A Sea-Change in the Sea? Perceptions and Practices Towards Sea Turtles and Manatees in Portugal's Atlantic Ocean Legacy

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Introduction and Historical Background

> «*Reconstruir o passado, conhecer o presente e prever o futuro, eis o difficil e sublime papel da sciencia.*»
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> «*To reconstruct the past, to know the present and to predict the future, this is the hard and sublime role of science.*» [Baldaque da Silva, Portuguese naturalist, 19th century]

The exploitation of marine resources, the intercultural trade and the collection of marine animals has a documented history which changed dramatically with the European Overseas Expansion and the exploration of the Atlantic (Costa 2009).

The onset of the European maritime discoveries in the Atlantic during the fifteenth and sixteenth centuries, marked Europe's history, culture, economy, and even science. The open-sea soon became a center of transoceanic fishing activities, maritime journeys and affairs, and politics, consequently yielding rapid expansion of economic trade and of local and global knowledge. Economic and political benefits of the historical focus on the ocean and coastline left an imprint in the grandiose patrimony, and created a place for several European nations in the annals of an Atlantic economy. During the early modern centuries, humans established new links – primarily by sea – around the entire world. In large measure because of naval capacity and improvements, a new, truly global economy coalesced (Richards 2003).

Following the first successful crossing of the ocean by the late fifteenth century, the Atlantic Ocean gradually became the scene of an integrated system of exchange for people, commodities and ideas (Kupperman 2012). This moment opened the so-called post-Columbian period in the Atlantic. Even though it was marked by great opportunities and also great loss and suffering, modernity was born there. The

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intensive voyages and knowledge of other people and lands that followed the earlier journeys led participants in all four continents to rethink their inherited lore about the world and its history (Kupperman 2012). New views of the world started to take place over medieval conceptions and changes in human societies started to emerge. From the late fifteenth century to the early nineteenth century, the pace and magnitude of change increased in human societies in every part of the world. In this same period, human societies developed the largest, most complex, and most efficient state and private organizations known since classical antiquity. The Atlantic became a new world for everyone (Kupperman 2012).

This new Atlantic world was composed by masses of waters from different origins and far flung environments, with ecosystems formed by distinct trophic nets of animals and plants. Every stretch of coast was included in trade with common as well as more exotic new species of plants and animals (Costa 2009; Kupperman 2012) which dramatically change life in lands and cultures bordering the ocean. New commodities in increasing quantities and variety flowed to markets in trade centers spread throughout the Atlantic margins (Richards 2003). People began to realize the existence of a new Nature – global surroundings rather than localized and familiar environments -, similar species in different continents and oceans and the existence of marine animals in counterpart to the already known terrestrial ones, most of them quite strange. And throughout this time period, people have liked some species, loathed others and for a number of creatures thought nothing about them at all.

Human responses to animals and environments shapes, and are shaped by, existing knowledge about a species and dominant social perceptions about its character and value. Some species are liked and valued for their economic usefulness, which means that they can be converted into products or services for human consumption, and this in turn shapes how the species is understood and described, or labeled (Goedeke 2004). There are many other, however, that people favor, despite having lost or never attained importance as a commodity. This is the case with companion animals – exotic monkeys and parrots are good examples of such (e.g. Masseti and Veracini 2014) – or wildlife with a spiritual or cultural importance, or that symbolizes a community and tradition (Goedeke 2004; Szabo 2008; White et al. 2011). Several species of large marine animals fall in one (or all) of these categories – they are economic resources, they have a spiritual property and they are symbols of people, places or a character – and consequently they are sources and material of history.

At the start of the early modern period, all levels of the society regarded the natural world from its own perspective and viewpoint and tended to classify it less according to its intrinsic qualities than according to its relationship to man (Thomas 1983). This viewpoint lasted for centuries. Social meanings attached to particular creatures due to an array of factors (Goedeke 2004) always existed but now they have changed. Only in recent decades, did the attitudes, perceptions and some practices start to be modified and the cultural relationships that people forge with animals have been marked, as humans started to view themselves not merely from an

anthropocentric perspective in an ethical state above nature, using its resources only with economic purposes, to a more biocentric perspective where they are an integrated part of nature (Vining et al. 2008).

