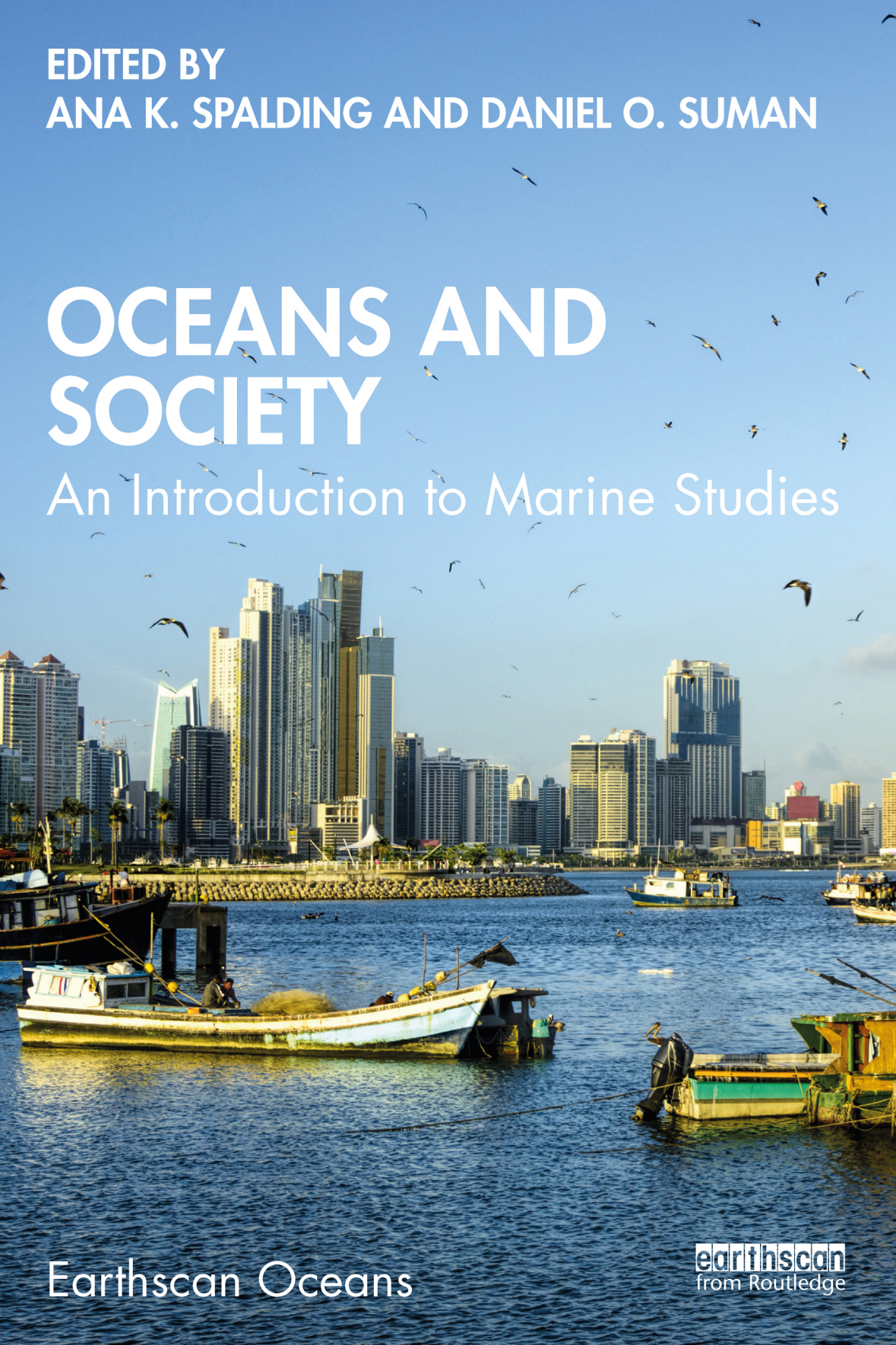
EDITED BY
ANA K. SPALDING AND DANIEL O. SUMAN

OCEANS AND SOCIETY

An Introduction to Marine Studies



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"*Oceans and Society* is a valuable introduction to the human dimension of coastal and ocean issues, accessible to individuals with a variety of backgrounds united by their passion to sustain a healthy future for our ocean, coasts, and people."

Professor Jack Barth, *Executive Director, Marine Studies Initiative, Oregon State University*

Oceans and Society

This unique textbook presents an introduction to the interdisciplinary field of marine studies, exploring the dynamic relationship between people and the marine environment.

