

## How is Life in the Sea affected by Climate Change?

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### SUMMARY

Climate change poses a serious threat to life in our seas, including coral reefs and fisheries, with impacts on marine ecosystems, economies and societies, especially those most dependent upon natural resources. The risk posed by climate change can be reduced by limiting global warming to no more than 1.5°C. Warm water coral reefs host a wide variety of marine life and are very important for tropical fisheries and other marine and human systems. As a result, projections of total future fishery yields under different climate change scenarios only show a moderate decrease of around 4% (~3.4 million tonnes) per degree Celsius warming. The Arctic and Southern Oceans are home to a rich diversity of life, from tiny plankton to fish, krill and seafloor invertebrates to whales, seals, polar bears or penguins.

### INTRODUCTION

Life in most of the global ocean, from pole to pole and from sea surface to the abyssal depths, is already experiencing higher temperatures due to human-driven climate change. In many places, that increase may be barely measurable. In others, particularly in near-surface waters, warming has already had dramatic impacts on marine animals, plants and microbes. Due to closely linked changes in seawater chemistry, less oxygen remains available (in a process called ocean deoxygenation). Seawater contains more dissolved carbon dioxide, causing ocean acidification. Non-climatic effects of human activities are also ubiquitous, including over-fishing and pollution. Whilst these stressors and their combined effects are likely to be harmful to almost all marine organisms, food-webs and ecosystems, some are at greater risk (Figure 1). The consequences for human society can be serious unless sufficient action is taken to constrain future climate change.

### Climate change impact on Sea

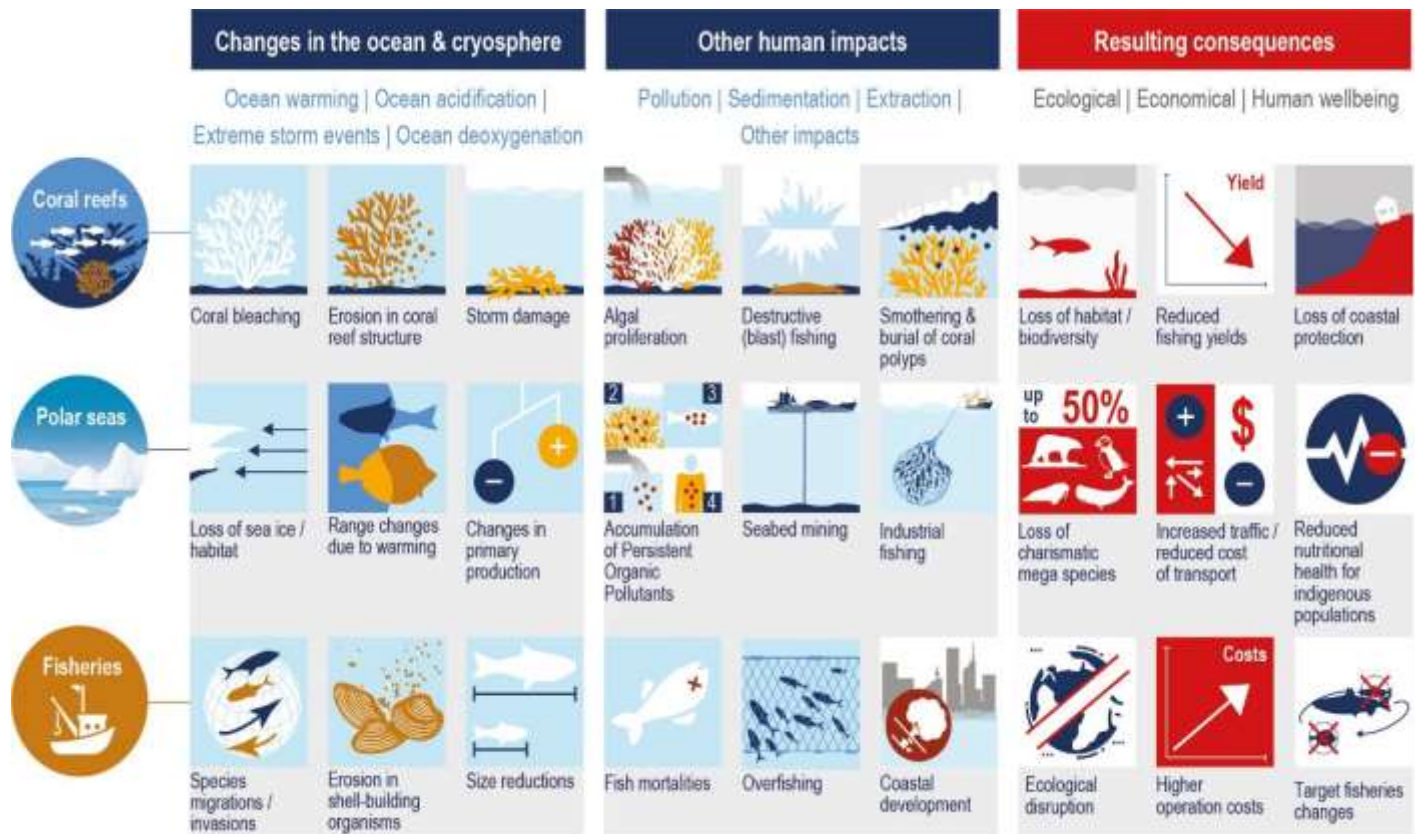
Warm water coral reefs host a wide variety of marine life and are very important for tropical fisheries and other marine and human systems. They are particularly vulnerable, since they can suffer high mortalities when water temperatures persist above a threshold of between 1°C–2°C above the normal range. Such conditions occurred in many tropical seas between 2015 and 2017 and resulted in extensive coral bleaching, when the coral animal hosts ejected the algal partners upon which they depend. After mass coral mortalities due to bleaching, reef recovery typically takes at least 10–15 years. Other impacts of climate change include SLR, acidification and reef erosion. Whilst some coral species are more resilient than others, and impacts vary between regions, further reef degradation due to future climate change now seems inevitable, with serious consequences for other marine and coastal ecosystems, like loss of coastal protection for many islands and low-lying areas and loss of the high biodiversity these reefs host. Coral habitats can also occur in deeper waters and cooler seas, and more research is needed to understand impacts in these reefs. Although these cold water corals are not at risk from bleaching, due to their cooler environment, they may weaken or dissolve under ocean acidification, and other ocean changes.

