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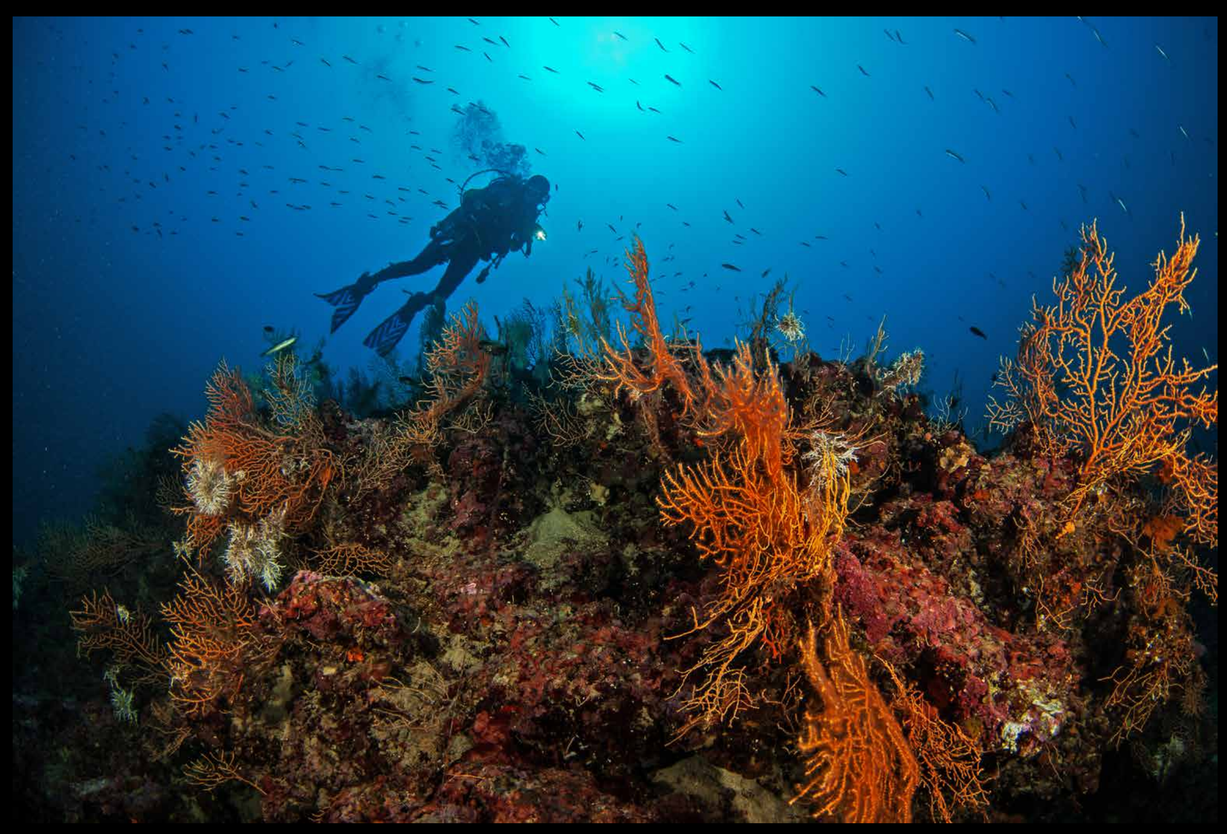
Arctic ice is decreasing rapidly. In Svalbard, the sea front of glaciers have also shrunk and retreated. These changes affect the food availability for fishes, seabird and seals, which use areas close to glacier fronts to find prey (here: Blomstrandbreen, Kongsfjorden, Spitzbergen island, NO).

How ecosystems are changing

Planet Earth has always been in continuous evolution: continents, oceans, atmosphere, climate change; new species arise, others become extinct. Ecosystems have always changed, but never as fast as in the last two centuries, due to climate change and to the exponential increase in the exploitation of natural resources. Intensified land use, pollution and anthropogenic climate change have reduced the habitat of many species, sometimes threatening their survival, sometimes forcing them to move to more suitable areas, e.g. to higher altitudes, with complex consequences for biotic communities. These changes affect both biodiversity conservation and ecosystems, as well as economic sectors such as agriculture, forestry and fisheries.

The intensity of climate change effects is greatest in particularly vulnerable regions and ecosystems, such as the Mediterranean, mountains (and the Alps in particular) and the Arctic. In mountain regions and in the Arctic, temperatures are rising at a higher rate (at least twice as fast) than the average, changing the start and duration of the seasons, leading to a decrease in snowfall and the extent and duration of the snowpack, drastically reducing glaciers. All this leads to changes in the river regime, impacts on species life cycle, altering ecosystems through changes in the food chain, the presence of invasive species, new diseases or pests.



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Mesophotic reefs of the Mediterranean Sea are unique habitats that host a large diversity of species. Gorgonian corals, a typical facies of Mediterranean, grow slowly, are irreversibly damaged by trawling (prohibited on coral habitats and marine protected areas) and suffer the rise in marine temperature. Here we see a group of Eunicella cavolini, commonly known as yellow gorgonian, growing to a depth of 50 m in the Gulf of Corinth (GR).

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Climate change will lead to an increase in extreme events such as drought. This picture, which portrays a particularly dry period in 2016, was taken in Kruger National Park, South Africa.

In the Mediterranean area, decrease in rainfall and increase in temperatures are expected, eventually causing droughts and increase in burnt areas, as well as an increase in sea level, with the consequent colonization of new habitats available from different animal and plant species and the disappearance of more fragile species, such as corals or endemic species with reduced geographical distribution.

Future projections, conducted by combining climate and ecological models, correlate the increase in temperatures with the likelihood of extinction and with changes in the structure of ecosystems, such as in primary productivity (the production of organic matter through photosynthesis), in the nutrient cycle (phosphorus and nitrogen) or in the carbon cycle.

Social and economic dynamics also have a strong impact on ecosystems: the increase in land use and pollution is restricting habitats and contributing to the loss of biodiversity. The abandonment of remote rural areas is causing other transformations such as the closure of environments rich in biodiversity, which survived thanks to the millennial human intervention to which the species are now adapted. There is still uncertainty about the intensity and speed with which the changes taking place will affect biodiversity and ecosystems, and on the irreversibility of these processes. Scientific research works to contribute to the conservation of natural ecosystems and the essential benefits that nature offers us.

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The abandonment of alpine pastures favours the regrowth of trees, which close open spaces with a consequent loss in biodiversity. Noaschetta Valley, Gran Paradiso National Park (IT).

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