A number of reasons influence public attitudes toward animals such as aesthetics, cultural and historical importance, economic value, and level of public knowledge, and presently the popularity of a particular species depends on perceptions about its usefulness, cognitive characteristics and loveable qualities (Driscoll 1995). Research on environmental perception shares a paradigm of man-environment relations in which man's individual and collective understanding of the environment is seen as a major force in shaping that environment through the action of their own choices and behavior (Whyte 1977). Only very recently, since the 1970s, humans' perception of the environment has been considered fundamental to analyze the man-environment relations. A perception approach to man-environment relations recognizes that for each objective element and relationship in the biosphere many perceived elements and relationships exist as seen and understood by different people, at different times and places (Whyte 1977).

Large marine animals have always captured people's imagination, figuring in ancient legends and visual representations as terrifying sea monsters and inspiring poets and artists with their strange grace and immense size (Szabo 2008). Over the centuries an entire oceanic mythology grew up, inspired by the mystery surrounding these creatures' habits. But the shared history is a bitter one, for the animals have long been hunted for their valuable oil, meat, bones and other products. This is particularly true in the case of whales and whaling throughout time (Szabo 2008; Brito and Sousa 2011; Brito 2012), a theme extensively discussed in the historiography. The history of whaling has always been subject of interest and references can be found, at least, from the early twentieth century (e.g. Jenkins 1921) to the present day (E.g. Reeves and Smith 2006). But for many other marine species and related maritime activities an investigation and discussion is still lacking.

In the present research a set of changing perceptions and attitudes towards a multiplicity of marine species has emerged but we will discuss only some aspects of two charismatic marine species. This chapter aims to reflect on some processes by which human beings intervened in marine environments during the early modern period (Richards 2003), using sea turtles and manatees in the Portugal's Atlantic Ocean legacy as case-studies.

Addressing Environmental and Social Changes in Atlantic History

While some authors pointed out the ways in which the ocean must be accounted for in the well-established field of Atlantic history, marine environmental history also has the potential to help historians recover hitherto overlooked oceanic worlds that embrace both humans and animals (e.g. Bolster 2006). Thinking about life beneath

the waves, transforms our view of events on the surface. It uncovers new historical actors, reshapes traditional geographies, and complicates older stories of the Atlantic as a projection of imperial and commercial power (Richards 2003; Jones 2013). As some authors did for the Pacific Ocean (Jones 2013), it is possible to look below the Atlantic waves and reveal all the complexities of humans' historical relationships with oceans. This is supported in the principle that the living, changing sea is an important factor in any oceanic history (Jones 2013).

Large marine mega fauna (marine mammals – cetaceans, seals and sirenians -, sea turtles, and large fish), although being animals living in an intimidating environment for humans, are big, most of them need to come to surface to breathe or to land to breed, and almost all show conspicuous aerial behaviors (e.g. whales breaching; dolphins' porpoising; dolphinfish feeding; sharks or manta ray jumping). Taken together, they are historically subjects of interest and their existence raised questions and issues throughout different cultures around the world. Some are present to some extent in modern fishing reports, but for the large majority their products did not appear as systematic import/export listings, nor were they explicitly registered in trade records. They are somehow ethereal animals, and left, as we came to comprehend, few material traces over time. However, these animals were also object of numerous written records and discussions on their geographic presence, their use in several places and cultures, and their ecological and economic importance overtime. And from our work on this research field, we believe that most of these records still remain unseen.

To gather information on these species and the changes of human perceptions towards them, and to frame it into the current historiography, is essential to go through different types of sources, data and material. These can range from medieval to early modern written sources, iconography and cartography, modern fishing and import/export statistics, journals and newspaper reports, articles and naturalists' records, to contemporary oral history and conservation movements/measures (see chapter by Poulsen, this volume). All this information needs to be integrated into models of analysis to answer problems and scientific questions (changing patterns of activities, uses and perceptions). The historical timeframe ranging from early modern to contemporary times is quite large making it difficult to analyze and interpret different types of data. If we consider the past few centuries, data will most certainly be very scattered and patchy and for each time period, and each region, its economic and cultural contexts need to be kept in mind. This may allow for temporal comparisons as "Then" versus "Now", and may provide valuable insights into past and recent changes, as long as the historical context is carefully considered (Lotze and McClenachan 2013). Historical records can provide information on past occurrence, distribution, and abundance of a certain species, as well as on impacts of human activities as they were being used as food, fuel, for clothes and to other purposes (Lotze and McClenachan 2013).

