

ENVIRONMENTAL IMPACT OF THE HISTORICAL USES OF THE SEAS IN THE FIRST GLOBAL AGE (1500-1800)

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Summary

This chapter submits to discussion three questions: first, how to define environmental history, on the assumption that it exists as a sub-field of historical research, and how to proceed in environmental studies for pre-statistical periods; secondly, how to connect environmental history and maritime history; thirdly, how the historical uses of the seas during the Early Modern Age (15th-18th Centuries) contributed to environmental changes, both on land and at sea, while connecting different continents and oceans at a global level; and which was the impact of an on-going globalization process, based on maritime dynamics, on the environment and environmental dynamics.

Assuming that the sea in its economic, cultural and environmental dimensions, contributed actively to world history, and is, in itself, a major factor of globalization, the chapter intends to highlight the topic of the sea as an agent for broad global exchange, focusing on interdependencies which fostered connections between the local and the global.

Finally, deriving from the assumptions of the “green imperialism”, this chapter conversely discusses the potential application of cooperation and self-organization theories and models on the study of the environmental impacts of colonial dynamics in the First Global Age (1500-1800).

1. Environmental History

“History is a product of its time” - this is commonplace, yet important to understand the current interest in environmental history. Since climatic changes, resource scarcity and pollution are some of the main challenges future generations have to face, an emphasis

on environmental issues is a mainstream of current concerns. History could not escape this trend.

Approaching the subject of environmental history implies, though, questioning the very existence of such a discipline, as an accepted field of research. Douglas Weiner (2005), in *A Death-Defying Attempt to Articulate a Coherent Definition of Environmental History* presents a pertinent insight into this subject: J.M. Powell stated - he says - that Environmental History is *like Belgium, the product of a resident collective imagination*. Wiener adds that “it is also the product of a resident collective toleration of a good deal of intellectual uncertainty, diversity, and even incoherence”.

Such a debate implies some reflection on what is environmental history, after all: is it the study of the environment in itself and its evolution? The study of the impact of environmental phenomena like floods, climatic changes, typhoons, earthquakes, droughts, on mankind, or else, the study of the impact of human dynamics on environment? The oscillating nature of the definition of the discipline is strongly stressed by John McNeill (see *The Historiography of Environmental History*) centered on the analysis of the historiography of environmental history.

Apart from what should be considered the main stream of Environmental History, it is consensual that it implies connections with human, historical dynamics. Environment emerges itself as a historical category. Environment is not equal to either nature or the ecosystems as stressed Sverker Sörlin and Warde,(2009) according to which nature ends with the upsurge of environment.

So, let us just assume that environmental history deals with the study of the relationship between the human agents and the environment over time, which results in changes in ecosystems. Quoting Donald Johnson (2001), environmental history can be understood as the study of “*the actions of humans that affect the web of connections with non-human organisms and entities*”. The assumption that those changes affect humans themselves and their social dynamics, in a reciprocal process, is a parallel postulation. The examination of the long-term evolution of the interaction between humans and nature, and vice-versa, becomes thus essential to the understanding of past and present social, economic, political and ecological phenomena.

Environmental history can also be described as “an attempt to study the interaction between humans *and nature in the past, which aims to deepen our understanding of how humans have been influenced by their natural environment through time and how they have affected their surroundings and with what results, emphasizing the role of humans as an integral part of their natural surroundings*”, as proposed by Ursula Lehmkuhl (2007). Nature and culture thus become two key concepts, calling for a complex analysis in which both categories become not opposed but rather entangled entities.

Men, time, and space: those are the three main elements of the historical framework, historians focusing their analysis on how human agents interact with space over time. All of them are also categories of environmental history. Socio-environmental dynamics occur in space and have themselves a spatial dimension. Nonetheless, what enable us to

categorize a historiographical approach as an expression of environmental history is a set of specific concerns with the environment and not with space. The invocation, on its own, of natural or environmental phenomena occurring over time does not necessarily qualify as a piece of environmental history either: if one studies the impact of geologic, climatic or biological phenomena on humankind, one may do it according to a social, economic, political, psychological, cultural historical approach, but not necessarily from an environmental point of view.

Environmental history is not moreover the history of the environment. The history of the environment is, in itself, an abstraction and an intangible target if defined as the understanding of the evolution over time of environmental phenomena (frequently mixed up with “natural” phenomena).

The interactions between humans and nature are then key elements of a historical perspective, which is different from a climatological, biological, geographical or other scientific environmental perspective. Environmental history cannot operate, however, only with the concepts, the methods and the tools of history. Environmental history is, by definition, multidisciplinary: it has unavoidably to integrate expertise provided by biology, chemistry, geology, botany, ecology, hydraulics, geography, landscape studies... Sociological, anthropological, archaeological methods are equally welcome, as well as mathematical skills. Those are particularly appropriate when the possibility of developing evolutionary models of past dynamics for pre-statistical periods is taken into consideration.

The required reciprocal connections between history and other disciplines are indeed a case in point. John McNeil summarizes precisely that urge when considering ecology: *“The enormity of ecological change strongly suggests that history and ecology, at least in modern times, must take one another into account. [...] Ecology that neglects the complexity of social forces and dynamics of historical change is equally limited. Both history and ecology [...] need to integrate with one another”*. (see *The Historiography of Environmental History*)

The concept itself of environmental history stands on some ecological principles: the human species is part of nature, and nature consists of systems with many parts and functions; these systems undergo significant changes over time; human actions produce many, even if not all of those changes, in some cases carrying them beyond the point of sustainability; technology tends to accentuate human impacts, producing more rapid changes with long-lasting and long-distance effects. Undervaluing these principles will contribute to deceptive evaluations of historical dynamics, whether human or ecological.

The association between history and ecology as disciplines is recent: it undergoes hardly 100 years. However, the recognition of the efforts of a more ancient colonial discourse, undertaken by European, i.e. British, French, Spanish or Portuguese colonizers, as contributions to environmental history seems to be consensual. Acknowledged from the 18th Century onwards, they seemed preoccupied both with holding a systematic census of indigenous species and with understanding the relation between humans and nature, mostly in tropical settings. At the same time, by the end of

the 18th and the 19th Centuries, concerns about the impact of human activity on the natural world, including climate change and energy sources, was triggered by the systematic observation and recording of data.

Nonetheless, not before the first decades of the 20th Century did a gradual professionalization of a scientific discourse begin among anthropologists, geographers, archaeologists or ecologists preoccupied with wildlife preservation and environment protection. Environmental history “*avant la lettre*” was mostly written by non-historians. The pioneering approaches in the field seem actually to have been provided by a range of specialist in other disciplinary fields, as pointed out by Sverker Sörlin, and Paul Warde. References to Carl Sauer (1889 -1975), Karl Ritter (1779-1859), Vidal de la Blache (1845-1918), Patrick Geddes (1854-1932) or Lewis Mumford (1895 -1990) emerge side by side with Hubert Lamb (1913-1997), the English climatologist, or James Malin (1893-1979), an American historical ecologist.

In a brief however instructive attempt to introduce a periodization of environmental history, Ursula Lehmkuhl (2007) claims that it went through three main periods of evolution: the period of proto-environmentalism, from about 1890 to 1960, the post 1960s and 1970s, taken as the date of the foundation of the modern environmental history, and the post 1980 and 1990s. The first period, confirming the deep-rooted interdependence of human action and geography, would involve the work and contributions by Paul Vidal de la Blanche and the writings of Frederick Jackson Turner (1861-1932), together with the publications of scientists like Aldo Leopold (1887-1948). It also includes the discovery of “*la longue durée*” by Fernand Braudel (1902-1985), Lucien Febvre (1878-1956) leading the way to the historicization of space.

The rise of a political environmentalism, associated with social movements and civic demonstrations in Europe and North America seemed to contribute to a decisive emergence of environmental history in the 1960s and 1970s.