Emphasizing the human dimension of coastal and ocean issues, the book provides an innovative examination of the complex marine–human environment dynamics by drawing on social science and humanities approaches. Applying these interdisciplinary approaches, it addresses key challenges facing the marine environment, including changing climate, fisheries, aquaculture, marine pollution, energy production, and management of areas beyond national jurisdiction. While leading with a human dimension approach to these challenges, the chapters are all firmly grounded in foundational knowledge about coastal and ocean environments and processes. The textbook also includes examples of professional or academic areas of specialization within marine studies such as social and environmental justice, governance, global perspectives, traditional ecological knowledge and management, entrepreneurship, community development, conservation, and the blue economy. Ultimately, the book provides the first cohesive resource on marine studies to educate students, train interdisciplinary marine leaders, inspire new knowledge about people and the sea, generate innovative solutions for sustainable oceans, and build capacity for a new generation of marine-focused professionals.

Oceans and Society is essential reading for students on marine studies courses, as well as those studying marine governance, policy, conservation, and law more broadly. It will also be of great interest to students, researchers, and professionals interested in applying interdisciplinary approaches to environmental challenges.

Ana K. Spalding is an Associate Professor of Marine and Coastal Policy at Oregon State University, and Research Associate at the Smithsonian Tropical Research Institute and Coiba Research Station – AIP in Panama.

Daniel O. Suman is a Professor of Marine Policy and Coastal Management at the University of Miami´s Rosenstiel School of Marine, Atmospheric, and Earth Science.

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Oceans and Society

An Introduction to Marine Studies

Edited by
Ana K. Spalding and
Daniel O. Suman

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To our colleagues in Marine Studies/Marine Affairs and Policy who pioneered the Human Dimensions field.

To our students who are the future ocean leaders.

To Tutty and Rosita who have provided some calm during our writing and preparation of the book.

Contents

Editors Bios

Ana K. Spalding

Dr. Spalding is an Associate Professor of Marine and Coastal Policy at Oregon State University, and Research Associate at the Smithsonian Tropical Research Institute and Coiba Research Station – AIP in Panama. She has a PhD in Environmental Studies from the University of California, Santa Cruz, an MA in Marine Affairs and Policy from the University of Miami, and a BA in International Economics from the University of Richmond. She has published widely on the socio-environmental outcomes of lifestyle migration to Panama; on the linkages between land use and policy, property rights, and development; and, more broadly, on the evolution of marine policy and conservation in Panama and the United States. She is also fascinated by interdisciplinarity and collaboration as an academic endeavor, where it no longer represents an abstract concept, but instead has become a critical framework for addressing global environmental threats. Her current research includes the study of adaptive capacity to changing ocean conditions in resource-dependent communities in California, science-policy engagement related to ocean acidification on the West Coast of the United States, and assessments of the social outcomes of marine protected areas.

Daniel O. Suman

Dr. Suman is a Professor of Marine Policy and Coastal Management at the University of Miami's Rosenstiel School of Marine, Atmospheric, and Earth Science. His research and project areas focus on coastal management, adaptation to climate change and sea level rise, governance of marine resources and space, management of mangroves and coastal wetlands, and marine protected areas – particularly in Latin America and the Caribbean, but also worldwide. Suman earned a PhD in Oceanography from the Scripps Institution of Oceanography (University of California, San Diego); a law degree (JD) from the University of California, Berkeley; an MA in International Education and Latin American Studies from Columbia University; and a BA from Middlebury College. At the University of Miami, he has taught courses for over 30 years in Environmental Law, Environmental Planning, Coastal Management, Coastal Law, and Water Resources Policy.

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Foreword

Relationships among people and oceans are complicated. People rely on the oceans and are influenced by them. They derive well-being from coastal and ocean spaces. And they also affect coastal and ocean health. It's not possible to fully understand the myriad connections among people and oceans through one disciplinary lens. The field of marine studies draws on multiple disciplines to better understand complex linkages among people and the oceans. The comprehensive multi-disciplinary approach at the core of the field of marine studies is critical to addressing some of society's most challenging issues related to water quality, multi-use, energy development, coastal access, environmental justice, and many others.

As the field of marine studies has gained attention over the years, the need for a holistic, multi-disciplinary text has emerged. Ana K. Spalding and Daniel O. Suman's *Oceans and Society: An Introduction to Marine Studies* fills that need. By drawing on multiple academic disciplines from across the social sciences and humanities, as well as traditional ecological knowledge, *Oceans and Society* equips students, coastal and ocean practitioners, and anyone else interested in the human dimensions of the oceans with valuable knowledge and practical tools to make sense of the way people relate to the coasts and oceans. This work demonstrates the importance of the social sciences and the power of the humanities to lend insights into how people think about and interact with coastal and ocean spaces.

