Kathleen Schwerdtner Máñez
Bo Poulsen *Editors*

Perspectives on Oceans Past

A Handbook of Marine Environmental History

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ISBN 978-94-017-7495-6 ISBN 978-94-017-7496-3 (eBook)
DOI 10.1007/978-94-017-7496-3

Library of Congress Control Number: 2016938419

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer Science+Business Media B.V. Dordrecht

Purse seine fishermen, Spermonde Archipelago, Indonesia. Photo by Kathleen Schwerdtner Máñez

Preface

The idea for a book on marine environmental history was put forward by Alexandrine Cheronet from Springer Publishers after listening to a talk by one of the editors at the YouMaRes Conference in Bremerhaven (Germany) in 2011. It came at a perfect time. We, the editors, both had worked for a number of years in what we think of as an exciting multidisciplinary and interdisciplinary new field of environmental and historical research: marine environmental history. We had seen promising research coming together at the Oceans Past conference series, as well as in large collaborative projects such as the History of Marine Animal Populations (HMAP) project of the Census of Marine Life. Moreover, marine environmental history gained increasingly attraction in the historical sciences as well as within the environmental sciences through a number of monographs, edited volumes and journal articles. Further recognition of this emerging subfield was reached in 2008, as the International Council for the Exploration of the Sea (ICES) supported the establishment of an expert group for the history of fish and fisheries, which is still in existence.

Yet, we also felt something was missing. As more researchers entered the field from diverse backgrounds ranging from zoo-archaeologists to mathematical modelers, from marine ecologists to human ecologists, there was in increasing need to take stock of all the new methods and techniques coming along at the intersection of the development of human society and marine ecosystems over time. This is what this book is about.

This volume offers a collection of theoretical and methodological considerations on how to do marine environmental history across traditional disciplinary boundaries. This goes even across what C. P. Snow, more than half a century ago, lamented as the two cultures, the humanities and the natural sciences, where a dialogue is much needed, but too rarely occurs. To further this dialogue, our idea has been that each chapter should be readily accessible for social scientists and natural scientists alike, as well as for any interested student at an institution for higher learning. In this way, we hope to solidify a subfield, where diversity is an intellectual strength on the one hand, but on the other hand, lends a fragile basis for community building.

The extent to which we have succeeded, the reader will have to judge. However, there is no doubt that any success of this book owes to the committed and diligent

contributions we received from colleagues around the world spanning a wide series of disciplines and themes of interest. Any mistake or shortcoming on the other hand is entirely the responsibility of us as editors.

In addition to the contributors, we would like to extend our gratitude to a number of people that have lent their support to this project. Over the past 4 years, we have profited from frequent encouragement and moral support from the Executive Board of the Oceans Past Initiative, (www.oceanspast.net). We presented the idea of having this volume at a session of the Oceans Past IV conference in Fremantle, Australia, in November 2012. We are very grateful for the feedback we received on this occasion. More recently, we received financial support for promoting this volume from the EU network, COST Action IS1403: Oceans Past Platform. The scope of Bo Poulsen's contributions was significantly improved through the work of his parallel research project, 'Navigator – Johannes Schmidt, ICES and the Carlsberg Laboratory, c. 1898–1933' sponsored by the Carlsberg Foundation. We would also like to acknowledge the support from our home institutions, Aalborg University (Denmark) and the Leibniz Center for Tropical Marine Ecology in Bremen (Germany). Special thanks to the librarians at ZMT Bremen, particularly to Hanna Thimm, who provided invaluable support with final formatting and references. Springer Publishers, namely, Alexandrine Cheronet and Judith Terpos, have been extremely helpful and very patient during the 4 years which we needed to finalize this volume.

Finally, we would like to thank our families for their support and for reminding us that there is a world outside of history and science. In fact, Kathleen Schwerdtner Máñez's interest in marine environmental history was only drawn by her wife (Gracias, María, para todo). As we both had a child during the course of making this book, we would like to dedicate the volume to our loved ones in Ashausen (Germany), María and Laia Edith, and in Dronninglund (Denmark), Anne Dorthe, Astrid, Niels and Laura.