In the 1980s and 1990s national historiographical patterns shaped environmental history, Ursula Lehmkuhl (2007) stressing that German environmental history emerged as a historical subfield with a focus on the history of industrialization and pollution, becoming very much the social history of the era of heavy industrialization and urbanization. Instead, the study of wilderness dominates, by that time, the American historiography, calling for a different approach to a diverse environmental perspective, of which the seminal study of Andrew C. Isenberg, *The Destruction of the Bison: An environmental history* is a demonstrative expression. This period was particularly shaped, in North America, by the writings of Donald Worster (1985, 1988), William Cronon (1983, 1992, 1996) and Alfred W. Crosby (see bibliography for many of his works).

The thorough attempt to define environmental history by Douglas R. Weiner (2005) deepens our comprehension of how cultural and political factors intervene with the setting of environmental history and its tendencies: “*Nature’s role, it turned out, is much more complicated and subtle, defying attempts to establish one-to-one correspondences with social and cultural forms*”. Based on Anna Tsing’s (2001) arguments according to which environment is what and where we want it to be, the

author sustains that “what we study about human-nature relationships is a set of shadows and distorted images - a moving target - and the objects of our study, social actors, are armed with their own socially constructed cognitive maps [....] In truth, our cognitive maps of the world are closely tied up with our political and economic systems and the practices associated with those”.

The political and economic power itself involved in the scientific and historical uses/manipulation of environmental issues cannot be discarded. Weiner's awareness that all the approaches of environmental history are inflected by power, lead him to the finding that historians of the environment produce a situated, inspired understanding of the world, choosing to develop cognitive models that will at the end orient complex exercises of domination. This is not far from Foucault (1972, 1980) analysis according to which the environment and nature, were produced socially in the dominion of ideas, the discourses of science, politics and economics. Deriving from such intellectual considerations, Weiner's article advances some accurate food for thought on the social and political constraints within which environmental historians perform.

Concurrently, environmental history, even if considering biomes and landscapes as open and complex, non-linear systems, of which humans are just a part, cannot forget the role of technology, power, economy and law in its approaches. If the first provide the environmental frameworks in which societies evolve, the second is frequently co-responsible for molding the environmental framework according to political and economic aims. In this sense, environment is built by processes of interaction between humans and nature inscribed into economic practices sanctioned by law. So, environmental studies cannot avoid the approaches of history and social sciences.

Concomitantly, being economy, trade and world politics being regulated to a great extent by the availability and location of natural resources, history cannot disregard the importance of past environmental dynamics and the evolving interaction, with consequences right until the present, between humans and nature.

Summing up, environmental history as a discipline exists, supported by a social urge of studies in the field, in order to enlighten both socio-economic and environmental dynamics deficiently understood until now and essential to the grasp of the past and of present-day environmental changes. Its existence is underscored by a tangible object of study - the relationship, over time, between humans and nature, and vice-versa; by an increasing number of publications and by the existence of specialized journals, particularly the American *Environmental History* and the European *Environment and History*. And it is reinforced by the assemblage of specialists in already numerous international conferences promoted by more than a few associations, among which the *European Society for Environmental History* (ESEH), the *American Society for Environmental History* (ASEH), the *Sociedad Latino-Americana e Caribenha de História Ambiental* (SOLCHA), or the *International Consortium of Environmental History Organizations* (ICEHO) deserve to be mentioned.

As a discipline, however, environmental history lacks homogeneity of scale, steadiness of theoretical perspectives and consistency of methods. In fact, environmental history could be described as a basin where a variety of scales, research perspectives and

objects of study come together, rather than a field based upon a single and exclusive definition of its own theoretical and methodological tools.

Within the scope of history, the focus of environmental history can be informed by a political approach, if the subject under study is the impact of state policies, political regimes or specific laws on the environment; by an economic approach, if the uses and exhaustion of natural resources are studied according to consumption patterns, losses and benefits and market logics; by a social approach if the attention is centered on an increasing social consciousness related to pollution phenomena or depletion of natural resources; by a technical point of view derived from the acknowledgment that technology accentuates human impacts, permitting much more rapid changes; by a cultural or religious approach, if one develops studies centered on the diversity of attitudes towards nature, natural resources or environment according to religious affiliations or cultural backgrounds, as pointed out by Donald Johnson' *Environmental history of the world*.

This means that the main path of environmental history is not defined by a specific method, each one being chosen according to the specific study to be undertaken. Nor is it defined by a specific time-scale (it works on different time-scales, from days through decades to millennia), nor by a spatial frame: it can be local, regional, national, continental, or global.

As its sources, environmental history uses written documents, iconography and statistics as well as archaeological evidences or field work. Floods, typhoons, earthquakes, droughts, deforestation, drying soils, exhaustion of natural resources, water supply, landscape changes urban and industrial pollution costs are just some of its topics of research. This fluidity and, at the same time, this transversal scope, gives environmental history a huge field of action, at the same time it puts it under strong pressure, when a specific disciplinary statute is called for. Founded mostly as the study of land, territorial and continental based environmental dynamics it turns steadily into other fields of research. Maritime historians and ocean researchers call for an environmental history of the seas, the oceans and the maritime dynamics. This seems to be interconnected with the development itself of marine ecology. The acknowledgment of widespread habitat destruction on the coastal zones, along with excessive nutrient inputs, overfishing, and the changes produced by alterations of the global climate, leading to major changes in marine ecosystems, attract top attention from researchers, including historians. Specialists attempt to figure out the evolution of these phenomena over time, trying to find, in an evolving timeline, some tendencies soon-to-be. Even so, the management of natural resources, essentially marine species, remains the chief concern of the recent approaches of what one could attempt to timidly call marine environmental history (since, in fact, a maritime environmental history does not exist).

2. Environmental History and Maritime History

In the domain of maritime history, perspectives connected with marine environmental issues begin to emerge in a context in which maritime history itself tends to swing. In her introduction to the *American Historical Review forum* on "Oceans of History," Kären Wigen states that "maritime scholarship seems to have burst its bounds; across

the discipline, the sea is swinging into view.” The same perception is sustained by Glen O’Hara (2009) in a recent article. The introduction to a recent book, *Maritime History as Global History* sustain, however, that present maritime history, even if not excluding new perspectives, is still dominated by traditional topics: shipping, nautical science, naval organization and warfare at sea are some of them. So too are empire building, overseas trade, navigation and geographical exploration, especially during the Early Modern period. Communication and transportation systems, including the study of fleets and companies, the age of sail, the steam revolution, containerization and technological advances in the maritime sector are part of the maritime historians remit.

Concurrently, issues related to social, religious and cultural studies have emerged recently as important topics in maritime history as well. Their inclusion reveals an understanding of the centrality of human agents to maritime dynamics. The focus tends to be not only on leaders but also on common and anonymous agents. Studies of seafaring communities, fishermen, professional organizations, family structures and identity patterns have become acceptable subjects for maritime historians, as have studies of literature, iconography, architecture and urbanization related to seafaring communities. The representation of maritime space is another subject for research, while interdisciplinary analyses including geography and the study of mental spatial representations are becoming relevant. Those approaches open the way to another acquisition: oceanic environmental history. Hydrologic plans, harbor construction technology, coastal area management, seaside resorts and seascapes become topics of interest, as does sea exploitation (both on the surface and under the sea), including fisheries and studies on marine ecosystems.

