turn **30%** of the seas into **protected areas**. Today it is only **2,5%**



and phosphorus, nutrients used in agriculture. The latter cause two types of damage: they enable algae to grow unchecked and they decrease the quantity of oxygen, which is essential to marine plant and animal life. Then there's plastic: 7% of the 8 million tons that end up in the world's oceans every year build up in the Mediterranean..

**4 ALIEN SPECIES:** Over the last 140 years, a thousand species from the Red Sea and other tropical waters have made their way into the Mediterranean via ballast water discharge, ship hulls and the opening of the Suez Canal. Some of the newcomers have decimated the native Mediterranean species: the Filipino clam has nearly overtaken the native Adriatic clam while the *Rhopilema nomadica* jellyfish, over 60 centimeters wide, has turned large stretches of the sea into expanses of jelly. Similar phenomena occur in all seas: today, over 7,000 alien species have been carried around the world by ships or by colonizing the floating islands of waste that are carried along by the currents..

**5 GLOBAL CLIMATE CHANGE:** Like seas everywhere, the Mediterranean has been impacted by the effects of global warming. In the Mediterranean, deep-sea temperatures do not drop below 13° C; which is 10° more than ocean temperatures at the same depth. The Mare Nostrum is warming both on the surface, where the temperature has risen by over 1.8 °C in recent decades, and in deep water, where it has risen by 0.2°C in the last 20 years. The effects have been devastating for ecosystem balance. Since 1999, there are areas where over 80% of sea fans and sponges have died in a matter of weeks due to prolonged heat waves. Extreme heat leaves organisms more vulnerable to disease and bacterial infection. In the oceans, extreme heat kills the algae that live in symbiosis with coral,

thus depriving the coral of nutrients and causing it to bleach. Fortunately, at least for now, the Mediterranean has been spared two other problems caused by human activity: hypoxia (see illustration on previous page) and acidification. Acidification is triggered by our massive CO<sub>2</sub> emissions. Every year, in fact, about 25% of CO<sub>2</sub> emissions due to human activities can be successfully absorbed by our seas. But there is a price. When the CO<sub>2</sub> in the atmosphere interacts with water, it is converted into carbonic acid (H<sub>2</sub>CO<sub>3</sub>), which gradually makes the water more acidic. As a result, the shells produced by marine organisms dissolve – because they are composed of carbon and calcium -- and no longer retain the carbon element, which then accumulates on the ocean floor. “Compared to two centuries ago, oceans today are 30% more acidic. If we cannot halt this decline, by 2100 the oceans will be much more acidic than they are today. The effects will be unimaginable,” emphasizes Danovaro. In short, the Mediterranean is very ill, and the other seas are not at all healthy either. So what can we do? “The first step,” replies Danovaro, “is to halt our impact by seriously reducing and regulating fishing and putting an end to habitat deterioration. A great deal also depends on what we do here on land. We must reduce greenhouse gas emissions by focusing on green energy sources, decrease the consumption of plastic, increase the number of sewage treatment plants and make them more efficient. The health of the Earth is closely linked to the health of the seas.” That is why, according to scientists, an effective remedy would be to safeguard at least 30% of the oceans by transforming them into protected oases. The UN is aiming for 10%. Today, however, only 2.5% of the oceans (and only 4.6% of the Mediterranean) are protected, so there is still a long way to go. But if we are to succeed in saving the Blue Planet, we must act now. Before it is too late. **F**



**A MASSACRE**  
Fish market in Antalya (Turkey): Indiscriminate fishing has decimated many species. Above, waste on the island of Mljet (Croatia), a maritime park.

Gethy Images