The secrets of the ocean

Climate, ocean goods and services in South America
Budget: US$884,870
Main Agency: Argentine Institute of Oceanography.
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Countries: Argentina, Brazil, Chile, United States, Peru and Uruguay

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Abstract:

Scientific knowledge on what is happening in the oceans in the southern part of the American continent supports decision-making for the sustainable management of fisheries and actions to adapt to climate change. The research of the international network VOCES, supported by IAI has unveiled many secrets of the Patagonian Sea.

Water bodies such as oceans and the marine species that live there do not respect national frontiers. Water and wind, as well as flora and fauna, do not need passports to navigate underwater or across the surface of the sea. Yet, in these environments biodiversity is suffering, mostly as a result of the actions of human beings.

It happens worldwide, but also in the southern part of the American continent. As a result, countries have created a network to study and understand how climate change and climate variability influence oceanic, atmospheric and terrestrial ecosystems.

From the marine waters of Patagonia to the coasts of Brazil, Chile and Peru, scientists of different disciplines and nationalities are studying the effects that ocean currents, strong winds and tides have on small- and medium-sized artisanal fisheries, increasing the algal or jellyfish populations in some cases, or even reducing clam or shrimp populations, in others.

For instance, they have found that the Patagonian Sea has particularities that do not happen in other regions. The most evident has to do with a phenomenon that scientists call upwelling, and refers to the ascent of deep ocean waters – usually cold and rich in nutrients – to the surface.

Along the coasts of California, in the United States, Chile and Peru, this phenomenon happens because of the action of the wind. But in the southern part of the continent, the Falkland current sparks the upwelling, helped by the abyssal topography, with the same force as the one caused by the wind in other regions. With the wind this phenomenon can last a few days, yet in the Patagonian Sea it can happen all year long.

“These results suggest that Patagonia could be an important source for iron and other nutrients that fertilize the entire Southern Ocean,” researchers say.

But there is more. The Southern Ocean is absorbing carbon dioxide from the atmosphere through biological processes mainly connected with phytoplankton, anchovies, hakes and calamari. It is being deposed in the bottom of the sea where it could rest for hundreds of years. For this reason, the Patagonian Sea is considered as an important CO2 reservoir.

The international network, VOCES, supported by the Inter-American Institute for Global Change Research (IAI), is working to understand these dynamics, producing results based on scientific evidence, comparing them with the findings of peers at climate change meetings, and calling the attention of national and regional decision makers.

The results have been so overwhelming that, in 2016, the Senate of the Argentine Republic approved a declaration in which the project was declared of national interest, through the case file 523/16. The document says: “Reliable scientific information, based on greater available certainty, is an essential component of the development of legislative policy which can evaluate proposals using science, improving its impact on people’s lives.” The document calls for the harmonization of rules across countries, allowing them to more effectively “respond to natural complexity and mitigate the impact of humans”.

VOCES, has coordinated regional marine research initiatives, promoted new scientific research, improved understanding of the processes that occur between marine systems and the deep ocean, and determined their impact on species of great importance for the region. This allows decision makers to develop policies to deal with global warming and protect fisheries.

According to the researchers, the large marine ecosystems of Patagonia, Humboldt and southern Brazil “sustain more than 20 per cent of the global fish catch, host unique biodiversity, and absorb 40 per cent of global CO_2 emissions”.

Because of the importance of fisheries in the region, the project has ensured its assessments have also taken into account the historical and social impact of developments on people who live from artisanal fishing. For example, it looked at the overpopulation of jellyfish in Peru, which impedes the production of anchovies, the country’s main fishing resource.

The products and activities researchers have developed during the execution of the project include more than 40 published articles, a book, and several workshops involving decision makers.

If IAI has influenced and contributed to the discussions of the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change and the Ocean Conference (New Yok, 2017) through numerous funded researches, the contributions of the studies developed in the oceanic ecosystems around South America are the ones that have influenced the most in public policies.