Maritime history in its widest sense is presented, according to Frank Broeze’s (1989) traditional definition, as a field of research which encompasses all the dynamics which result from, and are required by the ways humans use the sea. Frank Broeze’s definition seems to be subscribed as well by Gerard Le Bouëdec (2010), a representative of the French groupement d’intérêt scientifique d’histoire maritime (GIS): “*Ce sont les usages de la mer et les rapports pluriels de l’homme au littoral qui constituent le socle conceptuel de l’histoire maritime*”. The focus of the GIS also expands the domains of maritime studies by including the sea’s impact on politics, society and cultural practices, as well as the global impact of the sea on the origins and development of countries and continents. The impact of natural disasters on coastal populations and coastal ecosystems emerge as other chief topic of analysis. The connection between humans and nature, through the uses of the seas and the coastal realm, become a main topic of interest.

In this sense, maritime history, just as much as environmental history cannot be confined to a specific field of historical research. Rather, it often crosses the boundaries of other disciplines and fields of research, and indeed goes beyond the limits of history. Understanding the historical development of fisheries requires the study of sea resources and an analysis of the sustainability of eco-systems, therefore involving disciplines such as biology, climatology, ecology and other environmental sciences. Studies on maritime accessibility draw on insights from geography, geomorphology and engineering. Studying seafaring or fishing communities requires theoretical and methodological inputs from anthropology, sociology and even the behavioral sciences.

Analyzing the distribution of maritime populations involves demographic studies. An analysis of labor markets, rivalry patterns or international economy demands insights from economics and political science, just as the study of shipping frequently involves understanding the achievements of naval studies and underwater archaeology. Oceanography, cartography and hydrography are also important tools for maritime historians. Just within the discipline of history, maritime history involves economic, social, demographic, political, cultural and art history, including representations of the sea in art and literature. Other cultural manifestations, such as religious and devotional practices and beliefs, can also be a focus of maritime history. More recently, maritime historians have also drawn on the histories of technology and science, as well as the history of the “immaterial” (i.e., the fears, expectations and informal social codes of maritime communities and groups).

In fact, the broader sense suggested by Broeze’s definition implies that maritime history is, just like environmental history, a heterogeneous field which encompasses a wide range of subjects. Several studies stand for it. Matt K. Matsuda (2006) claims, in his contribution to the *American Historical Review* Forum on “Oceans of History”, that studying and even defining an ocean historically requires the assimilation of multiple disciplines and scholarly domains. He argues persuasively that comprehending the Pacific as an entity requires the inclusion of anthropological studies of islanders, approaches to the Pacific rim, policy issues and economic development, side by side with navigational, immigration and diaspora studies on Oceania, East and Southeast Asia and the Americas. He concludes that contributions by ethno-botanists, musicologists, historical linguists, marine archaeologists, poets, novelists and political activists are necessary for such an endeavor. The same point is argued by Paul d’Arcy (2006) in *The people of the Sea*, according to which the history of the Pacific depends on the understanding of the human-environment relation. The sea shaped the people of Oceania: it is more important than land to understand the human societies of the Pacific, since its influence is even more extended and its dynamics are equally active and influential. The same has been argued about the Indian Ocean. Michael Pearson (1976, 1998, 2003, 2005), too, called for a shift in perspective on maritime studies of the Indian world. He claims that “*We must try to identify people whose social life is importantly tied in to the ocean, that is people of the sea, not just on it; for the latter the sea is optional, non-essential, for the former it is life.*”

Gelina Harlaftis’ and Carmen Vassallo’s (2004) *New Directions in Mediterranean Maritime History* is another contribution to take into consideration. Focusing mostly on Europe, the volume stresses the need for more multicultural and transnational studies, emphasizing “*the extent to which the maritime history of one country is found in the history of the others, and how much research in maritime history means research across national boundaries.*” Based on the Mediterranean, this same statement could be applied to the Atlantic, Indian or Pacific oceans. Those are common grounds to environmental history and global history.

Even if there is no deterministic articulation between global history and environmental history, the two fields have lately been connected through theoretical approaches like the one proposed by Joachim Radkau’s *Nature and Power* (2008). A *global History of the Environment*, or by empirical analysis developed according to a biologic, botanic,

zoological or epidemiologic background, as in Alfred Crosby's *Ecological Imperialism* or John F. Richards' *The Unending Frontier*(2003), both fed by a worldwide historical vision and a conception of environmental impact which derives from worldwide interactions, presumed by globalization processes.

There is nevertheless some criticism towards the viability of a global environmental history. Douglas Weiner, following Richard White, argues that "*we can make believable statements about some effects by local actors on environments of local scale, but beyond that we get into chaos theory*". And even those who pursue a path of global history, like Joachim Radkau (2008), show identical skepticism concerning history as global: "*By widening history towards a global horizon, the empirical basis becomes glib; the global approach usually raises the danger of speculative constructions and fashionable dilettantism*". One thing remains unquestionable: environmental phenomena, and their study, even if locally based, frequently earn a worldwide dimension and gain from a global analysis, since nature has no frontiers.

Plus, marine oceanic ecosystems are typically large and intermingled, with a high level of connection between distant populations.. In this sense, maritime history can make important contributions both to environmental history and global history. The question arises in Polónia's essay (2011) *Maritime History: A gateway to Global History?*: "Seen as highways of trade, routes of migration, paths for communication flows, spawning grounds of political and economic empires, offspring of miscegenation processes between different civilizations and cultures, venues of opportunity for pirates, smugglers and adventurers, the seas, oceans and their dynamics emerge as a crucial field of study directly connected with global history. Since the oceans are usually seen as levers for globalization processes and as key factors in the creation of the "First Global Age," maritime history becomes indeed a "gateway to global history". As it does to environmental history, we would argue.

Maritime history and environmental history not only have common epistemological, methodological and scientific grounds as they might and should converge into common studies centered on the seas as ecosystems as environmental frameworks of human action. Historians and marine environmentalists complain about their almost inexistence. They claim that the abundance of life in the ocean is a recent discovery of science. Until the late 1800s the ocean and the dark ocean were believed to be azoic. They point to the insufficient understanding of the biodiversity patterns in the oceans and the evidence that, despite the fact that diversity of life forms in the seas is far greater than that on land, the number of known marine animal species appears to be only two percent of the terrestrial ones. As Colazingari (2008) says, in his analysis of *Marine, Natural Resources and Technological Development*, "*Humanity has interacted with the marine environment since the earliest times. However, man only very recently began to gain effective working access to the depth of the oceans - intervention being limited to the surface because of the lack of proper technology*".

Data on the social and economic value of marine resources reveal to what extent the oceans are valuable. The world's oceans cover about 71 percent of the planet's surface, providing 99 percent of the potential living space on Earth and performing a number of fundamental ecosystem services. Being, not only the ultimate recyclers, but having a

crucial function in the carbon cycle (absorbing about 30-40 percent of the CO₂ produced worldwide each year), oceans are one of the main determinants of the planet's climate and the support of the major part of the planet's biodiversity.

As a supplier of goods, the oceans provide a considerable amount of food, minerals and energetic resources. In 2003 marine fisheries and aquaculture produced over 130 million tons of fish food worldwide, which is the primary source of animal proteins for 2.6 billion people in developing countries. As for minerals, the ocean's current contribution to the global economy is providing freshwater by desalinization, as well as salt, sand, gravel, oil and gas, tin, gold and diamonds.

As a supplier of services the ocean provides trade routes, tourism and transportation. In 2000, ship transport as the cheapest means of moving large quantities of commodities accounted for 90 percent of the world's trade tonnage, with more than USD 400 billion a year. Tourism was a business of USD 525 billion in 2003, responsible for 11 percent of the world's jobs, and representing 25 percent of total export earnings in the Pacific and over 35 in the Caribbean, according to data provided in 2008. Concerning energy resources, besides offshore oil and gas installations, the oceans hold a great economic potential as source of alternative energy (tidal power generation, wave kinetic energy and ocean thermal energy conversion), that has recently started to be tested for sustainable harvesting.