Ashausen, Germany
Dronninglund, Denmark
July 2015

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Of Seascapes and People: Multiple Perspectives on Oceans Past

Kathleen Schwerdtner Máñez and Bo Poulsen

Introduction

> The sea surrounds us. It gives us life, provides us with the air we breathe and the food we eat. It is where we came from, and what we are made of; it represents home and migration, ceaseless change and constant presence. It covers two-thirds of our planet, yet caught up in our everyday lives; we seem to ignore it, and what it might mean. (From "The Sea Inside" by Philip Hoare)

The interaction of humans with the sea is a long story, of which not all has been told. Some scientists are convinced that it started with the earliest hominids wading and climbing in swampy or coastal forests in Africa–Arabia, searching for molluscs. They also believe that the story continues by Homo descendants later migrating to or remaining near the Indian Ocean coasts, where they could exploit waterside resources. Marc Verhaegen and his colleagues call them our "aquaboreal ancesters", arguing that they may have given rise to early modern humans: furless, long legged waders and divers with subcutaneous fat and the ability to control their breath (Verhaegen et al. 2002). With these characteristics, they were able to explore the manifold resources in coastal environments. The archaeologist Jon Erlandson is convinced that it was this adaptation to a coastal livelihood which enabled human migration out of Africa. The rich resources of kelp forests, mangrove systems and coral reefs, provided early modern humans with abundant food on their way to Asia and the Americas (Erlandson 2001).

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K. Schwerdtner Máñez, B. Poulsen (eds.), *Perspectives on Oceans Past*,
DOI 10.1007/978-94-017-7496-3_1

But despite the long common history of men and the sea, until the turn of the twenty-first century historical information did play a negligible role in the analysis, conservation and management of marine ecosystems. Marine and fisheries sciences used data that mostly came from scientific monitoring, with data series which hardly went back further than 20–50 years. Consequently, historical reference points for earlier exploitation or other impacts were missing (Lotze and Worm 2009). In his book *Scaling Fisheries*, Tim D. Smith stated that fisheries scientists had come to suffer from historical myopia, a blindness towards the past (Smith 1994).

In a similar way, historians did show little interest in environmental issues. That changed with the growing public awareness of environmental problems such as air and water pollution or the dumping of solid waste. In the 1960s and 1970s, the large-scale green movements in the United States made American historians looking for the origins behind contemporary environmental problems. The publication of Rachel Carson's *Silent Spring* (1962), dealing with the side effects of DDT and other pesticides, is often mentioned as the final kick off, of American environmental history (McNeill 2003). The institutionalisation of environmental history started with the foundation of the *American Society for Environmental History* in 1975. More than 20 years later, the *European Society for Environmental History* was created in order to unify and coordinate different European initiatives which had been established by then.

Until the late 1990s, environmental historians were mainly concerned with terrestrial topics such as forest history or the origins of air pollution. The sea, especially everything beneath its surface, was largely left out. One remarkable example of the 1980s is Arthur McEvoy's *The Fisherman's Problem*, where the rise and fall of the great mid-twentieth century California sardine fishery is investigated in a combined light of market forces, fisheries management, fishing impact, and environmental forcing (McEvoy 1986). This ignorance of marine issues might be explained by the once widespread perception of oceans as a source of inexhaustible resources. John R. Gillis has also argued that "… the persistent reluctance to tackle the oceans is due … to western civilization's unique cultural relationship to the sea itself. Other societies have felt much more at home with the sea. We, however, have consistently defined it as "other," as alien and exotic." (Gillis 2011).

This is not to say that historians have not been engaged in the history of fisheries before. There is a long tradition of studying the lives of fishermen; fishing families and the economic performance of the fishing industry (see Holm, this volume). Throughout the twentieth century however, the actual reservoir for harvesting the fruits of the sea was largely treated as an interchangeable constant, something to be left out of the equations of sorting out the roots and causes of human enterprise in the maritime world.

Inventing Marine Environmental History

Historians began to look into history's connectivity with the marine environment from the late 1990s on, and within the last decade or so the field has been growing in scope and volume within and across the fields of history; and within various intersections between history, social sciences and historical ecology.