Here, we aim to study over time trajectories and drivers of past and recent changes in marine populations and ecosystems and in societies. Case-studies were chosen based on the identification of a historical research question in relation to a present-day societal need/response/change, and the analysis is supported on the

tracing of human activities, or uses and perceptions left on the historical records. As discussed earlier, several species of large marine animals became commodities in the early modern period and they offer examples of the natural wonders reaching Europe from the newly discovered and explored Atlantic regions and are subject of intense exploitation and use since the early sixteenth century (Costa 2009). Simultaneously, they are presently considered charismatic megafauna and flagship species for the conservation of marine ecosystems and populations.

Catching Sea Turtles: From Food Items to Conservation Icons

Sea turtles (Family Cheloniidae and Dermochelyidae) live in tropical and subtropical waters of all oceans. They are migratory marine reptiles that undergo long journeys between feeding areas and the beaches were they nest. Depending on the species (seven species of sea turtles still exist today), the breeding period varies and when females come to the beaches to lay their eggs is when encounters between them and humans usually occur. Sea turtles have been traditionally considered a very valuable marine resource and captures have occurred throughout their range. Presently all seven species are highly endangered and they face major threat from depletion (McCauley et al. 2015).

Historically, they have been hunted in their breeding beaches, mostly for their meat, eggs, and shells. They have also been used as traditional medicine in several parts of the world (Loureiro and Torrão 2008). Moreover, they have long fascinated people and have figured prominently in the mythology and folklore of many cultures. For instance, in the Miskito Cays off the eastern coast of Nicaragua, the story of a form of a "Turtle Mother," still lingers. Unfortunately, the spiritual significance of sea turtles has not saved them from being exploited for both food and for profit. Millions of sea turtles once roamed the earth's oceans, but now only a fraction remain (more about the biology and conservation of sea turtles can be found in http://www.conserveturtles.org).

In the Cape Verde Islands, the history of the relation between humans and sea turtles goes far back to the European discovery and settling on the archipelago and the ways of perceiving and using the animal results from the mixture of people that inhabited the islands. As a consequence of the cultural heterogeneity of communities living in the islands, sea turtles were perceived in a multiplicity of ways. Here, sea turtles were used as food or as an ingredient for traditional medicine, as well as to produce artifacts (Loureiro and Torrão 2008):

> *We also captured a quite large sea turtle that we ate and was very tasteful. Lepers recover from their illness eating turtle meat, and also passing turtle blood all over the body, and cooking all the meals with its fat, and after two years they are completely healed* (…). *These sea turtles are of considerable size, and with their shells it is possible to make a good shield for protection during a combat* (…).

Since the late twentieth century, in the Cape Verde Islands the sustainable use of marine resources and conservation of endangered species is a new concern. As a result of such new ways of perceiving the marine natural environments, new laws were introduced in order to invert the tendency of a predatory hunting of sea turtles for the consumption of their meat and eggs towards a more sustainable approach. So, the multi-secular way of doing things is being replaced by a new prevailing current of opinions and behaviours. Conservation is now overcoming old practices. Once and again, the same Europeans (Spanish, Portuguese, Italians and other) that introduced continuous exploitation and consumption are the ones starting current conservation movements. However, exchange of ideas and attitudes with the Cape Verdeans is being assured (Loureiro and Torrão 2008), and both national and international conservation actions are ongoing.

São Tomé and Príncipe is also a paradigmatic case-study for changes in perception and practices related to sea turtles. Here, as in many other places, a recent change from a long history of eating and using sea turtles to present-day more environmental and conservation oriented attitudes is taking place. During the Portuguese expansion of the fifteenth century along the West African shores, several observations of sea turtles were reported. Sea turtles were an important protein source for the sailors and they could also be an indication of an approximate geographical position or of land proximity. For the region beyond the Cape Bojador (Zurara 1989 [1453]):

> «*And already inside the bays they have seen an island which is outer than the others, however small and sandy, where they launched their skiffs out to see if they could find something of what they sought. The true is that the Moors not long have been there as it seemed from the nets and fishing gears that were found, and especially for a large group of turtles that should be 150. And because all of those who read this story may not know this fish, do learn that turtles are tortoises of the sea, whose shells are such as shields* (…) *And even if in those islands there are very many good fish, the Moors have this one as the most special.*»

From several Atlantic regions, descriptions and observations of sea turtles reached Europe, but the intention beneath early human interest in these animals was an economic and predatory one. They were valuable resources for people from all parts of the Atlantic and soon become a common interest and a contact point to different human cultures spread out over this oceanic basin.

