Our friends from the deep

Research carried out in the deep ocean over the last ten years has revealed a varied environment, connected to our own, which provides immeasurable ecosystem services.

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Sorting material collected during a deep-water trawl, Brazil.

Deep-sea fish are particularly fascinating. They are strange, they sometimes eat things bigger than they are, and some light up the darkness like beacons in the night. And yet, these fish could not be more distant from us, with their strange mouths and shapes that traverse the vast ocean, somewhere between 200 and 5,000 metres below the surface. The only way we get to see them is in a natural history museum, leafing through a book or watching a film. They are virtually foreign to our world, and yet they are an unsuspected cornerstone of it.

Acoustic and trawl data from the first 1,000 metres of the water column, particularly off the coast of Brazil, show that they are far more numerous, diverse and complex than imagined. Although relatively small in size, they are thought to constitute the largest biomass of vertebrates on Earth.

••• Observations in deep waters reveal the key role played by this fascinating ecosystem •••

Observations also show that these deep-sea fish undertake major vertical migrations. They can cross a vast range of the water column, and therefore a large number of pelagic zones, in a single day, making them great travellers, but above all great transporters. They are essential participants in the transport of carbon to the ocean depths,

"The research carried out by IRD in Brazil has been a successful model for the advancement of studies on the biodiversity, ecology and conservation of historically neglected deep sea ecosystems. This partnership goes beyond traditional academic objectives, not only fostering high quality scientific outputs, but also serving as a tool to train and equip young scientists to take the lead in their field, creating opportunities for significant progress in priority areas of science."

Michael Maia Mincarone, Institute of Biodiversity and Sustainability, Federal University of Rio de Janeiro

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Viperfish *Chauliodus sloani*, deep-sea fish, Brazil.

a phenomenon that contributes to the "biological carbon pump", itself essential to the oceanic carbon cycle.

In the current context of global change (global warming, biodiversity loss, etc.), these ecosystems absolutely must be preserved. They play a crucial role in marine food chains, feeding tuna and whales in particular, and thus indirectly influencing fishing activities. They also represent enormous potential for biotechnology.

Even before fully understanding the consequences of potential harvesting, the fishing industry is starting to take a close interest in these deep-sea fish, which are valuable to them for their essential role in feeding tuna and whales. However, scientific exploration must continue before these areas can be fished, if we are to gain a better understanding of this still mysterious ecosystem and preserve these deep-sea fish, which although strange, are nonetheless essential to marine life.

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OUR SHARED OCEAN

Science in the Global South for a Sustainable World

IRD Éditions
Collection Grands enjeux
Marseille, 2025

Editorial management
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Proofreading
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Distribution coordination
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Cover photo
Children fishing on a reef flat in Reao, French Polynesia. © IRD/S. Andréfouët

ISBN Papier: 978-2-7099-3070-3
ISBN PDF: 978-2-7099-3071-0
ISBN Open/epub: 978-2-7099-3072-7

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