As a university professor who has been teaching introductory marine studies for two decades, I know how beneficial it is for students to be able to draw on different disciplines and areas of expertise when tackling important – but challenging – issues like marine pollution, habitat decline, inequitable access, and climate change. I also recognize how difficult it can be to provide just the right amount of disciplinary depth and breadth so that students are adequately equipped to engage with complex coastal and ocean issues. By providing in one place important theories and tools from a variety of disciplines and valuable cases, like the harvesting of Manoomin (wild rice) by Indigenous communities for subsistence and ceremony or the international governance of the Arctic Ocean, this book is a welcome addition to the field of marine studies.

It is essential that current and future generations of coastal practitioners, policy makers, researchers, and coastal and ocean users approach complex coastal and ocean issues through a lens of multidisciplinarity. The field of marine studies in general, and this book in particular, prepares them to do just that.

Dr. Tracey Dalton
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University of Rhode Island
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Preface

Daniel and I, together, have over 60 years of experience conducting research, consulting, and teaching about the interactions between oceans and society. Notably, during this time our emphasis has been on "society" in all its dimensions (e.g., political, cultural, economic, legal, etc.) within the marine space. However, the path to becoming marine social scientists was far from clear. Daniel has a background in oceanography, law, Latin American studies, and education; I have degrees in environmental studies, marine affairs and policy, and economics; and we both share a deep connection to the ocean and curiosity about the people who rely on it (and we are both originally from Panama!). The latter, unfortunately, is not enough to secure a job nor does it provide clarity on the types of skills or knowledge needed to work with oceans and people. Indeed, before I met Daniel almost 20 years ago (Daniel was my MA and PhD supervisor), I had asked myself this question many times – *how can I work on social issues, in marine areas, without pursuing a degree in marine biology?* Since then, Daniel and I have actively collaborated on various projects related to coastal zone management, policy, tourism and sustainability, ocean conservation, and now on this book. Over the years we have often discussed challenges we faced while doing this work, such as funding (it tends to be less compared to funding available for our natural and physical science counterparts), expectations (often colleagues will expect us to translate or communicate the natural or physical science to the public, instead of recognizing our work as generating its own type of information), perceptions (inclusion of marine social scientists as research collaborators as a last minute add-on to a project to satisfy the funders), and marine-specific social science training (it is straightforward to pursue a degree in economics, anthropology, business administration, etc.; yet not as easy to find opportunities for training in marine economics, marine anthropology, marine business, or other marine-focused social sciences). In response, we decided to put together this volume on what we are calling *Marine Studies*, an interdisciplinary field that centers the human dimension (social sciences and humanities) and is grounded in a solid understanding of the natural and physical processes that define oceans and coasts. It is our hope that the volume will contribute to current efforts to build capacity and foster a community of interdisciplinary thinkers who can overcome these challenges and become the next generation of oceans and society leaders.

The volume is designed in three parts to provide a deep and practical understanding of the complex social, cultural, historical, economic, and environmental issues faced by global coasts and oceans. Part I sets the stage and defines the field of Marine Studies; describes the basic, applied, and interdisciplinary fields that enable the study of the human dimension; and outlines the natural and physical processes that make the ocean a unique place. Part II is a survey of contemporary and emerging grand challenges faced by oceans and society, such as fisheries, aquaculture, marine pollution, climate change, energy production, and the proposed framework for governance of the 60% of the ocean that is found in areas beyond national jurisdiction, aka "High Seas". Notably, most chapters in this Part of the book are co-authored by a natural or physical scientist in partnership with a social science or humanities expert. This was intentionally done to invite readers to think critically about how we portray problems in the ocean – *Is the problem that there are less fish in the sea? Or is the problem that human activity has led to fewer fish and is, in turn, negatively affecting those who rely on fishing for their livelihoods?* Finally, we recognize that readers will have different professional and academic interests and worldviews. Thus, Part III showcases a suite of applied approaches or perspectives to help address these grand challenges, such as ocean governance, conservation, social justice, traditional ecological knowledge, community development, entrepreneurship, and development for the blue economy.

If you are an **instructor** wanting to use some or all of this volume in your classes in marine or environmental studies, we encourage you to think about the goal of each part of the book. While you may certainly pick and choose chapters from Parts II and III, we encourage you to carefully present all the content from Part I as a foundation for subsequent discussions of the grand challenges and approaches. This can provide students with some clarity on their disciplinary or interdisciplinary identity, effectively building a community of Marine Studies scholars and future practitioners. To work through the marine socio-environmental problems of Part II, we have added questions for reflection to each chapter as a starting point for class discussion. You may facilitate activities, such as think-pair-share, where students can talk with each other about the points they found most interesting about the chapter. We also realize that due to space limitations we were only able to include a few specific examples in each chapter. To overcome this, you might ask students to each bring a current event related to the chapter and critically assess the social and environmental nature of the event. In our classes, for instance, we have engaged students by asking them to select one of the grand challenges and explore its many dimensions throughout the length of the term, with the expectation that they will produce a final project that reflects their interests and experiences. We have also developed case studies around some of these topics, inviting the whole class to represent a different approach or perspective, essentially replicating a real-world scenario where decision-making requires effective collaboration and communication across often conflicting interests.[1] Finally, to actively engage students to think about how their own personal vocation and interests might shape their future careers, in addition to questions for reflection, all the chapters in Part III include a short section on professional pathways that hints at