In fact, also in São Tomé and Príncipe, and until very recently, sea turtles kept on being an important source of animal protein with relevance to the local economy. Their meat was eaten as well as their eggs, and it was sold in fish markets. Shells were also used to produce handicraft and artisanal jewelry that during all the twentieth century were highly priced by local people and highly requested by Europeans living or travelling to this region. Recently, a drastic change occurred due to international and national efforts towards the conservation of sea turtles coming to nest in the archipelago's sandy beaches. Local campaigns focusing on environmental education, ecological tourism and sustainable management of marine resources started to be conducted in the 2000s and now are already a common place. Local NGOs, such as MARAPA (more information on the website http://www.marapa.org), were able to change local mentalities, public perceptions and practices regard-

Fig. 1 A public list of captured sea turtles in the island of São Tomé (São Tomé and Príncipe), showing location of captures, species and numbers. This postcard also alert to the importance of their conservation (Source: MARAPA)

Fig. 2 Photograph of Hipólito Lima, a former turtle hunter and presently a sea turtles' pro-conservationist and a local educator (2014) (Source: MARAPA)

ing sea turtles. For the last couple of years, they have regularly published lists of sea turtle captures (numbers and photographs) (Fig. 1) alerting to the importance of their conservation and correct management. As a consequence of local efforts, in 2015, a law for sea turtle protection (forbidding their capture and commerce, and criminalizing the capture and consumption of eggs) was passed by the São Tomé and Príncipe Government. Former sea turtles hunters are now the advocates for their conservation (Fig. 2) and structured programs of surveillance of furtive hunters, education for children and fishing communities, nest building and protection, and turtle release to the sea are currently taking place. Ecotourism practices are also currently an important source of income. All these campaigns are public and with a strong national and international focus (Fig. 3) and result from the engaging of different stakeholders, from the artisanal fishers to the foreign tourists.

Similar situations occur all over the world. For instance, in Brazil since 1980 several sea turtle protection mechanisms were implemented and are presently cases of success in sea turtles' conservation (for more information on the Brazilian and the Portuguese sea turtles' conservation programs check the websites http://www.projetotamar.org.br and http://tartarugasmarinhas.pt). The first so-called conservation manifest regarding sustainable captures of sea turtles is from the eighteenth century Brazil. Here, Alexandre Rodrigues Ferreira, wrote about the indiscriminate captures of aquatic animals (fish, manatees, and sea turtles) using the term "predatory fishing" (Pádua 2002). He considered that the unregulated exploitation of turtles was a relevant issue (Ferreira 1972):

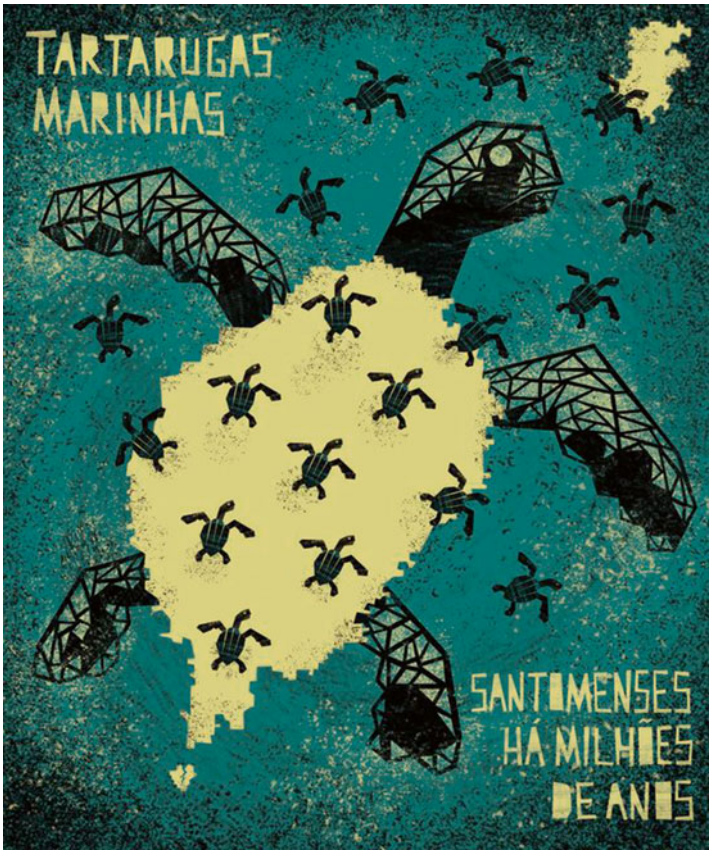

Fig. 3 An illustration pro-conservation of local sea turtles in a 2014 national contest for awareness rising in São Tomé and Príncipe, organized by a local NGO (Source: MARAPA)