Mobile species, such as fish, may respond to climate change by moving to more favorable regions, with populations shifting poleward or to deeper water, to find their preferred range of water temperatures or oxygen levels. As a result, projections of total future fishery yields under different climate change scenarios only show a moderate decrease of around 4% (~3.4 million tonnes) per degree Celsius warming. However, there are dramatic regional variations. With high levels of climate change, fisheries in tropical regions could lose up to half of their current catch levels by the end of this century. Polar catch levels may increase slightly, although the extent of such gains is uncertain, because fish populations that are currently depleted by overfishing and subject to other stressors may not be capable of migrating to Polar Regions, as assumed in models. In polar seas, species adapted to life on or under sea ice are directly threatened by habitat loss due to climate change.

The Arctic and Southern Oceans are home to a rich diversity of life, from tiny plankton to fish, krill and seafloor invertebrates to whales, seals, polar bears or penguins. Their complex interactions may be altered if new

warmer-water species extend their ranges as sea temperatures rise. The effects of acidification on shelled organisms, as well as increased human activities (e.g., shipping) in ice-free waters, can amplify these disruptions.

**Figure 1: Harmful to almost all marine organisms, food-webs and ecosystems, some are at greater risk.**



**CONCLUSION**

Whilst some climate change impacts (like possible increased catch levels in Polar Regions) may benefit humans, most will be disruptive for ecosystems, economies and societies, especially those that are highly dependent upon natural resources. However, the impacts of climate change can be much reduced if the world as a whole, through inter-governmental interventions, manages to limit global warming to no more than 1.5°C.

**REFERENCES**

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