the type of disciplinary specialization students might need to focus on to be more prepared for a given career direction. These professional pathways may appear generic. Certainly, for instance, to become a marine conservation practitioner a student may pursue a degree in marine biology, public policy, environmental education, etc. However, they would probably also want to focus on learning about the types of organizations that do conservation work and specifically tailor their coursework, assignments, and networking to building expertise on the topic.

If you are a **student** or **practitioner** reading this book, we invite you to read it critically and thoughtfully. You might ask yourself – *What is the change I want to see for oceans and society, and how can the content of each chapter help me think about creative and innovative solutions?* You may also notice that some of the topics are presented in more than one chapter. In fact, you may even notice that the same topic is addressed differently across chapters (e.g., the links between fisheries and aquaculture in providing food from the sea; or the implications of promoting marine renewable energy in ocean spaces that are already experiencing competing uses, such as fisheries, aquaculture, and conservation; or the role of international agencies in managing and regulating the ocean space). This, again, is intentional to reflect the interests, perspectives, and worldviews of a diverse society. Chapter authors have a range of disciplinary and professional experiences, expertise, and identities that are reflected in their writing. In this sense, we invite you to not just look at the content of the chapters but also read about the authors and think about their contributions to Marine Studies.

We have enjoyed the process of designing the structure of the book, inviting author contributions, and thinking deeply about how to best use this material to train the next generation of ocean leaders. Ultimately, we hope we have provided a tool that will inspire a new narrative for the ocean as a coupled natural–human system that calls for interdisciplinary thinking and holistic approaches to innovative solutions. Increasingly, policymakers, resource managers, conservation organizations, and natural and physical scientists are finding that solutions to pervasive environmental problems, such as climate change, require this interdisciplinary approach, including social science and humanities perspectives. Students of Marine Studies are ideally suited to fill this demand for future interdisciplinary marine-focused professionals.

Ana K. Spalding, *Oregon State University and Smithsonian Tropical Research Institute*
Daniel O. Suman, *University of Miami*

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Note

1 You can find excellent case study materials in the UC Press journal titled *Case Studies in the Environment*, and in the National Socio-Environmental Synthesis Center's (SESYNC) Case Study Collection, available online at: https://www.sesync.org/resources/case-study-collection.

Part I
Setting the Stage

Part I sets the stage for the rest of the book by introducing the field of marine studies, describing various human dimension disciplines, and introducing basic natural and physical processes that define the marine environment.

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1 An Introduction to Marine Studies

A. K. Spalding

Introduction

Marine studies is an emerging interdisciplinary[1] field of study that explores the dynamic relationship between people and the marine environment. As the reach of anthropogenic activities expands from heavily populated coastal areas into remote regions of the ocean, the marine environment has become a literal, as well as symbolic, last frontier for exploration and exploitation. At the same time, there is a growing awareness of the unequal outcomes and unjust practices associated with this expansion of ocean-based activities (e.g., Büscher et al., 2017; Campbell & Gray, 2019; Fusco et al., 2022). Scientists, practitioners, and civil society have made it clear that social equity and, more specifically, ocean justice must accompany all thinking about the future of coastal communities, ocean industries, conservation, and the governance of ocean spaces and resources in areas beyond national jurisdiction. More than ever, unraveling these dynamics to better understand how people affect the ocean and, in turn, how the ocean affects humans is essential. The field of marine studies is ideally suited to take on this challenge by engaging a suite of human dimensions approaches and tools (described in more detail in Chapter 2 of this volume) and applying these to real-world problems (marine-specific problems are presented in more detail in the chapters included in Part II of this book). This chapter specifically explores the evolution of marine studies as an interdisciplinary field. It then highlights the importance of adopting a marine studies approach by asking the question: Why should we care? And it ends with a discussion about ways in which interdisciplinary research and training can embrace the applied nature of this field, as well as support capacity building for the next generation of ocean and coastal professionals.