The acknowledgement of the economic relevance of the sea, as a resource supplier, as a waste assimilator, as a direct source of utility and as a provider of wealth, increased the interest for its study from an environmental point of view. Simultaneously, since humans have only recently acquired the technological capacity to systematically and exhaustively extract resources from the ocean's environment, the environmental concerns about the preservation of ocean resources are also centered on more recent periods.

Besides the direct economic value of marine ecosystems, other, only apparently symbolic values have to be taken into account. In a synthetic overview of the value of the oceans, Marco Colizingari insists that, beside the use value of goods and services provided by the oceans (those associated with its direct use: fish or minerals price), one has to consider the option value (connected with the possible future use of the same resources) and the non-use value (reflecting human willingness to conserve the environment). The author stresses also the more recent attempt to value the oceans within the framework of the 'dowry and patrimony' theory, including every available resource and asset (material or not), using qualitative indicators and the concept of utilization value.

The economic value of the Oceans tends thus to increase the interest for its ecosystems, resources and uses, including from a historical point of view. In the area of fisheries and marine resources, one of the most important, but also one of the few research projects on this area with a historical perspective is the "History of Marine Animal Population" (HMAP), a global initiative to study past ocean life and the effects of human interaction with the sea. Aiming to enhance knowledge and understand how the diversity, distribution and abundance of marine life in the world's oceans have changed in the long term, the project brought together historians and marine biologists. HMAP

constitutes a research effort of more than 50 historians, ecologists and ecosystem modelers working in several institutions all over the world. HMAP is a historical constituent element of a wider project, *The Census of Marine Life*, a program designed to assess the diversity, distribution and abundance of marine life in the world's oceans. With the combination of maritime history and ecological sciences as their main goal, HMAP makes a major contribution to the field of environmental history, developing an integrated analysis of ecosystems and human societies, inquiring after the role of mankind in the historical development of ecosystems, within a net in which mankind is seen as but one factor in a broad ecological network of complex interactions.

In 1985, the US National Oceanic and Atmospheric Administration (NOAA) launched the Estuarine Living Marine Resources (ELMR) in order to develop a consistent database on the presence, distribution, relative abundance, and life history characteristics of ecologically and economically important fishes and invertebrates in the nation's estuaries. It has been conducted jointly by NOAA's National Ocean Service (NOS), NOAA's National Marine Fisheries Service (NMFS), and other agencies and institutions. The nationwide data base was completed in 1994, and includes data for 153 species found in 122 estuaries and coastal bays in five regions. Areas under scrutiny were the North Atlantic, Mid-Atlantic, Southeast, Gulf of Mexico and West Coast of America. A National Overview Report was completed in 2000 (<http://ccma.nos.noaa.gov/ecosystems/estuaries/elmr.aspx>).

From a historical point of view, the universe of topics to explore in terms of maritime or even strictly marine environmental history is still infinite: questions of acclimatization, biodiversity, marine ecosystems; consumption patterns of marine resources; water contamination; ecological foot-print; energy production and management; environmental impact assessment; environmental risks; extinction of marine species; hazardous wastes; marine resources depletion; silting processes are but some of the possible research paths to carry on through an unending timeline, from pre-historical times to the present days.

Historians' work depends, however, on sources, and those are the main obstacle to a systematic work plan, mostly when applied to the pre-statistical era. If archaeology and anthropology can provide indicators to more remote historical or pre-historical periods; if statistics, mostly from the 19th Century onwards, benefit the work of the historian, for most of the time there is a very difficult path to track. Field work, difficult enough to implement on land, usually depending on landscape analysis, associated with scientific indicators from climatology, biology, zoology, botany, or chemistry, is, when applied to the oceans, even more difficult to perform.

Evaluating, on a stable basis, long-term changes and environmental processes for the pre-statistical era seems frequently an impossible task. Historians have to be creative in their inquiry and inventive in the ways they gather and cross source information. Local inquiries and micro-analysis frequently prevail in a context in which macro-approaches reveal themselves almost impossible to pursue. Even if they are part of a global process or of a process of globalization and inter-connectivity on a worldwide level, these phenomena cannot be historiographically analyzed on a global scale. This is not necessarily a problem, since studies on micro-history and those based on self-

organization theories sustain precisely the spontaneous emergence of global coherence out of local interactions. Local and regional studies are the prevalent way to approach environmental studies in a pre-statistical era. Unable to undertake massive catches, Early Modern environmental history has to live with line fishing tracking rather than with dragnet fishing, in terms of the information available.

Legislation, political treaties, travelers' literature, descriptions of new worlds, logbooks, geographic treatises, records of natural disasters, historical cartography, taxation records; customs records; monastery and confraternities records; municipal registers, census of maritime populations; census of fisheries and registers of fishery catches (for the statistical era); side by side with paleo-ecological information are but a few items of a list of possible historical data sources to use. Testing hypotheses based on interdisciplinary methods; creating significant samples which can be processed by mathematical and ecological modeling are some parallel strategies designed to overcome the difficulties imposed to environmental history of the Early Modern Age by the lack of consistent historical data. Since theoretical agendas orient the academic production of knowledge in history at least as much as the sources, the achievements of environmental history depend also on the creative and workable hypotheses put forward, as well as on the cooperation between specialists from different scientific fields.

Nonetheless, we do not expect to find many cases where historical records are sufficiently eloquent and complete to allow the reconstitution of entire ecosystems or the full explanation of changes in previous times. The analysis of the change is, in fact, the focus of history. Rather than stability and permanence, historians seek to identify dynamics of change, in the short, medium or long term, the Braudelian "longue durée". As many environmental processes occurred in the long term, the social, anthropological, political and economic contexts of the past are required to understand the factors and the levels of those changes: History becomes, thus, a crucial approach in scientific studies centered on the environment. Likewise, its contributions become vital to the recognition that frontiers between land and sea are themselves artificial when analyzing environmental changes.

This is, in fact, the theoretical premise of the empirical approach to this chapter, aiming both to check the environmental impact which resulted from the new historical uses the oceans, from 1500 to 1800, the period usually called the First Global Age, and the interaction of human action with environmental ecosystems, led by European overseas expansionism and the ensuing worldwide colonial process.

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Glossary

- Brazil-wood :** The *Caesalpinia* tree. It provided a highly prized dye, but also a wood which was no less in demand for furniture in Europe.
- Capitanias :** Administrative divisions of some Portuguese colonies, including Brazil.
- Bandeirantes :** Informal Portuguese expeditions searching for precious metals and capturing indigenous people, acting across frontiers all over South America.
- Encomienda :** The system employed mainly by the Spanish crown during the first period of the colonization of the Americas to regulate Native American labor. The Spanish crown granted a person a specified number of natives for whom they were to take responsibility. It became, in practice, a kind of slavery, even if not legally.
- Repartimiento :** Forced labor system imposed upon the indigenous population of Spanish America, as well as the Philippines, later on. It was a tribute-labor system, affiliated in the *mita* of the Inca Empire or the *corvée* of *Ancien Regime* France: the natives were forced to do low-paid or unpaid labor for a certain number of weeks or months each year on Spanish-owned farms, mines, *obrajes*, and public projects. This system intended to replace the *Encomienda* system, and was tried to be implemented by the 1542 New Laws (*Leis Novas*), formulated by the Spanish Crown, to which colonists were extremely resilient. Both *encomienda* and *repartimiento* implied moving indigenous population from their own villages and communities.
- West Indies :** Designation for the Spanish colonial territories that include the Greater Antilles (Cuba, Puerto Rico, Hispaniola, Jamaica, the Bahamas), and the Lesser Antilles (Barbados, Nevis, Antigua, Anguilla, Barbuda, Montserrat, among others islands).

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Grove, Richard (1995) - *Green imperialism: colonial expansion, tropical island Edens, and the origins of environmentalism, 1600-1860*. Cambridge New York: Cambridge University Press [The book documents the origins and early history of environmentalism, centered on colonial and global aspects. It shows how the analysis of the colonial impact on the environment depended on the emergence of professional scientists' work.]

