A plankton model

Plankton accounts for 80% of ocean biomass. However, it is still relatively poorly understood and modelled. These gaps in understanding are problematic when it comes to projecting the evolution of marine ecosystems, as planktonic organisms are at the base of the entire food chain.

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Plankton under the microscope.

The term plankton comes from a Greek word that means "wandering". It refers to a world within a world, one that allows itself to be carried along by the currents. However, that does not mean it is passive - far from it. Because behind this word lie microscopic plants (phytoplankton) and tiny grazing and predatory animals (zooplankton). Together, they form the basis of ocean food chains. It is therefore important to understand how they function, their ecological role and the factors that determine their development.

One current approach is based on modelling. Scientific teams are seeking to model the physiology, behaviour and evolution of plankton biomass and its role in the functioning of a fish ecosystem off the coast of Senegal, which supplies a large part of West Africa with sardinella.

To achieve this, the scientists have developed four different models: the first reproduces the region's physical functioning, the dynamics of temperature and currents; the second looks at biogeochemical dynamics, from nutrient salts to phytoplankton; the third simulates zooplankton and fish, including sardinella; and the fourth represents the socioeconomic processes that determine sardinella fishing. By linking these four models, it will be possible to reproduce the entire chain of processes and deduce the societal impacts of ongoing climate change or overfishing, for example. This is what makes the approach unique.

The importance of each model will be assessed and validated using observations gathered during oceanographic campaigns. This modelling work will make it possible to regionalise and refine the predictions of the Intergovernmental Panel on Climate Change (IPCC) based on large-scale, low-resolution simulations, and thus better anticipate the local repercussions on an ecosystem and fisheries of great socioeconomic importance to the region.

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••• The development of four interlinked models will make it possible to reproduce the functioning of the marine ecosystem off the coast of Senegal and deduce the socioeconomic impacts of certain processes, such as resource overexploitation or global warming •••

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Small-scale fishing in Djiffer, Senegal.

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Children fishing on a reef flat in Reao, French Polynesia. © IRD/S. Andréfouët

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