People and the Sea

The attraction to the ocean is deeply embedded into who we are as humans. From evolutionary science debates about Darwin's writings on the origins of life to faith-based representations in the Bible of the sea as simultaneously a limitless source of food and a dangerous life-threatening force, our connections to the ocean run deep and are inextricably linked to our existence. Depictions, interpretations,

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and representations of the human relationship to the ocean abound in literature (e.g., Herman Melville's *Moby-Dick* or Samuel Taylor Coleridge's *The Rime of the Ancient Mariner*), art (e.g., Katsushika Hokusai's *The Great Wave off Kanagawa*), and history (e.g., the Age of Exploration, known for European colonization of the Americas). Similarly, naturalists such as Charles Darwin and Edward Forbes, intrigued by the ocean and its creatures, developed their own relationship with the ocean – where scientists are observers, and the ocean is the observed – by systematically documenting and studying the ocean in all its complexities. In the purest example of interdependence, humans have long relied on food from the sea for their survival. Academics often describe these relationships through distinct disciplinary perspectives. For instance, anthropologists tell us about seafaring cultures of the Pacific (Hau'ofa, 2008), political economists explain the role of neoliberal ideology on current uses of the ocean (e.g., Mansfield, 2004), fisheries biologists assess the health of fish stocks (e.g., Grorud-Colvert & Sponaugle, 2011), and oceanographers describe the relationship between ocean currents, fisheries resources, and climate change (e.g., Pinsky et al., 2018). But, as Singh et al. (2021) point out, will understanding the ocean in this fragmented way really lead to "the ocean we want"?

Importantly, it is us, as humans, who continue to socially construct[2] the ocean and have done so over time through our attitudes, beliefs, and actions. Humans have created what is known today as the Anthropocene ocean: a geographical space in which human activities are undeniably driving observed physical and environmental changes (Spalding & de Ycaza, 2020). Intricately linked as a tightly coupled natural–human system, these environmental changes are affecting human societies that are, in turn, also experiencing rapid change. It becomes ever clearer that understanding, and making decisions based on, this dynamic relationship between people and nature has become one of the most challenging, yet critical, tasks of our time. So … what if, by recognizing the ocean as a socially constructed and dynamic space, scholars and practitioners were able to move beyond disciplinary limitations to informing decision-making? What if, instead of working narrowly within academic and practical silos, scholars and practitioners adopted a more holistic and integrated approach to understanding the material (practical) and symbolic (socially constructed) drivers of change in the ocean, and made decisions accordingly?

In practice, humans are actively creating the Anthropocene ocean through policy, management, and behaviors that are, in turn, shaped by needs, culture, values, and unequal power structures. These actions result in persistent plastic pollution in the ocean (Jambeck et al., 2015), overexploitation of living marine resources (Food and Agriculture Organization of the United Nations, 2022), and rising sea levels and temperatures as a result of anthropogenic climate change, among others. Symbolically, or through narratives about the ocean, humans are also affecting the ocean by, for instance, supporting the dominant perception of the ocean as limitless or "too big to fail" (Lubchenco & Gaines, 2019) or by conceptualizing the ocean and its resources as "open for business" (Virdin et al., 2020). Simply put, how we understand, perceive, and use the ocean matters. If we

care about the future of the ocean and its resources, we must act and think in more holistic, integrated, and sustainable ways.

It follows, then, that a holistic approach to scholarship and practice – one that explicitly and intentionally integrates politics with ecological outcomes, or links literary and historical accounts of travel with state-of-the-art oceanographic observations – is a possible way forward. As Berkes points out in the preface to his 2015 book *Coasts for People: Interdisciplinary Approaches to Coastal and Marine Resource Management*: "Addressing the real problems of the world requires crossing disciplinary boundaries and, ultimately, eliminating the divides between science and management, resource user and decision-maker, and different kinds of knowledge" (p. 12). While admittedly a lofty goal, marine studies seeks to do just that! The next sections of this chapter outline how this interdisciplinary field can help address the very real challenges faced by the Anthropocene Ocean through focusing on the human dimension of coastal and marine issues.

Marine Studies as an Interdisciplinary Field of Study

You may be wondering whether this interdisciplinary thinking is really new. For instance, is it not obvious that the economy affects fisheries? Or that how we feel about the ocean affects whether or not we are willing to support or respect conservation regulations? The simple answer is that, in effect, it is not groundbreaking; and yes, some academic disciplines have embraced interdisciplinarity since at least the middle of the 20th century (Sauer, 1956). For instance, geographers, human and cultural ecologists, and environmental studies scholars have long engaged in explorations of the relationship between people and nature. However, it is the intentional application of this thinking to the ocean that is, arguably, novel. Certainly, the expectation that the information obtained from these interdisciplinary studies be used to solve real-world problems is new. Perhaps a key distinctive feature of marine studies as a field is that issues are framed foremost by the human dimension – and that the human dimension is inclusive of humanities, as well as disciplinary and interdisciplinary social sciences. By putting people first, in all their diversity and complexity, marine studies scholarship is ideally suited to disentangle the uneven, and often unjust, outcomes of resource use. Specifically, it may provide insights into the social and political conditions that are more conducive to successful conservation outcomes, or it may even help discern the human drivers of and proposed solutions to climate change. This does not mean natural and physical science contributions, alone, are not important. Instead, it suggests the need for a shift in thinking toward considering people as an inextricable part of the story of environmental change and associated solutions. While a traditional ecologist might focus on advancing knowledge about the life history of a given species based on ecological theories of evolution, an ecologist with training in marine studies might expand her focus on the life history of said species to explicitly consider the relationship between fish and associated human uses over time. A marine studies specialist might further look at the broader political economy, the culture, or even human migration patterns to understand why and