In his famous two pages on 'Anecdotes and the shifting baselines syndrome of fisheries", Daniel Pauly argued that fisheries managers and fisheries scientists worked with time series that were too short to properly determine natural or desirable states of fish stocks. Scientific monitoring usually spans a few decades only. If then the earliest measurement was from 1960, then the notion was that this would be the original stock size to be targeted by management. But, asked Pauly, what if a fish stock was already decimated by 1960? The short time series wold not be able to properly capsulate significant changes in the observed ecosystem (Pauly 1995). Three years later, Pauly published his seminal paper "Fishing down marine food webs", which showed that the trophic levels of some 220 species groups had declined from 1950 to 1994 (Pauly et al. 1998). A similar impression was made by Jeremy Jackson's article on the changes in Caribbean reefs since their discovery by European explorers (Jackson 1997). In the following years, a wave of papers revealed a devastating truth: that human impacts on marine ecosystems were much more severe, and also often much older than previously thought. This so-called 'historical turn' in marine sciences had a major influence on the formation of marine environmental history. The raising scientific awareness was also accompanied by the increasing attention of the broader public, visible for example in the publication of several popular science books such as *The Empty Ocean* (Ellis 2004), *The End of the Line – How Overfishing is changing the World and what we eat* (Clover 2008), or *The Unnatural History of the Sea* (Roberts 2009).

Eventually, the broad sense of marine systems as endangered, yet insufficiently understood boosted the largest research effort in the history of marine science from 2000 to 2010. Funded by the A. P. Sloan Foundation, the **Census of Marine Life** (CoML) engaged more than 2000 natural scientists and historians in finding answers to three major questions: What does live in the oceans? What did live in the oceans? What will live in the oceans? The second question prompted the establishment of an historical research enterprise entitled, History of Marine Animal Populations (HMAP), focusing on what marine life looked like in the past (Holm et al. 2001). Some of the more than 200 hundred publications coming out of this programme were summarized in the chapter, 'A New Look back in Time' (Holm et al. 2010). Additionally, in a 2013 theme issue of *Environmental History*, several results arising from HMAP were brought forward, mainly focusing on American historiography (Chiarappa and McKenzie 2013).

Meanwhile, marine environmental history underwent an equally significant development in scholarly settings with less direct engagement with the natural sciences. In a topical fashion the book chapter, 'Marine Environmental History' tried to present the diversity in marine environmental history by the end of the first decade of the twenty-first century (Poulsen 2012). Much more has been published since then, and by now, there is in fact too much research to mention for an introductory chapter such as this. However, throughout this volume, the various contributors frame their topic in the light of existing research. The book stands on the shoulders of a number of collected volumes and journal theme issues which have addressed the fields of marine environmental history and historical marine ecology from various angles over the past decade or so.

In 2007 for instance, the anthology *Oceans past*: *Management insights from the history of marine animal populations* showed some of the scope of marine environmental history. They range from contributions on the history of global whaling, over nineteenth century attempts to fisheries management, to the use of restaurant menus as sources of information. In the same year, the journal *Fisheries Research* hosted a theme issue on results coming out of the HMAP programme (Ojaveer and MacKenzie 2007). A few years later the anthology *Shifting Baselines. The Past and the Future of Ocean Fisheries* presented a series of case studies attempting to cross the divide between the human and natural sciences (Jackson et al. 2011). Recently, a theme issue of the Journal *Isis* focuses on the history of marine science, where the papers cover aspects of physical and biological oceanography and their historiography with contributions from across North America (Rozwadowski 2014). While this volume is written solely by historians, conversely, another recent volume, namely *Marine Historical Ecology in Conservation*: *Using the Past to Manage for the Future* is written largely by marine scientists (Kittinger et al. 2014).

The mainstream research agenda as such is on the move as well. Most of the above collections provide future recommendations on a background of existing scholarship. Such recommendation is also part of a recent essay with the telling title: 'Time is an affliction: Why ecology cannot be as predictive as physics and why it needs time series,' where the authors state that there is still a great potential in more research efforts within historical marine ecology. They particularly argue that the research field still needs to prove itself in a managerial context (Boero et al. 2015). Another recent paper calls for more research in currently underrepresented topics and geographical regions. This includes the role of gender in historical marine resource exploitation, which is addressed in this volume (Schwerdtner Máñez and Pauwelussen), but also more in-depth studies on coastal regions in Asia, Africa, and Latin America (Schwerdtner Máñez et al. 2014).