> «"*This amphibian so useful to the* [*Portuguese*] *State has not yet received the care or measures that are necessary to avoid the abuses that are practiced against it. A turtle to reach its proper growth takes some years. Countless are wasted every year due to the absolute will of the Indians*; *all nests are discovered*, *are trodden in rows and almost all little turtles are eaten without need*, *and this all together influences their rarity in the course of time* (…)».

But his main concern was guaranteeing the future continuity of such an important economic activity and not moving towards the prohibition of its capture. Therefore, Ferreira's views did not work to the environmental protection but rather to the protection of State economic interest (Pádua 2002). This approach is common throughout modern history as a management tool for species with high economic values; a well known example is the establishment of the International Whaling Commission in 1946 for the conservation of whales stocks and the management of whaling (Donovan 2009).

Currently all sea turtle species are threatened and, as a result, most worldwide human cultures advocate for their conservation. They are a flagship species for the marine environment and conservation efforts are being pulled all over their geographical range. They are still at risk due to defaunation, exploitation of other marine resources where they can be a bycatch, such as in trawl nets, or due to the pollution of the oceans with plastics. However, in several African countries (e.g. Guinea Bissau) their capture is still a traditional activity and conservation efforts may still take long to be effective. Public education, participation and engaging seem to be the way to overcome current conservation difficulties and work towards global protection of sea turtles.

Magical Manatees: From History to Local Knowledge

Marine defaunation, or human-caused animal loss in the oceans, emerged only hundreds of years ago contrary to terrestrial depletion which has been occurring far longer (McCauley et al. 2015). Still today the loss of terrestrial species is far more severe that marine ones. However, if we consider marine species that have terrestrial contact, such as sea turtles (as discussed previously), sea otters, sea lions and seals, and seabirds and shorebirds, the number is much higher than in exclusively aquatic species (McCauley et al. 2015). This is also the case with sirenians (manatees and dugongs) (e.g. Romero et al. 2014).

Ongoing research (e.g. Brito and Sousa 2011; Brito 2012) on the historical importance of marine animals to early modern societies has resulted, so far, in the compilation of 35 written sources for sirenians. These refer to the historical presence and descriptions range from the fifteenth to the eighteenth century both for the Atlantic and Indian Ocean. In the case of the three species of manatees, the extant Atlantic living sirenians, historical sources show their current distribution as severely constricted in Brazil (Fig. 4) and fragmented in West Africa (Silva 2001). In the both sides of the Atlantic, manatees are listed as Vulnerable by the IUCN Red List of Threatened Species.

In America, two species of manatees occur and they range from the north of Florida to the northeast of Brazil, including the great Amazon basin. The first known reference from Brazil, where both the West Indies and the Amazonian manatee can live, is from Father José de Anchieta in the sixteenth century (Anchieta 1946) who refers to this animal when writing about the "*Province of Brazil*":

> «*In the rivers that flow into the sea there are manatees that weight 20 to 30 arrobas. Inside the brain of these a most medicinal stone for those who have stone pain can be found and the flesh is priceless, it can be cooked with sprouts and taste like beef; with spices, it taste like sheep and also pig and it is made from it a very good slaughter.*»

In West Africa, manatees presently occur from southern Mauritania to the Kwanza River in Angola (Barlow 2002), and historically they were very abundant in the Congo River (Cavazzi 1965 [1687]):