how humans use certain fish species, or actions that might support the sustainable management of fisheries and the livelihoods of people dependent on living marine resources. Furthermore, marine studies often calls for collaborations across individuals who, together, form interdisciplinary research teams.

So, if not new, what are the intellectual origins of marine studies, and how does it differ from marine science? The "marine" aspect of the field is self-explanatory and encompasses all issues related to oceans (including the water column and seafloor) and coasts (spaces and uses along the broadly defined land–sea interface). To understand the meaning of "studies", consider environmental studies, a discipline that has existed since the 1970s. An inherently interdisciplinary field of study, environmental studies examines, understands, and addresses environmental challenges from a range of perspectives, including social, political, and economic concerns – often using more than one perspective at a time. The field is grounded in human ecology, a school of thought proposed by Barrows in 1923 that represented a critique of environmental determinism.[3] Subsequent scholarship, known as cultural ecology, moved away from the idea that the relationship between humans and the environment could be explained using ecological concepts and moved toward explanations of the evolution of culture and human civilizations, using culture and history as elements that also influence cultural change over time (Steward, 1955). For instance, Sauer's (1956) work on fire and agriculture reinforced Barrows' (1923) critique by recognizing the role of human activity in shaping environments into what he called "cultural landscapes". This new thinking about people and the environment had closer ties to the social sciences, applying concepts from economics, history, sociology, and political science to particular situations and environmental conditions. A more recent critique of cultural ecology, related to its failure to understand or fully account for the complexities of human interactions with their environment, is known as political ecology. First used by Eric Wolf in 1972, political ecology was born from the recognition that in post-WWII societies, people and communities no longer lived in isolation from larger political or economic forces. Political ecology scholars acknowledge the need to integrate broader social, political, and economic contexts into socio-environmental research.

Thus, drawing on this long tradition, environmental studies emerged from concepts that have evolved over time to include various human dimensions disciplines, and it applies that lens to relevant environmental problems. Importantly, the natural and social sciences work together to explore the causes of and identify solutions to complex environmental problems. In sum, environmental studies scholars acknowledge that environmental degradation is inextricably linked to the human condition and is often characterized by unequal or unjust outcomes for vulnerable communities. The inclusion of this human dimension is, indeed, what differentiates the environmental *studies* from environmental *science*. While environmental scientists acknowledge the interactions between people and the environment, they often focus primarily on the scientific drivers of and answers to environmental problems.

Currently, almost a century after the emergence of the field of human ecology, we are living in a time when converging climate, public health, economic, and

racial justice crises, brought to a head in 2020 with the Covid-19 pandemic, have highlighted that failures of collective and public policies around health and the environment have perpetuated individual and collective suffering. In 2018, more than 1 billion people around the world were living in poverty (i.e., living on less than $3.20 per day), most of them in Sub-Saharan Africa (World Bank, n.d.). Furthermore, an estimated 25% of assessed animal and plant species are threatened (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019). Thus, the legacy of interdisciplinary thinking around people and the environment, as applied to the grand challenges facing society, is, arguably, more important and relevant than ever.

While the interdisciplinary nature of environmental or marine studies is not new, it is, unfortunately, far from widespread – likely because this type of research is harder to conduct, assess, and fund (Nature, 2015). Within the marine space, in particular, this integration of disciplines and application to real-world problems lags behind interdisciplinary efforts in terrestrial areas. An exploration of the reasons for this is beyond the purview of this chapter. But suffice it to say that the interdisciplinary perspectives on marine grand challenges presented in Part II of this book, and the various human dimensions approaches highlighted in Part III, are important reminders of a much-needed shift in thinking toward inclusive science that goes beyond the use of increasingly complex and sophisticated tools for describing and modeling ocean conditions. Indeed, such a shift could be responsive to calls for environmental justice and equity and the solutions-oriented science needed to achieve an ocean space that reflects the diversity of needs and interests of marine actors, knowledge-holders, industry, and government (Singh et al., 2021).