Challenges of Interdisciplinarity

Following the great surge in research output within marine environmental history and historical marine ecology, English ecologist, Callum Roberts in 2007 was able to paraphrase Tim Smith's notion of historical myopia. Following Roberts, a combination of certain reluctance to acknowledge environmental changes in the marine realm, and a "collective amnesia" had prevailed in the sense that until now hardly anyone did realize the far-reaching alterations of marine and coastal ecosystems (Roberts 2009). In fact, looking at the field of marine environmental history from the practitioners' point of view, such as the contributors to this volume, the potential, the achievements and the appropriateness of the suggested approaches may seem obvious.

A key factor, highlighted in several contributions in this volume, is the interdisciplinary nature of much marine environmental history. Here, interdisciplinarity is defined as the scholarly practice, where theories, methods and data arising in the

arena of social science endeavours cross over to natural science papers and vice versa. Oral history for instance, developed as an historical method of inquiry in the 1970s, is now applied by marine scientists teasing out knowledge of past ecosystems that were otherwise hidden or simply lost (Thurstan et al. this volume). In the chapter by Coll and Lotze the authors present a whole range of methods and tools, which can – and have been used when seeking to reconstruct significant features of past marine ecosystems (Coll and Lotze this volume). Conversely, the chapter on archaeological methods and contributions shows several examples, where natural science techniques such as the isotopic composition of human bones can be used to infer the contribution of marine protein to human diet in for instance the late Middle Ages, where such analysis have been carried out on remains from graveyards (Orton, this volume). In this fairly distant past, paper or parchment documents are rare to find, and they will seldom be able to give a precise account of the composition of vegetables, meat and fish in people's diet. Within the past c. 400 years though, historical studies based on paper documents preserved in archives have become ever more prolific. In this way fishermen's logbooks, landing certificates and similar types of records have been deployed as a means to test methodology from marine science to tease out the historical variability of species abundance and the impact of fishing pressure (Poulsen, this volume; Engelhard, this volume). A particular challenge for both modern day fisheries managers and scientists trying to record what goes on at high sea is the phenomenon of "IUU" which stands for Illegal, Unreported and Unregulated fisheries. In his chapter, Joseph Christensen places this phenomenon in an historical perspective focusing on the Southern hemisphere (Christensen, this volume).

Nonetheless, institutional inertia and scholarly and scientific blindness to the interdisciplinary aspects of marine environmental history still prevail. In some, also influential corners of academia, one can even find the proposition that the interdisciplinary aspirations of marine environmental history are futile or impossible.

More than half a century ago, English physical chemist and novelist, C. P. Snow lamented the fact that, as he observed it, the natural sciences and the humanities were living two separate worlds within the larger realm of academia as well as in public discourse. These 'The Two Cultures' as his book on the subject was titled, were devoid of serious interest in appropriating learning from the other culture. Snow found this to be a tremendous loss to a society, whose leaders in government and administration tended to be trained solely in the humanities ignorant to the advances of modern science. Conversely, Snow found a danger in the fact the engineers of modern technology fell short, when it came to training in moral judgements. Snow's observations were critical of this division of the two cultures (Snow 1966). In an article from 1996, American environmental historian, Donald Worster, took C. P. Snow's critique to the then rapidly emerging field of environmental history, highlighting how environmental history was an important and necessary meeting point for sharing the environmental challenges between the humanities and social sciences on the one hand, and the environmental sciences on the other hand (Worster 1996).

Nonetheless, many commentators on the subject of scholarly division in the human and natural sciences simply adhered to this a fact, not disputing the soundness thereof. A twenty-first century example of this is the widely used textbook by English historian, Arthur Marwick who gives the following view on the two cultures: '… there is a fundamental difference in the subject of study: the natural sciences are concerned with the phenomena of the natural world and the physical universe, while history is concerned with human beings and human societies in the past. There is a difference in the phenomena studied, and these phenomena are very different in character.' (Marwick 2001: 248). This is true, when one believes it to be true, and the traditional divisions between disciplines at universities around the world indeed support and encourage such a more mono-disciplinary approach to science. However, many insights will remain out of sight if this is the only way human and natural sciences are practiced.