Grove, Richard (1997) - *Ecology, climate, and empire: colonialism and global environmental history, 1400-1940*. Cambridge, UK: White Horse Press.[This collection of essays shows how climate change is far from being a uniquely modern phenomenon. It integrates environmental debates applied also to early colonial experiences, namely in the West Indies, St. Helena, Mauritius, India, South Africa, Australia and New England..]

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Headrick, Daniel R. (2010) - *Power over peoples: technology, environments and Western imperialism, 1400 to the present*, Princeton, N.J.: Princeton University Press [The book examines Western imperialism relationship with technology, from the Portuguese experience in the 15th Century to America's contemporary conflicts in the Middle East.]

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Holm, Paul Starkey, David J. Smith, Tim D. (2001) - *The exploited seas: new directions for marine environmental history*. St. Johns, Newfoundland, IMEHA/Census of Marine Life [Connected with the project "History of Marine Animal Population" (HMAP), a research on the study of the past of ocean life

and the effects of human interaction with the sea, the book puts together historians and other marine scientists.]

Hornborg, Alf (2010) - "Global environmental history", in *World System History*, [Eds. George Modelski, Robert A. Denemark], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Oxford, UK, Eolss Publishers [<http://www.eolss.net>] [Based on a scrutiny of diverse disciplinary contributions to environmental history, the author debates what is, what is not and what should be a "global environmental history", stressing the need to maintain an analytical distinction between the material/ biophysical and the cultural dimensions of environmental studies overtime.]

Howe, K. R. (2000) - *Nature, Culture and History: the "knowing" of Oceania*. Honolulu, University of Hawai'i Press. [The book discusses some contentious subjects on the Pacific world, among them disease and depopulation, ecology and environment. It explores the encounter of the West and Pacific peoples.]

Hughes, John Donald (2001) - *An environmental history of the world. Humankind's changing role in the community of life*. New York: Routledge [A concise history of the interaction between the human societies and others forms of life that inhabit the planet, from ancient to modern times.]

Hughes, J. Donalds (2006) - *What's environmental history?*, Cambridge UK: Polity, 2006. [A textbook which provides an overview of the writers, topics and perspectives that have come to constitute the discipline of environmental history.]

Isenberg, Andrew C. (2000) - *The Destruction of the Bison: An environmental history, 1750-1920, Studies in Environment and History*, Cambridge, New York: Cambridge University Press. [Based on an interdisciplinary approach, the author argues that the cultural and ecological encounter between native Americans and Europeans was the central cause of the near extinction of the bison.]

James, Lawrence (1994) - *The rise and fall of the British Empire*, London: Little, Brown, and Co. [An example of traditional approaches to empire building processes and empire building studies. The British case.]

Jantschs, Eric (1980) - *The Self-organizing Universe: Scientific and Human Implications of the Emerging Paradigm of Evolution*, New York: Pergamon [The book provides a comprehensive framework for a deeper understanding of how scientific knowledge evolved, taking the evolution of the universe as the ultimate paradigm of self-organization and self-organization as the paradigm of evolution.]

Johansen, Hans Chr. (1998) - "Shipping and Navigation on the Oceans, 1300-1800" in Cavaciocchi, Simonetta, ed. - *Prodotti e Tecnice d'Oltremare nelle Economie Europee Sec. XIII-XVIII. Atti della "Ventesima Settimana di Studi"*, Firenze: Le Monnier, pp. 905-926. [An accurate overview of the conditions under which the oceans became highways of traffic and transference of goods during the Early Modern age.]

Kamen, Henry (2002) - *How Spain became a world power. 1492-1763*, London: Penguin, 2002 [A different perspective on the origins of the Spanish colonial empire, now viewed as a global enterprise in which non-Spaniards -- Portuguese, Basques, Genoese, Neapolitans, Flemish, Incan Aztecs play an essential role.]

Knight, R.J.B. (1986) - "New England Forests and British Sea Power: Albion Revisited". *American Neptune*, 46 (4). [A survey of how the British shipping industry highly contributed to the exhaustion of royal forests and private lands.]

Kreike, Emmanuel (2010) - *Deforestation and reforestation in Namibia: the global consequences of local contradictions*. Princeton: Markus Wiener Publishers [The book discusses how colonial conquest, population pressure, biological invasions, new technology and economic globalization caused both dramatic deforestation and reforestation in less than a century in Namibia.]

Ladurie, Emmanuel Le Roy (1967) - *Histoire du climat depuis l'an mil*, Paris: Flammarion [A classic and unavoidable book, in the framework of the European climatology, revealing the different timescales of climate changes.]

Lamikiz, Xabier (2010) - *Trade and trust in the eighteenth Century Atlantic world. Spanish merchants and their overseas networks*. s.l.: The Royal Historical Society/The Boydell Press.[The book examines the role of interpersonal trust underpinning trade and focuses on the nature of mercantile activity, exploring the activities of trading networks, and seeks to understand both merchant behavior and the way individuals and networks condition empire building processes.]

Le Bouëdec, Gérard (2010) - "Introduction to *La Recherche Internationale en Histoire Maritime - essai d'évaluation*". *Revue d'Histoire Maritime*, 11-12 (2010), p. 8. [Introduction to an overview of the French maritime historiography in the last decades.]

Lehmkuhl, Ursula and Wellenreuther, Herman (eds.) - *Historians and Nature: Comparative Approaches to environmental history*, Oxford New York: Berg, pp. 1- 44.[This collective work draws on a range of interdisciplinary perspectives on nature and the environment, including history, cultural studies, human geography, biology and ecology.]

Leopold, Aldo (1949) - *A Sand Country Almanac, and Sketches Here and There*. New York: Oxford University Press [Aldo Leopold, one of the foremost conservationists of the 20th Century, presents, in this seminal book, one of the first global overviews of America's relationship with the land, launching the debate on ethical issues related to wildlife conservation.].

Lloyd, Trevor O. (1996) - *The British Empire 1558-1995*, 2nd ed., Oxford New York: Oxford University Press [A short and traditional survey of the entire history of the British empire.].

Marcilio, Maria Luiza (1984) - "The Population of Colonial Brazil", in *The Cambridge History of Latin America*, edited by Leslie Bethell. Cambridge: Cambridge University Press. [An attempt to reconstitute the Brazilian population during the colonial era, with the limitations imposed by a pre-statistical era .]

Martin, Calvin (1979) - *Keepers of the Game: Indian-Animal Relationships and the Fur Trade*, Berkeley and Los Angeles: University of California Press [A contribution to the analysis of the Indians' role in the fur trade with Europeans.].

Martinez-Cortizas, A. (et al.) (1999) - "Mercury in a Spanish Peat Bog: Archive of Climate Change and Atmospheric Metal Deposition", *Science* 284, no. 5416 [The paper presents new findings on the thermal lability of the accumulated mercury as a new tool for quantitative paleotemperature reconstruction, as well as to quantify the effects of human activity.].

Matsuda, Matt K. (2006) - "The Pacific". *American Historical Review*, CXI, No. 3 (2006), pp. 758-779 [The author argues that defining the Pacific historically requires the assimilation of multiple disciplines and scholarly domains, including anthropological studies of islanders, as well as contributions by ethnobotanists, musicologists, historical linguists, marine archaeologists, poets, novelists and political activists.].

McNeil, John R. (2000) - *Something new under the sun: an environmental history of the twentieth Century world*, New York: WW. Norton [The work traces what the author defines as the most significant dimension of the twentieth Century: environmental history.]

McNeil, John R.(2003) - "Observations on the nature and culture of environmental history". *History and Theory*, 42, (Dec.), pp. 5-43 [The article deals with the links between environmental history and other fields within history, as well as with other related disciplines. It foresees intermingled connections between nature and culture, and presents environmental history as an essential discipline within the frame of environmental studies.]