Finally, you may have heard the ideas described above as falling under the purview of disciplines other than marine studies. Other names typically used to describe interdisciplinary approaches to marine issues include maritime studies, marine social science, marine or blue humanities, marine affairs, among others. Indeed, these are all terms broadly used to refer to the study of people and the ocean. While the term marine studies is used here as an all-encompassing term, it is important to also acknowledge the many historical and current traditions that have influenced and inform the various chapters of this book.

Changing Oceans and Societies: Why Should We Care?

We have hinted at the challenges faced by the ocean and the people who depend on it. These include climate change, pervasive plastic pollution, questions around conventional exploitation of fossil fuels and increased knowledge about renewable sources of energy from the ocean, food from the sea (wild-caught and farmed), and global negotiations around resource management in ocean areas beyond national jurisdiction (further described in Part II of this book). The pervasiveness of these challenges suggests that the time to change our approach to finding solutions is now. Three points make this a unique moment for finding solutions for people and the sea.

First, physically and environmentally, the imprint of humans is ever-present. The Anthropocene ocean puts us, as humans, closer than ever to being affected

by and having the opportunity to shape ocean futures (Biermann, 2021). For instance, technology has allowed us to explore further and deeper into the ocean than ever before, while also increasing our ability to predict future ocean conditions and, thus, reduce risk at sea. Furthermore, recent natural and associated social disasters (e.g., the 2004 Indian Ocean Tsunami, recurring heat waves across Europe, wildfires in Australia and most of the US West Coast in 2020 and 2022, and the global health crisis from the Covid-19 pandemic) have become regular reminders that we are highly dependent on a functioning natural, social, and political environment.

Second, related climate and global health crises have exposed significant flaws in how we understand and address society's problems, emphasizing the vulnerability of certain sectors of society and the need to simultaneously consider cross-cutting issues. You may consider, for example, the link between fisheries, nutrition, poverty, and gender. Global wild-capture fisheries plateaued in the 1980s (Pauly, 2008), and climate change is predicted to further affect their availability and distribution (Pinsky et al., 2018). Nutrition and food security continue to be a high priority on the sustainable development agenda; in 2017, some 815 million people around the world went to bed hungry, and about 2 billion people lacked key micronutrients (Development Initiatives, 2017). Closely related to nutrition, in 2015 about 10% of the world's population lived in extreme poverty, meaning that they lacked access to basic needs such as health, sanitation, and education, among others. For the first time since the 1990s, that number increased as a result of the Covid-19 crisis (Lakner et al., 2021). Studies show that these changes in fisheries, nutrition, and poverty disproportionately affect women around the world. If we consider post-harvest processing, women represent 50% of the global fisheries workforce (Food and Agriculture Organization of the United Nations, 2016). However, the nature of their involvement suggests they receive lower returns than men, in part due to engagement in less profitable segments of the value chain, gendered divisions of labor, and patterns of access to and ownership of assets (WorldFish, 2016). The value of securing gender equality has been extensively studied, effectively demonstrating that supporting women's engagement in productive activities, such as fishing, has the potential to improve nutrition and other development indicators through their contributions to the overall wellbeing of the household (WorldFish, 2016). As with poverty, the Covid-19 crisis has rolled back recent gains for women's rights and equality (UN Women, 2020), and negatively affected the fishing industry as a whole (Bennett et al., 2020). Applying lessons from recent efforts to support women and girls is more important than ever, and it offers an opportunity to engage more broadly across sectors to address these intersecting challenges.

Third, from a policy and governance perspective, the complex nature of the problems faced by people and the ocean means that solutions increasingly require both social and ecological information to make better resource management and development decisions. The ocean has only recently emerged as a critical element of the global development agenda, creating opportunities for action. In 2015, the ocean secured its own Sustainable Development Goal, SDG 14: Life Under Water,

within the UN's *2030 Agenda for Sustainable Development* (United Nations, 2015); and scholars and practitioners are increasingly working on emphasizing the intersecting goals and benefits across all 17 SDGs (e.g., links between sustainable fisheries and poverty reduction [WorldFish, 2016]). Additionally, the decade that started in 2020 has, in a short time, seen the emergence of global efforts such as the High-Level Panel for a Sustainable Ocean Economy, as well as a variety of national and regional-level efforts. Indeed, the UN has declared this the UN Decade of Ocean Science for Sustainable Development. These actions allow for increased attention to the natural, social, and physical aspects of the ocean to be placed on the global agenda and have the potential to raise important questions and hold global and national institutions accountable for addressing the intersectional nature of our ocean's grand challenges.

How Does a Marine Studies Approach Help Address Ocean and Society Problems?