From an epistemological point of view, this volume attempts to highlight the value of multiple perspectives provided by scientists from a number of different disciplinary backgrounds. One of its interdisciplinary aspirations has been to facilitate considerations of the potential in the common denominator of human and natural sciences. Fundamentally they are both sciences. As stipulated by other commentators on the nature of the sciences, this means that historians, archaeologists, sociologists, ecologists, fisheries scientists are all focusing on posing open-ended questions or transparent hypotheses serving as guiding principles for ones' inquiry, or scholarly pursuit as one might also call it. Any scientific enquiry then is based on some sort of observation. The historian or social scientist will often rely on written testimonies or conduct interviews. Yet, as we will see in several contributions to this volume, this type of data is also of relevance to natural science oriented investigations (Chalmers 2000; Paludan 1990).

The natural sciences do foremost deliver answers to questions concerning the physical surroundings, but studies of for instance the natural variability of fish populations, environmental forcing and fishing pressure can be thought of in connection with societal developments, for instance of fishing communities, with promising results (Holm, this volume).

In many cases multiple perspectives are likely to result in a more rewarding study than the singular perspective of just one disciplinary approach. The decisive point as to whether or not a study should be classified as natural science, human science or interdisciplinary science, is not defined by the object of one's study, but by the perspective from which questions are asked. When a scientist uses material for data, or as sources, as the historian would have it, such material exist as data only for so far as it is being used to serve as a remedy in addressing the scholarly question. Thus data are not scientific data in their own right, but merely a function of the investigative process, or scholarly pursuit trying to address a problem.

If the addressed problem is primarily oriented towards a problem within the realm of human society, one would label it social science or as belong to the humanities, but if the problem addressed tackles an issue of relevance to both of 'the two cultures', then you could call it an interdisciplinary study. Thus, it follows that there

is a certain degree of relativism at play in between the subject of inquiry, i.e. the scientist, and the observed phenomenon.

One of the prejudices against interdisciplinary or multi-disciplinary research is a bit peculiar. In the anglo-saxon world of academia, the human sciences are commonly known as the *arts*. This gives rise to common claim that history or archaeology are not real science. Nonetheless, this is a problem only in the English speaking parts of academia, and has been labelled an 'eccentricity of the English language' (Evans 1997). In most Germanic and Latin languages the same word for scholarly pursuits are being used in the humanities and in the social and natural sciences. In German for instance, the equivalent terms are *Geschichtswissenschaft*, *Sozialwissenschaft* and *Naturwissenschaft*, respectively.

From a different point of view, the degree of relativism is exactly what has given rise to criticism of history as a science. English historian Keith Jenkins has promoted the view that history should not be looked upon as a science. He proposes that history falls within the realm of craftsmanship or a bundle of literary conventions enabling historians to tell stories in the same way as novelists writing fiction. Since history is often occupied with the past – a phenomenon, which by definition does not exist, because it is gone – the claim is that history is unscientific (Jenkins 1995).

Quite rightly, there are elements of construction in the practice of history, but this is true of any scientific inquiry, also within the natural sciences. Often Newton's laws of physics are brought to the table as an example of how, in for instance physics, scientists are occupied with undeniably factual relationships, while scientists in the humanities are focusing on cultural attitudes and particularities. Nonetheless, this is in many cases an unfruitful stereotype. Within the so-called life sciences, such as ecology, conservation biology, zoology or botany, practitioners in the field are equally self-critical and aware of elements of construction, as many historians or social scientists would be. Conversely, one could also stipulate that much human science embarks from the point of view that certain elements in the world can be taken for granted as factual; rationality for instance. While explicitly, rational choice theory is centred on the rational action by standardized individuals, this is implicitly the case assessments of most human activity.