McNeill, John R. (2010) - "The historiography of environmental history" in *World Environmental History*, [Eds.Mauro Agnoletti ,Elizabeth Johann ,Simone Neri Serneri], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Oxford ,UK, Eolss Publishers [http://www.eolss.net] [This essay follow the evolution of environmental historiography, exploring its origins and evolution, concluding with an assessment of its most active grounds.].

Meadows, Donella H. (et al.), (eds.) (1972) *The Limits to Growth: A report for the club of Rome's Project on the Predicament of Mankind*, New York: Universe Books. [A renowned report produced for the Club of Rome, a global network which deals with a variety of international political issues. Founded in 1968, it raised considerable public attention in 1972 precisely with this report on *The Limits to Growth*.]

Modelski, George (2011) - "Self-organization in the world system" in *World System History*, [Eds. George Modelski, Robert A. Denemark], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Oxford, UK, Eolss Publishers [http://www.eolss.net] [A comprehensive survey of Modelski's main assumptions and theories on the mechanisms of the world system evolution.].

Modelski, George (1990) - "Is world politics evolutionary learning?" *International Organization*, Vol.44 (1), 1-24 [The article advances the claim of an existing evolutionary learning as the generative principle of world politics.]

Modelski, George; Devezas, Tessaleno; Thompson, William R. (eds) (2008) - *Globalization as evolutionary process: modeling global change*, Abingdon New York: Routledge [The editors develop an understanding of the trajectory of contemporary world trends, based on evolutionary models of globalization.].

Mosley, Stephen (2010) - *The environment in world history*. Milton Park, Abingdon, Oxon; New York, NY: Routledge [Based on global reflections derived from examples of hunting, forestation, immigration and urbanization processes, the author discusses the interdependencies between environment and History.]

Neves, Baeta das, ed. (1980-1993) - *História florestal, aquícola e cinegética: colectânea de documentos existentes no Arquivo Nacional da Torre do Tombo: chancelarias reais*, Lisboa: Ministério da Agricultura e Pescas, Direcção-Geral do Ordenamento e Gestão Florestal. [This is a collection of sources from Portuguese crown chancelleries concerning forest and natural resources as well as water management from medieval to the modern times.].

North, Douglass C. (1981) - *Structure and Change in Economic History*. New York: W.W.Norton [The author sets his core question of how property rights, and institutional frameworks conditioned development and change in the long run, and discusses the arrangements individuals and groups have made throughout history to deal with the fundamental economic problem of scarcity of resources. The technological variable is also taken into consideration.].

North, Douglass C. (1990) - *Institutions, Institutional Change and Economic Performance*. Cambridge, UK; New York: Cambridge University Press [The author explains how property rights and transaction costs are fundamental determinants to economic development and change..]

North, Douglass C. (2005) - *Understanding the Process of Economic Change*, Princeton, N.J.: Princeton University Press. [One of the more important works of the main representative of institutional economics: here the author explains how different societies arrive at different institutional infrastructures which greatly determine their economic trajectories.].

O'Hara, Glen (2009) - "The Sea is Swinging into View: Modern British Maritime History in a Globalized World". *English Historical Review*, CXXIV, No. 3 (2009), pp. 1109-1134. [A reflection on how recent British maritime historical research has changed, distinguishing it from the traditional studies on shipping, seafaring and sea power.].

Orta, Garcia de (1563) - *Colóquios dos simples e drogas he cousas medicinais da Índia*, Goa, [s.n.] [16th Century compendium of the medicinal plants of the East. It testifies to the interest of European scientists and physicians in the therapeutics and healing processes of the East .]

Ostrom, Elinor (1990) - *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge, UK: Cambridge University Press [Returning to the core question of how common pool resources management results in satisfactory or unsatisfactory answers to the communities, the author provides theoretical and empirical outlines in order to illustrate the diversity of possible solutions for governing the commons.].

Parry, John H. (1971) - *Trade and Dominion: the European Overseas Empire in the Eighteenth Century*, London: Phoenix Press. [An example of traditional approaches to empire building processes and empire building studies, mostly centered on the Spanish and the British cases.]

Pearson, M.N. (1976) - *Merchants and rulers in Gujarat : the response to the Portuguese in the Sixteenth Century*, Berkeley: University of California Press [Analysis of the reaction of the rulers and merchants of Gujarat', in western India, to the trade-control measures imposed by the Portuguese in the sixteenth Century..]

Pearson, M.N. (1998) - *Port cities and intruders: the Swahili Coast, India, and Portugal in the early modern era*, Baltimore, Md.: Johns Hopkins University Press [The book explores the economic and cultural roles of port cities, the relations between the coast and the interior, their place in the world economy, and the impact of the Portuguese in the early modern period in India.]

Pearson, M.N. (2003) - *The Indian Ocean*, London New York: Routledge [A comprehensive overview of the Indian Ocean in the long run: from geographical and geomorphological aspects to political, cultural and economic trends from pre-Islamic times to the period of European presence.].

Pearson, M.N. (2005) - *The World of the Indian Ocean, 1500-1800: studies in economic, social, and cultural history*, Burlington, VT: Ashgate.[A collection of articles published between 1968 and 2001 which deal with a wide range of subjects related to the history of the Indian Ocean region.].

Polónia, Amélia (2011) - "Seaports as Centers of Economic Growth: the Portuguese Case, 1500-1800" in Unger, Richard, ed. - *Shipping Efficiency and Economic Growth, 1350-1800*, Leiden, Brill, pp. 379-409. [An overview of Portuguese seaport systems, shipping and economic activity in the Early Modern Age.]

Polónia, Amélia (2012) - "Redes auto-organizadas na construção do império ultramarino português" in Garrido, Álvaro; Coata, Leonor Freire Duarte, Luís Miguel (eds.) - *Economia, Instituições e Império. Estudos em Homenagem a Joaquim Romero de Magalhães*, Coimbra, Almedina, 2012, pp. 349-372 [An essay on how the commoners contributed to the build-up of Portuguese maritime expansion and colonial settlements in the Early Modern Age. Issues of shipping, seafaring, trading, transference of goods and information and even warfare are analysed from the perspective of the activities of individual agents and informal networks.]

Polónia, Amélia (2007) - *A Expansão Ultramarina numa perspectiva local. O porto de Vila do Conde no século XVI*, Lisboa: IN-CM, vol.1, pp. 131-173.[A micro-analysis of the historical dynamics of a small maritime community involved in Portuguese overseas expansion, with common people as main protagonists: pilots, seafarers, merchants, women, and their ways of participating, within informal networks, in shipbuilding, navigation, trade, emigration and overseas settlement.].

Polónia, Amélia (2011) - "Maritime History: a gateway to global History?" In Fusaro, Maria; Polónia, Amélia (eds.) - *Maritime History as Global History*, St. Johns, Newfoundland: IMEHA, pp. 1-20. [An analysis of the recent developments in maritime historiography.].

Polónia, Amélia; Barros, Amândio (2012) - "Articulações Portugal / Brasil. Redes informais na construção do sistema Atlântico (séculos XVI-XVIII" in *Políticas e Estratégias Administrativas no Mundo Atlântico*, Recife: Editora Universitária/UFPE, 2012, pp. 19-48. [A theoretical and empirical approach to how self-organization assisted in the creation of a colonial Brazil. The empirical evidence is centered on the Porto case in its relations with Brazil, mostly in the 16th Century.]