To provide a deep and practical understanding of the complex social, cultural, historical, political, and economic character of the marine environment, it is necessary to center human dimensions research, training, and capacity building. This training must be grounded in a solid understanding of marine natural and physical processes. The interdisciplinary perspective of a marine studies approach can be applied to real-world problems such as climate change, fisheries, aquaculture, pollution, energy production, governance, and biodiversity loss. Furthermore, this approach provides the skills and creates opportunities for future professionals to engage in a diversity of careers related to social and environmental justice, policy, entrepreneurship, community development, support for Indigenous rights, and conservation.

Marine Studies Research

Social science research and a humanities approach to the study of the marine environment has traditionally been organized around distinct disciplines, instead of by its shared focus on the ocean and associated activities. Analogous research on land use, food, and agriculture, in contrast, has enjoyed a community of scholarship built on shared study sites, themes, topics, theories, methods, and approaches. However, this is changing for the marine space. For instance, the Manifesto for the Marine Social Sciences (Bavinck & Verrips, 2020), generated at the Centre for Maritime Research's 2019 MARE conference, is the first attempt at identifying marine and coastal topics that are relevant to social scientists. In the Manifesto, the authors identified urgent marine social science topics, suggestions for further research, and thoughts on how to apply new methodologies and approaches to the study of marine issues. The resulting vision for marine social sciences includes an expansion of theory and applied research opportunities, as well as marine-based thematic focal areas such as ocean politics, regional perspectives, gender and fisheries, and sustainable blue growth. Importantly, there is a need to

further connect the social sciences, the humanities, and the natural and physical sciences. This is often limited by challenges such as the inclusion of social science as an afterthought to a project, a relative lack of funding for environmental social science and humanities, and the differences in jargon between natural and social scientists (Spalding & Biedenweg, 2017). However, the interdisciplinary nature of marine studies research may help to overcome these challenges and facilitate integration by centering the importance of understanding the environmental and physical characteristics of the ocean (see Chapter 3 of this volume). In other words, marine studies research can help to understand the broad social and environmental context of marine issues, with a vision to identify holistic and viable solutions to the most pressing problems faced by people and the sea.

Interdisciplinary Training and Workforce Capacity Building

The vision for marine studies research outlined above requires appropriate training and capacity building. A key critique of interdisciplinarity is that it focuses on breadth (knowing a little about many things) versus depth (knowing a lot about a few things). However, in the context of marine studies, breadth of knowledge might be an asset – especially if accompanied by an understanding of the type of social science or humanities expertise that is needed to address a given problem (if it's not your expertise, you can always call on someone with knowledge in that field! Indeed, collaboration is a key element of marine studies), the type of natural or physical science that would be most useful for a given issue, and the social and governance context within which said issue is occurring (International Ocean Institute, 2018). Chapter 2 (*Human Dimension Approaches to Marine Studies*) and Chapter 3 (*The Ocean – An Introduction to the Marine Environment*) in this volume offer this foundational knowledge, while subsequent chapters in Part II illustrate how that knowledge is applied to key socio-environmental issues. Furthermore, research shows that while disciplinary knowledge can be valuable, other capacities such as the ability to work collaboratively, tolerance and reflexivity, trust, and the ability to balance power dynamics within groups are essential elements of interdisciplinary training and capacity building for the marine workforce of the future (Blythe & Cvitanovic, 2020).

Conclusion: A Field Evolved

This chapter shows how marine studies has evolved to integrate humanities, natural, and social science disciplinary approaches in the context of real-world problems. Through marine studies research, training, and capacity building we can prepare future interdisciplinary marine leaders, inspire new knowledge about people and the sea, generate innovative solutions for sustainable ocean futures, and build capacity for a new generation of marine-focused professionals. Environmental careers are diverse, wide ranging, and rapidly growing! Chapters in Part III of this volume provide examples of how marine studies training can be used to address social justice, understand governance and decision-making, incorporate

and support Indigenous rights and knowledge, build marine-themed businesses, work with coastal communities, or focus on conservation. Importantly, marine studies lays the foundation for you to learn more about the links between people and the sea and invites students to embrace interdisciplinarity and align research and training with pressing environmental and societal needs.

Notes

1 Rosenfield (1992) defines multidisciplinary and interdisciplinarity as the spaces in which teams of people with different disciplinary backgrounds work in parallel with no or some integration across fields, respectively. Transdisciplinarity goes beyond integration and is characterized by a shared goal or approach to address the societally relevant question or issue.
2 Social construction is a sociological theory that suggests that knowledge of or about objects, events, landscapes, or even other living beings is shaped by meanings placed on said objects, landscapes, or living beings by society (Andrews, 2012).
3 Environmental determinism is a highly debated and critiqued geographical concept that suggests all human activities and characteristics are determined by environmental conditions. The concept has a complex history, starting in the early 20th century. Currently, geographers generally accept that the human condition is affected by politics, the economy, and other social factors, in addition to the environment (Livingstone, 2011).

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