

Brazilian Marine Biodiversity

Series editor

Alexander Turra
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The book series *Brazilian Marine Biodiversity* was designed to communicate to a broad and international readership the diversified marine and coastal habitats along the large Brazilian coast.

The diversity of marine habitats found in Brazil is astonishing and includes estuaries, coral reefs, rocky shores, sandy beaches, rhodolith beds, mangroves, salt marshes, deep-sea habitats, vegetated bottoms, and continental shelf. These habitats are addressed from an ecosystem perspective across the series, and characterized in terms of distribution and peculiarities along the Brazilian coast, records of relevant species, and information on the prevailing structuring ecological and oceanographic processes governing biodiversity.

The series also presents an analysis of the role of biodiversity and the importance of ecosystem services, and discusses the threats to each habitat, such as pollution, habitat loss, invasive species, overfishing, and global environmental changes. Conservation efforts are also considered as well as gaps in scientific knowledge and science-policy interface.

This series is an initiative of the Brazilian Network for Monitoring Coastal Benthic Habitats (ReBentos; reentos.org), which is supported by the Brazilian National Council for Scientific and Technological Development (CNPq), the Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use of the São Paulo Research Foundation (BIOTA-FAPESP), the Coordination for the Improvement of Higher Education Personnel (CAPES) and the Brazilian Innovation Agency (FINEP). ReBentos is part of the Brazilian Network on Global Climate Change Research (Rede Clima) and the Science and Technology National Institute on Climate Changes (INCT Mudanças Climáticas) at the Ministry of Science, Technology, Innovation and Communication (MCTIC).

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Coastal and Marine Environmental Education

 Springer

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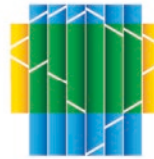
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Foreword

The volume on *Coastal and Marine Environmental Education* (CMEE) represents an updated and broad overview on relevant theoretical and empirical issues that are supporting the development of CMEE in Brazil. This book was elaborated by leading researchers on CMEE in Brazil, from different regions, backgrounds, and institutions, who face the challenge of improving the society's knowledge on the ocean and of creating the conditions for its sustainability. It builds on the rich biodiversity along the Brazilian coast as subsidy to improve the understanding of the society on the ocean. The development of Ocean Literacy is then considered as a relevant milestone to widen and deepen the Environmental Education (EE) approaches, thus aiming to foster changes in the way modern society relates to marine and coastal environments. This is especially relevant given the growing impacts that reach these environments and the relevance of the ocean to humankind.

The concepts of ocean literacy and Anthropocene are presented in the context of the role social control has on ocean environmental quality, followed by how EE initiatives can help in the dissemination of this knowledge. The Brazilian EE setting is then presented focusing on the legal framework. New approaches involving the integration of developing concepts and technologies and the coupling of geobiodiversity are described, intending to promote the interest of students in environmental issues through an integrated and systemic worldview. Relevant aspects related to the process of evaluation of the effectiveness of EE activities are discussed as a way to improve practices and their achievements, as well as comparisons among different initiatives. The strategic role of Brazilian Marine Protected Areas in promoting both environmental education and conservation is discussed. A synthesis of CMEE projects conducted in Brazil as well as instructional materials used is also presented. This book, thus, comprises a synthesis of the Brazilian conceptual and practical approaches on Coastal and Marine Environmental Education.

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Preface

Brazil is a country with jurisdiction over a huge marine territory defined by the exclusive economic zone and extended continental shelf, in which the area of approximately 4.5 million km² is equivalent to half of its continental territory. Brazil is also a megadiverse country (Paknia et al. 2015) with beautiful and accessible marine and coastal environments, providing a vast field for Coastal and Marine Environmental Education (CMEE). The contact with coastal and marine environments allows for a connection of our feelings and emotions with them. This sensorial commitment to nature can help us free ourselves from the artificial needs of modern societies (Freire 1979; Rousseau 1992). Besides, the contact with and the knowledge regarding the sea and coasts provide people the opportunity to critically reflect about the ecological, social, and economic importance of these ecosystems (Ghilardi-Lopes and Berchez 2013). This contact with nature is good not only under a conservation perspective but also for our physical and mental health (Field et al. 2015). These are basically the assumptions for achieving critical environmental education related to marine and coastal environments, in which human beings are recognized as part of the web of social, natural, and cultural relationships, whose link with the environment results from socially constructed historical processes and whose role in problem identification, resolution, and mitigation of environmental problems must be active and based on solid knowledge (Carvalho 2004). Taking these assumptions into account, the present book, as a part of the book series “Brazilian Marine Biodiversity,” aims at presenting to the readers how the accumulated knowledge regarding coastal and marine environments is contributing to the development of CMEE policies, projects, and actions in Brazil. The book is divided into two sections: one related to the conceptual and legal bases of CMEE in Brazil and the other related to the ways CMEE is being implemented in the country.

Since Brazil presents a great diversity of cultural, educational, and social realities, CMEE provides endless possibilities for the promotion of “Ocean and Coastal Literacy” for learners of all ages (NOAA 2013). This is fundamental under the present scenario of profound and complex changes in natural systems caused by human actions (see more on Chap. 1), which demand the construction of knowledge under an interdisciplinary and systemic worldview (García Díaz and Rivero 1996; see

more on Chap. 3). At the same time, this diversity imposes several challenges to the development of a standardized Environmental Education (EE) national program (see more on Chap. 2), which also needs to emphasize marine and coastal habitats. The coastal zone of the country encompasses 395 cities distributed in 17 coastal states that have a direct contact with the sea, making CMEE initiatives more accessible. However, there are other 5175 cities in the country to which the “Ocean Literacy Framework” should also reach, especially in elementary and high schools. In the Brazilian curriculum standards, environmental education should be treated across all disciplines, and a way to reach this goal would be to use emerging themes, such as the ocean or climate change, and pedagogies and methodologies, such as phenomenon-based education and outdoor and active learning strategies, which can be associated with Information and Communications Technology (ICT) (see more on Chap. 4).