Polónia, Amélia; Owens, Jack (2009) - *Cooperation-Based Self-Organizing Networks in Portuguese Overseas Expansion in the First Global Age, 1400-1800*. Available at <http://www.dyncoopnet-pt.org/working-papers/25-cooperation-based-self-organizing-networks-in-portuguese-overseas-expansion-in-the-first-global-age-1400-1800> [Accessed at 2012.08.28.]. [The theoretical framework developed under an interdisciplinary international research project, DynCoopNet, followed by a scrutiny of how that rationale can be applied to the analysis of the Portuguese overseas expansion in the Early Modern period.].

Pope, Peter (1997) - "Early Estimates: Assessment of Catches in the Newfoundland Cod Fishery 1660-1690" in *Papers Presented at the Conference "Marine Resources and Human Societies in the north Atlantic Since 1500" October 20-22, 1995*, St. John's, Newfoundland: The Institute of Social and Economic Research, Memorial University of Newfoundland. [An estimate, for a pre-statistical era, of the Newfoundland cod fishery, useful for an assessment of the environmental impact of those early catches upon patterns of marine resources depletion.].

Poppino, Rollie E. (1949) - "Cattle Industry in Colonial Brazil", *Mid-America* 31, pp. 219-247. [The paper provides a historical approach to cattle breeding patterns introduced by Portuguese in Brazil.]

Prem, Hans J. (1992) - "Spanish Colonization and Indian Property in Central Mexico, 1521-1620". *Annals of the Association of American Geographers*, 82 (1992) [A useful insight on the historical causes of landscape degradation in tropical central Mexico.]

Prestes, Maria Elice Brzezinski (2000) - *A investigação da natureza no Brasil Colônia*, São Paulo: Annablume/ Fapesp [The book is centered on the work of several Luso-Brazilian naturalists during the colonial period, stressing the injunctions of central power in order to promote their research on Brazilian species and the contributions those missions made to European scientific knowledge.].

Joachim Radkau, (2010), WORLD HISTORY AND ENVIRONMENTAL HISTORY, in *World Environmental History*, [Eds. Mauro Agnoletti, Elizabeth Johann, Simone Neri Serneri], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford, UK, [<http://www.eolss.net>] [A reflection on the environmental approach contributions to global history, based on a discussion of the relations between human and non-human nature, within the mainstream of history, based on a periodisation since the 16th Century.].

Radkau, Joachim (2008) - *Nature and power: a global history of the environment*, Washington, D.C.: German Historical Institute/Cambridge New York: Cambridge University Press. [The book undertakes a historical analysis on the projection of power policies over nature and natural resources, and ultimately, over the environment. It sheds light on the scope of environmental action over the course of history, framed by implicit or explicit environmental policies, shaped by particularities of culture and by the diversity of human nature itself..].

Raminelli, Ronald (2001) - "A natureza na colonização do Brasil". In Reigota, Marcos (ed.) *Verde cotidiano: o meio ambiente em discussão*. 2. ed. Rio de Janeiro: DP&A [A contribution that shows the colonists' behavior toward nature in Brazil, during the Portuguese colonization, and stresses the devastation deriving from the individually driven economic intentions of the colonisers.].

Reff, Daniel T. (1991) - *Disease, depopulation and culture change in Northwestern New Spain. 1518-1764*, Salt Lake City: University of Utah Press [An assessment of how the colonial settlement impacted upon population and nature and how they changed pre-Colombian human and natural conditions.].

Ribeiro, Ana Sofia Vieira (2011) - *Mechanisms and criteria of cooperation in trading networks of the First Global Age. The case study of the Simon Ruiz network, 1557-1606*. Porto [Unpublished PhD thesis.]. [An academic research on the mechanisms of cooperation based on network analysis, applied to a case study: the company of Simón Ruiz, a Castilian merchant and banker of the 16th Century.].

Richards, John F. (2003) - *The Unending Frontier: An environmental history of the early modern world*, Berkeley: University of California Press. [A global assessment, based on case studies, of the profound impact of humanity on the natural world in the early modern period. The fur trade in North America, the cod fishing in the North Atlantic, the whaling in the Arctic or the hunting in the Cape region are some of the historical examples of the worldwide depletion and ecological transformations caused, mainly, even if not exclusively, by European colonisation in the First Global Age which are analysed by the author.].

Richerson, Peter J.; Boyd, Robert (2005) - *Not by Genes Alone. How Culture Transformed Human Evolution*, Chicago: University of Chicago Press [The book emphasises the role of culture in evolution. Based on inputs from anthropology, political science, sociology, and economics, and pursuing Darwin's mainstream on the theory of evolution, it offers an interpretation of human evolution, assuming that

human ecological dominance and human singular social systems stem from a unique capacity to adapt and to create complex culture.].

Rowley, Charles D. (1970) - *The Destruction of Aboriginal Society*, Canberra: Australian National University Press. [The book sets an overview on how British colonial settlements and policies overtime contributed (or not) to the annihilation of Aboriginal pre-existing social organization and cultural frames.].

Sánchez -Albornoz, Nicholas (1990) - “La población de la America Colonial Española” in León Portilla, Miguel (et al., eds.) - *América Latina en la Epoca Colonial*, Barcelona: Editorial Critica, vol. 2, pp. 9-32. [An overview of the evolution of the post-Colombian Spanish American population, within the contextual historical frameworks which explains the trends apprehended.]

Schwartz, Stuart B. (1984) - “Colonial Brazil, c. 1580 - c. 1750: Plantations and Peripheries” in Leslie Bethell (ed.) *The Cambridge History of Latin America*. Cambridge: Cambridge University Press [A comprehensive description of the colonial plantations system in Brazil by one of the most recognized specialists in the field. The book stresses the contexts in which plantation agriculture evolved; how sugar-cane exploitation was a central element in the colony's formation and why it emerged as the actual frame in which colonial society was formed.].

Sherman, Kenneth Alexander, Lewis M. Gold, Barry D. (eds.) (1990) - *Large Marine Ecosystems: patterns, processes, and yields*. Washington, DC: American Association for the Advancement of Science [Essential book on the definition of the concept and the dynamics of marine ecosystems. It stresses the exchanges between the sea and the coastal areas, essential to historical analysis.].

Sörlin, Sverker; Warde, Paul (eds) (2009). - *Nature's End. History and the Environment*, Basingstoke: Palgrave Macmillan [This collective book, based on the concept of environment as opposed to nature, provides a reflection on the core directions of environmental history, based on a diversity of contributions focused on historiographical and monographic approaches covering wide political, scientific and geographical spaces all over the world.].

Stenseth, Nils (et al, eds.) (2004) - *Marine Ecosystems and Climate Variation: the North Atlantic: a comparative perspective*, Oxford New York: Oxford University Press [This collective book focuses on the influence of climate variability on the marine ecosystems of the North Atlantic and on the analysis of the ecological impact of climate variability on marine population dynamics.]

Studnicki-Gizbert, Daviken (2007) - *A Nation upon the Ocean Sea: Portugal's Atlantic Diaspora and the crisis of the Spanish Empire, 1492-1640*. Oxford: Oxford University Press. [An account of Portuguese diaspora based on an active circulation, maritime trade, and cultural hybridity. Under the concept of “nation”, the book is centered on the performance of Portuguese mariners and traders in Europe and overseas, mostly in America.]

Subrahmanyam, Sanjay (1993) - *The Portuguese Empire in Asia, 1500-1700: A Political and Economic History*, London and New York: Longman.[A synthetic work which tends to favour the geopolitical positioning of the Portuguese facing the Asian political counterparts and their later confrontation with the English and Dutch.].

Subrahmanyam, Sanjay (ed.) (1996) - *Merchant Networks in the Early Modern World* (Series: An Expanding World, Vol. 8), Aldershot: Variorum Books[One of the first works on merchant networks and their importance to world history. The book presents merchants as privileged intermediaries between peoples and cultures in the early modern era..]

Subrahmanyam, Sanjay (ed.) (2004) - *Land, Politics and Trade in South Asia*, Delhi: Oxford University Press. [A collective book with a diversity of studies characterising Asia before and during the presence of the European agents and colonisers.]

