

## Section 5

### Socioecological systems

#### Introduction

The ocean is more than just a vast body of water—it is a dynamic, interconnected system where human societies and natural ecosystems are deeply intertwined. Human activities, from fishing and shipping to tourism and energy production, have a profound impact on marine ecosystems. At the same time, the ocean's health determines the well-being of communities worldwide, influencing food security, livelihoods and even public health. The present section contains an exploration of the complex socioecological systems of the ocean, emphasizing that sustainable management involves both conserving nature and ensuring the well-being of communities that rely on the ocean for their livelihoods.

The challenges facing the ocean today are multifaceted. Pollution, habitat destruction, overfishing and climate change place significant strain on marine ecosystems. Meanwhile, social and economic factors, such as demographic shifts, governance structures and technological advances, shape how these pressures manifest. The ocean is also a source of opportunity, with emerging solutions offering pathways to a more sustainable and inclusive future. The present section is aimed at providing a holistic perspective on these issues, assessing both risks and opportunities while proposing practical solutions.

The aim of the present section is to not only document challenges but also to identify meaningful solutions. By integrating scientific insights, case studies, and socioeconomic considerations, it outlines a road map for a future in which both people and the ocean can prosper.

The first subsection is focused on ocean economies—how marine resources are used and the systems in place to govern them. It includes an analysis of key sectors, such as fisheries and aquaculture, food trade, energy, shipping, tourism, biotechnology and coastal development, examining their impact on marine ecosystems and strategies for achieving sustainability.

The concept of a sustainable and inclusive ocean economy serves to emphasize the integration of economic growth, environmental stewardship and social well-being. In each chapter, the concept of sustainability pathways is applied to outline strategies for achieving the Sustainable Development Goals, including ecosystem restoration, governance improvements and sustainable marine resource management for future generations.

The second subsection has been structured around the One Health framework, a holistic approach aimed at striking a sustainable balance and optimizing the health of humans, animals and ecosystems. Under that framework, it is recognized that the health of humans, domestic and wild animals, plants and ecosystems are intrinsically connected and interdependent (One Health High-Level Expert Panel (OHHLEP), 2022). Emphasis is placed on the importance of a thriving ocean for biodiversity and human health, including access to safe seafood, clean water and mental well-being. Issues such as marine pollution, zoonotic diseases and the role of coastal ecosystems in carbon sequestration are encompassed under this broad framework.

Equity, gender, justice and knowledge-sharing are key to shaping sustainable ocean futures. The second subsection also contains an exploration of how global challenges, such as pandemics, climate-related disasters and environmental injustices, affect communities differently. It highlights the importance of

considering Indigenous, traditional owner and local community knowledge in building the evidence base for decision-making, as well as ways to ensure that ocean governance is fair and inclusive.

### **References**

One Health High-Level Expert Panel (OHHLEP), Adisasmito, W.B., Almuhaire, S., Behravesh, C.B., Bilivogui, P., Bukachi, S.A., and others (2022). One Health: A new definition for a sustainable and healthy future. *PLoS Pathog*, 18(6): e1010537. <https://doi.org/10.1371/journal.ppat.1010537>.