Independently of the place where they are implemented or the public to which they are targeted, an important concern of educators should be the evaluation of these activities in terms of educational effectiveness and environmental impacts (see more on Chap. 5). As happens in other places around the world, evaluation is not always included as part of planning, making it difficult to draw conclusions regarding the attainment of the goals and objectives initially proposed and the comparison of results across the country.

Regarding the implementation of CMEE in Brazil, the most recent synthesis was carried out by Pedrini (2010) in the book published in Portuguese entitled *Educação Ambiental Marinha e Costeira no Brasil (Marine and Coastal Environmental Education in Brazil)*. However, since then, educators from all over the country developed and applied a variety of activities in different contexts and used different strategies (see some examples in Chap. 6). Also, relevant initiatives are taking place at Coastal and Marine Protected Areas (CMPAs), although there are some challenges, such as the lack of personnel and funding (see more on Chap. 7). These activities, and the educational materials produced for their accomplishment (see more on Chap. 8), are usually restricted to the places where they were developed and are not properly shared or divulged, which is also a challenge.

We expect this book provides a broad view of CMEE in Brazil, emphasizing our concern with conceptual robustness and sharing possibilities and challenges that can serve as an inspiration for other countries. Enjoy the reading!

São Bernardo do Campo, São Paulo, Brazil
São Paulo, São Paulo, Brazil

Natalia Pirani Ghilardi-Lopes
Flavio Augusto de Souza Berchez

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Abbreviations

A3P	Public Administration Environmental Agenda
BA	Bahia State
BIOMAR Network	Network of Projects on Marine Biodiversity
BU	Bibliographic Units
CBME	Community-Based Marine Ecotourism
CDB	The Convention on Biological Diversity
CG	Management Council
CIRM	Interministerial Commission for the Resources of the Sea
CMEE	Coastal and Marine Environmental Education
CMPAs	Coastal and Marine Protected Areas
Conabio	National Biodiversity Commission
CONEMA	State Council of the Environment
COP	Conference of the Parties
CPDS	Commission on Sustainable Development Policies and on the Brazilian Agenda 21
CS	Citizen Science
EE	Environmental Education
EECC	Environmental Education Coordination Committee
EESD	Environmental Education for Sustainable Development
EESS	Environmental Education for Sustainable Societies and Global Responsibility
EEU	Environmental Education Unit
EI	Environmental Interpretation
ENCEA	National Strategy for Communication and Environmental Education in Conservation Units
ESS	Earth System Science
FF	Forest Foundation
FN	Fernando de Noronha
FNDCT	National Fund for Scientific and Technological Development
GCC	Global Climate Change
GEIA	Interdisciplinary Environmental Study Group

IB-USP	University of São Paulo Biosciences Institute
ICMBio	Chico Mendes Institute for Biodiversity Conservation
ICT	Information and Communications Technology
IFSC	Federal Institute of Santa Catarina
IPCC	Intergovernmental Panel on Climate Change
IT	Interpretive Trails
IUCN	International Union for Conservation of Nature
MAI	Itaipu Archaeological Museum
ME	Marine Ecotourism
MEC	Brazilian Ministry of Education
MMA	Brazilian Ministry of the Environment
MPAAB	Marine Protected Area of Armação de Búzios
MPAs	Marine Protected Areas
NFC	Near-Field Communication
PA	Paraíba Aquarium
PAs	Protected Areas
PCNs	Brazilian National Curriculum Parameters
PCNMar	National Policy for the Conservation and Sustainable Use of the Brazilian Marine Biome
PNPCT	National Policy for the Sustainable Development of Traditional People and Communities
PEIA	Anchieta Island State Park
PESET	Serra da Tiririca State Park
PLACEA	Latin American and Caribbean Program of Environmental Education
PNBio	National Policy on Biodiversity
PNEA	National Environmental Education Policy
PNGC	National Coastal Management Plan
PNMA	National Environmental Policy
PNMA I and II	National Environmental Program I and II
PNRH	National Policy on Water Resources
PNRM	National Policy for the Resources of the Sea
PPs	Public Policies
Probio	Project for the Conservation and Sustainable Use of Brazilian Biological Diversity
PROMAR	Marine Mentality Program
Pronabio	National Biological Diversity Program
ProNEA	National Environmental Education Program
ProNMA	National Environmental Program
PSRM	Sectorial Plan for the Resources of the Sea
REARJ	Rio de Janeiro Environmental Education Network
REBEA	Brazilian Environmental Education Network
ReBentos	Monitoring Network for Coastal Benthic Habitats
RESEX Itaipu	Itaipu Marine Extractive Reserve
RFID	Radio-Frequency Identification

S, T & I	Science, Technology, and Innovation
SNUC	National System of Nature Conservation Units
SP	São Paulo State
SPop	Scientific Popularization
TEEE	Transformative and Emancipatory Environmental Education
TEESS	Treaty on Environmental Education for Sustainable Societies and Global Responsibility
TNC	The Nature Conservancy
UC	Nature Conservation Units
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWF	World Wildlife Fund