Subrahmanyam, Sanjay (1990) - *Improvising Empire: Portuguese Trade and Settlement in the Bay of Bengal, 1500-1700*, Delhi: Oxford University Press, 1990 [This collection of essays deals with the Portuguese presence in the Bay of Bengal, a less well-studied region by the time of this publication, where Portuguese had an important official and mostly unofficial presence in the 16th and 17th Centuries.].

Subrahmanyam, Sanjay, ed. (1990) - *Merchants, Markets and the State in Early Modern India*, Delhi: Oxford University Press [A collection of essays providing a comprehensive overview of economic change in pre-industrial India and the complex relationships between political states and trading communities.]

Szabó, György & Hauert, Christoph (2002) - "Evolutionary prisoner's dilemma games with voluntary participation". *Physical Review E* 66, 062903 [A contribution from two of the most reputed specialists in the field concerning methods of analyses of the evolution of cooperation among unrelated individuals in human societies within the context of public goods games for group interactions.]

Szabó, György & Hauert, Christoph (2002) - "Phase transitions and volunteering in spatial public goods games". *Physical Review Letters* 89 11810 [A contribution from two of the most reputed specialists in the field concerning methods of analyses of the evolution of cooperation among unrelated individuals in human societies within the context of public goods games for group interactions.]

Tait; R.V. Dipper, F.A. (1998) - *Elements of Marine Ecology*. 4th ed., Oxford: Butterworth Heinemann [A revised version of a classic text book, essential to the study of ecology, as the study of organisms in relation to their surroundings. The book provides essential foundation of knowledge to non-specialists. A new chapter on 'Human impact on the marine environment' adds increased actuality to the book..]

Tietenberg, Thomas H. - *Environmental Economics and Policy*, 5th ed., Boston: Pearson/Addison Wesley, 2006. [A broad introduction to the field of environmental economics. The book discusses essential topics such as *Valuing the Environment; Sustainable Development; The Population Problem; Common-Pool Resources; Air Pollution; Climate Change; Transportation; Water Pollution; Managing Waste*, those being intersected with issues of development, poverty, or the quest for suitable and sustained development.]

Trivellato, Francesca (2009) - *The Familiarity of Strangers. The Sephardic Diaspora, Livorno, and cross-cultural trade in the Early Modern Period*. New Haven/London: Yale University Press.[The book presents a new approach to the study of cross-cultural trade. It analyzes instances in which business cooperation relied on language, customary norms, and social networks more than the progressive rise of state and legal institutions.]

Tsing, Anna L. (2001) - "Nature in the Making", in Crumley, Carole L. (ed.) - *New Directions in Anthropology and Environment*, Walnut Creek, Calif: Altamira Press, p. 3 [An anthropologic approach to the study of nature, discussing theoretical, practical and even political implications of scientific approaches on nature.]

Tucker, Richard P. (1988) - The Depletion of India's Forests under British Imperialism: Planters, Foresters, and Peasants in Assam and Kerala in Worster, Donald (ed.) (1988) - *The Ends of the Earth Perspectives on Modern Environmental History. Studies in Environment and History*. Cambridge, UK, New York: Cambridge University Press, pp. 118-140. [A study on how, under British imperial rule, India's forests were depleted not only by the expansion of cultivated land, but also by both commercial timber operations and plantation cropping for European markets.]

Wallerstein, Immanuel (1984-1990) - *The Modern World-System*, 2 vol., New York/London: Academic Press [The seminal Wallerstein's work in which his world-system theory is presented.]

Webb, James L.A. (1995) - *Desert Frontier: Ecological and Economic Change along the Western Sahel, 1600-1850*, Madison: University of Wisconsin Press [The book revolves around the concept of frontier, defines the evolving frontiers in the Sahel region, and discusses the environmental consequences of the European horse trade, slave trade and the Arabic gum trade.]

Weiner, Douglas R. (2005) - "A Death-Defying Attempt to Articulate a Coherent Definition of environmental history". *Environmental History*, 10 (Jul. 2005), pp. 404-420 [An elaborate and thorough reflection on the epistemological territory of environmental history, defining both the concept and the evolution of its recent historiographical paths.]

Weiskel, Timothy C. (1988) - "Toward an Archaeology of Colonialism: Elements in the Ecological Transformation of the Ivory Coast" in Worster, Donald (ed.) - *The Ends of the Earth Perspectives on*

Modern Environmental History. Studies in Environment and History, Cambridge, UK, New York: Cambridge University Press, pp. 141-154 [A detailed analysis on how European expansionism and an increasing level of slave trade worked against ecological equilibriums in the Ivory Coast. A fresh breath for the analysis of colonialism and the environment which overtakes the “green imperialism’s” basic assumptions.]

West, S. A.; Griffin, A. S.; Gardner, A. (2007) - "Social semantics: altruism, cooperation, mutualism, strong reciprocity and group selection". *Journal of Evolutionary Biology* 20 (2). [The paper deals with the clarification of basic concepts of the theory of cooperation, responding to some fuzzy understandings of those key terms, as a consequence of greatest interdisciplinary research, including the one developed on the scope of the human sciences.]

White, Richard (1999) - “The Nationalization of Nature”. *Journal of American History*, 86 (Dec. 1999), pp. 976-986. [The article debates issues of scale: local, national, transnational, global, when dealing with nature and the environment, and tries to point out the historical nature of the history of the environment in itself .]

Wigen, Kären (2006) - “Introduction to AHR Forum on ‘Oceans of History’”. *American Historical Review*, CXI, No. 3 (2006), pp. 717-721. [A brief assessment taken by many as the evidence of a turning point in the way researchers understand and practice maritime history, concerning its subjects, methods and goals.]

Worster, Donald (1985) - *Nature's Economy: A History of Ecological Ideas*, Cambridge; New York: Cambridge University Press [A reedited version of a 1977 work. The author focuses on the way the idea of nature has been built, points out the thinkers who have shaped it, and shows how it moulded the modern perception of Man's place in nature.]

Worster, Donald (ed.) (1988) - *The Ends of the Earth. Perspectives on Modern Environmental History: Studies in Environment and History*, Cambridge, UK, New York: Cambridge University Press.[A collection of readings centered on the environmental changes from the 15th Century onwards, resulting from the European expansionism, seen as responsible for an integrated global economy, higher population levels and greater resource demands - all working against previous ecological equilibriums, mostly in Africa and America, but also in Asia.]

Yerbury, J.C. (1986) - *The Subarctic Indians and the Fur Trade, 1680-1860*, Vancouver: University of British Columbia Press [The book documents the profound changes affecting the universe of Athapaskan-speaking people of the Canadian subarctic as a consequence of the European contact and the uprising demands for fur trade.]

Biographical Sketch

Amélia Polónia is a professor of the Department of History, Political and International Studies of the University of Porto. An associate professor with habilitation since 2009, Amélia Polónia has been a member of the University of Porto since 1985. She is currently Head of the Department of History, as well as a member of the Scientific Board of the Master Course in History and Heritage and of the History PhD Course and a researcher with CITCEM (Transdisciplinary Research Center on Culture, Space and Memory). Amélia Polónia is vice-president of the International Maritime Economic History Association (IMEHA); member of the European Science Foundation Pool of Reviewers and leader of several research projects, funded by national and international institutions. She is the Director of *História - Revista da FLUP* and member of editorial boards of several academic journals. Her interests are centered on the early modern period and include global history, entrepreneurial economics, cross-cultural studies, informal economies, colonial Brazil, slave trade, seaport studies, women's studies, heritage studies and environmental studies. These perspectives are applied to her work on Portuguese overseas expansion and European colonialism in the early modern age. Multidisciplinarity, self-organization and informal mechanisms of empire building are some of her current research challenges.