Reading contributions to important scientific journals such as *Social Science History* or *Fish and Fisheries*, the published articles share the exact same ambitions to strive for exactness in the research presented, not least through the use of quantitative methods. Within fisheries research for instance, fishermen can be expected to fish to earn a living. It is rational to maximize the output of fishing within certain technological limits dictated by boats, fishing gear and availability of fish stocks. Yet, in many societies, fishermen do not fish on Sundays, or they stay at home during weekends. From a strict economic point of view this is irrational, but to properly assess the irrationality of fishermen's actions, a certain notion of the opposite is to be assumed. Thus, differences in cultural preferences come to mind, when a fisherman's logbook is consistently marked by blank spots on any given Sunday, a strong hint that fishermen, wholesalers or restaurants are observing the Christian day of rest. In a study of Catalan shrimp fishermen, the observation was made that

the catch rates increase from Monday to Friday. During the weekend, the fishermen rested, and then on Monday and Tuesday their catch was lower, because the fishermen had to first find the shrimp after the weekend break (Sardà and Maynou 1998).

Moving from the level of individual agents to the level of human societies or marine ecosystems, the element of construction becomes even clearer. When a biologist operates within the framework of an ecosystem or a food web, these are all models of Mother Nature, in just the same way as the social scientist deploys concepts such as class or community – both abstract notions based on observed phenomena from the physical world.

To phrase it little more squarely, one could say that whereas much social science oriented writings of history, such as economic history, has the same nomothetic ambition as much classical natural science, that is to define scientific laws or regularities, or at least categories of development within certain given contexts. However, within the humanities in general, there is a strong ideographical tradition, which means that what is in focus is the study of the description of what is special, peculiar or even unique. Here, specific generalizations are often avoided.

There are more to the discussion about bridging *The Two Cultures* than the nature of how to do proper science. Several more practical and contextual issues or challenges for multi- and inter-disciplinary work deserve mentioning. One of the most widespread and real prejudice from the humanities towards the natural sciences springs out of the difference in traditions for academic publishing. Natural scientists tend to publish their most prestigious results in a selected number of scientific journals, whereas in the case of the humanities, a standard chat-up line at a conference is: 'So, what is your next book about?' Historians do publish in journals, and some are very highly appreciated. However, in some corners of academia shared authorship is frowned upon. Not because it needs to be so, but because of the fact that it is widely *perceived* to be so out of necessity. Attitudes towards different styles of publication are very conservative. This is indeed odd. The focal point deserves to be the shared goal of obtaining new research results, new knowledge about the world. The division of labour characterising the practices and traditions of much natural science is one area, where the humanities can really learn from *the other culture*. In many cases a short message entailed in a brief manuscript is much to desire, when compared to a quirky book of several hundred pages. From the other side of the fence between scientific cultures, similar obstacles persist. Publishing in a format other than the peer-reviewed scientific journal is not very attractive for natural scientists, which would not get credit for other types of publications, often labelled as 'grey literature'. Rarely marine scientists write big humanities style books, but some who did so have made an enormous impact, such as Callum Roberts.

In This Volume

The ambition of this volume is to present some of the major advances within the intersection of marine environmental history and historical marine ecology within the last 20 years. It can, however, not cover all aspects of the discipline, but focuses

on the changing relationships between human societies and natural marine resources over time. Analysing these relationships requires new, often unconventional and innovative concepts and methods. The book seeks to present some of the main methodological challenges in reconstructing past marine resource use. Leading scholars in the field introduce major theories and methods, such as new tools in archaeology, developments in modelling, or the proper frameworks for studying historical fishing communities.

Ideally, the chapters written by historians and social scientists are supposed to be readable for interested researchers and practitioners with a natural science background. Vice versa, we hope that historians can gain insights and inspiration from the methodologies presented in the chapters written by authors with a marine science background.

Global research initiatives such as the History of Marine Animal Populations (HMAP) as well as numerous smaller projects have studied coastal and marine systems all over the globe, although many regions including large parts of South America and Africa have so far been left out (Schwerdtner Máñez et al. 2014). Hopefully, the studies presented in this volume can be an inspiration to engage with these issues on a truly global scale as well as in a wide range of regional contexts.

Marine environmental history will hopefully continue to thrive as a dynamic meeting point between the natural, social and historical sciences – arguably forming an open-ended sub-discipline of its own, with distinct traits and characteristics. This book seeks to encapsulate some of the major novelties of this fascinating new discipline and its contribution to the management, conservation and restoration of marine and coastal ecosystems as well as the cultural heritages of coastal communities in different parts of the world.

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