



From models to life

Combining climate models and ecosystem models makes it possible to predict how life in the ocean will develop in the future.

Fisheries is the main economic sector in a number of countries bordering the tropical oceans. In the recent decades, a growing global population has increased the pressure on marine resources.

With an estimated ten billion people by the year 2050, fish stocks cannot keep up. Sustainable

management of the fisheries is necessary.

Sustainable fishing means leaving enough fish in the ocean, respecting marine habitats and ensuring that people who depend on fishing can maintain their livelihoods.

How can this be achieved?

Modeling ecosystems in the ocean

It is crucial to understand how marine ecosystems function and how they are impacted by climate change and human activities.

Marine ecosystems are complex food webs, ranging from microscopic organisms – phytoplankton – at the lowest trophic levels all the way to the big fish and mammals at the top of the food chain.

The physical and chemical properties of the ocean can influence marine ecosystems in many

ways, and organisms have different preferences for light, oxygen, temperature etc.

Phytoplankton, the very basis of the marine food-web, depend on nutrients and light. Changes in the environment can profoundly affect marine ecosystems.

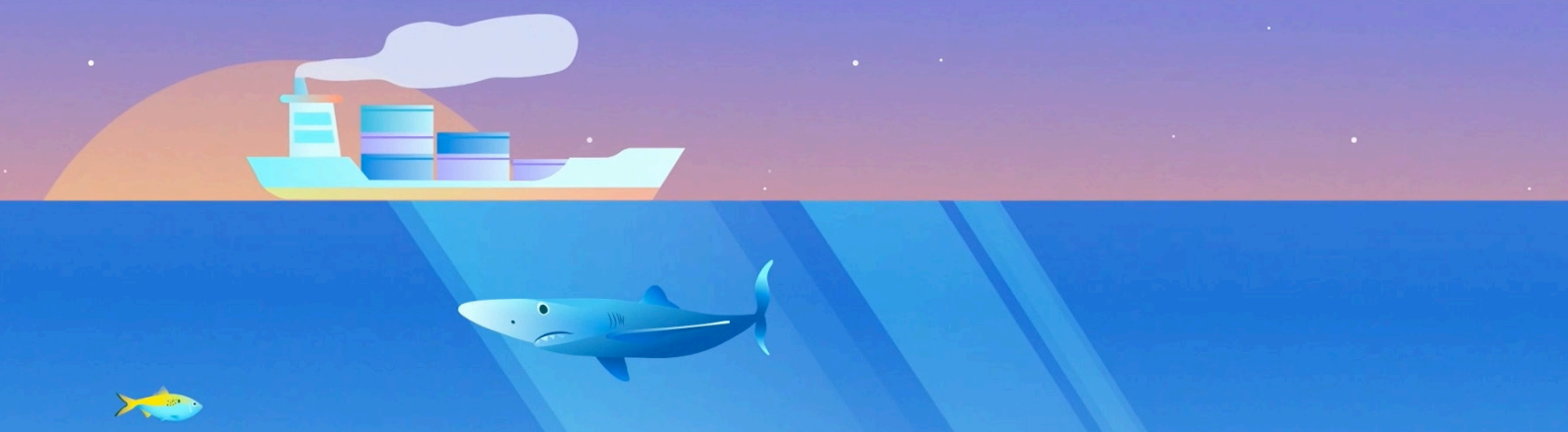
Ecosystem models are designed to capture the interactions between different organisms and their chemical and physical environment.

Modeling variations in the climate

The climate system changes on timescales of weeks, months, decades and beyond. These

changes can be triggered naturally or by humans.





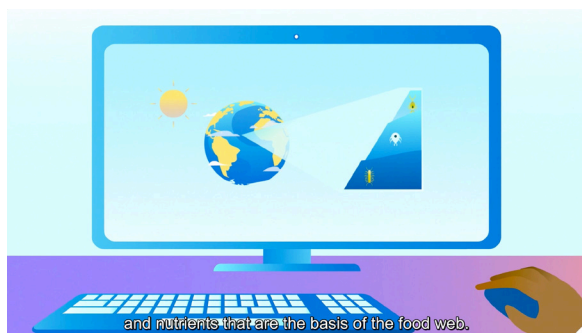
Climate scientists use complex, mathematical models, also called Earth System Models, to explore and predict the evolution of the ocean, the atmosphere and other components of the climate system.

Modern climate models also include a biological component and can be used to predict the distribution of microorganisms and nutrients at the base of the food web.

Combining the two

Traditionally Earth System Models and Marine Ecosystem Models have been developed and used independently by different research groups and communities.

In the EU Horizon 2020 project TRIATLAS, the two types have been combined, resulting in more realistic predictions of the marine ecosystems and a better understanding of the past, current and future state of fish stocks. This knowledge can be beneficial when planning for a more sustainable management of fisheries.



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Learn more

Learn more about the modeling of climate and ecosystems in this animation video: www.youtube.com/watch?v=GWWgmYzBjMQ&t=1s.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817578.