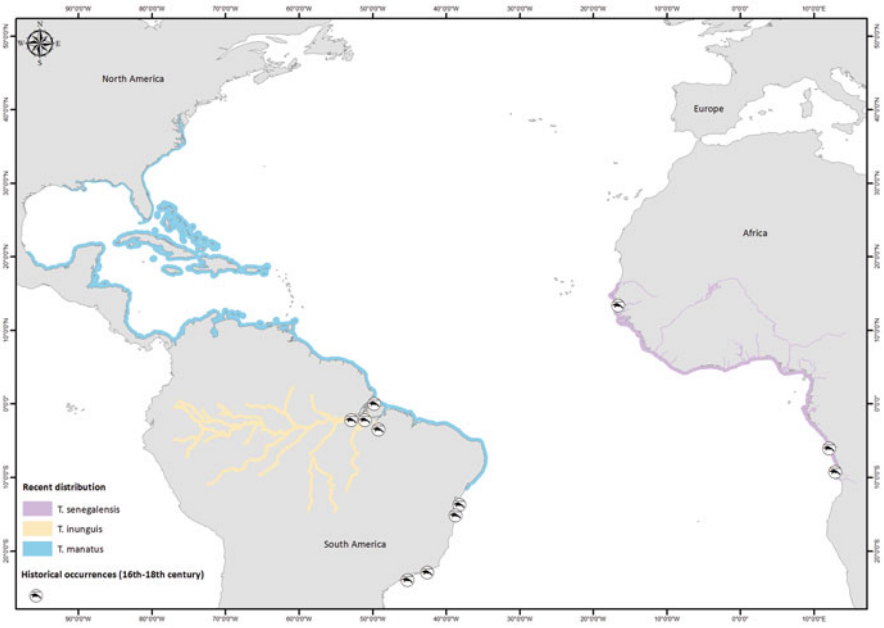

Fig. 4 Current geographic distribution of the three species of manatees (IUCN shapefile) showing historical observations in the Southern Atlantic with an indication of an approximate geographical position (n = 11)

> «(…) *there is one that the Europeans call women-fish and the indigenous call* ngulu-a-maza [*literally in* kikonco, *water-pig*], *beautiful in name but horrendous in form*. (…) *The teeth are like the dog*; *the fins*, *like arms*, *reach half the body*, *finishing with five cartilaginous fingers and misdeeds. The tail has more than 3 spans*, *and the breasts*, *where I suppose the name comes*, *seems like those of a women*. (…) *Both its meat is tasty to the palate as it is harmful to the stomach. The fisherman*, *to catch it*, *dig holes in the banks of a river*, *and the fish*, *deceived*, *goes into them. Then*, *taking off the water*, [*they*] *easily catch it*, *because it is naturally lazy and slow* (…)».

Manatees have historically been perceived as an easy and valuable resource as they provided a different food sources for sailors, explorers and pirates roaming Atlantic waters (e.g. Roberts 2007; Romero et al. 2014). As mentioned above, also across the Atlantic (as in Brazil) parts of manatees (such as a "brain stone") were valued and used for their medicinal or magical properties, something that was reported as early as the sixteenth century (Anchieta 1946). Still today in West Africa, some parts of the manatee (such as the heart) are used in ritual ceremonies and are an important natural element for traditional communities. In these regions, the hunt of the manatee is also a tradition passed from the father to the son Morais et al. (2006).

Manatees have been hunted severely throughout their range and the only mention of concern about its disappearance comes (as for the sea turtles) from Alexandre Rodrigues Ferreira in eighteenth century Brazil (Ferreira 1972; Pádua 2002). He

stresses that all the animals are harpooned, with no distinction of size or age, even the pregnant females, and states that this is the reason why in some lakes the numbers of animals have decreased.

Despite the increasing conservations measures until the late last century, and its conservation status, West African, West Indian and Amazonian manatees are still being captured for consumption throughout their distribution areas. This takes place in South America (such as in Brazil, Chile, Colombia, Ecuador, French Guiana, Peru, Suriname and Venezuela) and in West Africa (such as in Benin, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo, Angola, Cameroon, Chad, Democratic Republic of the Congo, Congo, Equatorial Guinea and Gabon) (Robards and Reeves 2011). In these countries manatees have been reported as being consumed in the period from 1970 to 2009. Some of these countries, besides hunting and consuming marine mammals, exchange their products for consumption in other countries, showing that external markets add incentives to those captures beyond the nutritional needs of the catchers. For instance, in Africa, manatees' meat has been illegally transported and sold from Chad to Cameroon (Robards and Reeves 2011).

In recent times, several local NGO and other manatee supporters worked to replace ignorance and negative impressions of manatees with knowledge and sympathy. In some parts of the world, such as in Florida, these efforts appeared to pay off as the manatee's image underwent a transformation; perceptions of the animal shifted dramatically in a matter of just two decades (Goedeke 2004). But, as seen before, this is not so the case in African countries and some parts of Brazil. Early modern to recent literature published about manatees often described them as monstrous animals, ugly and grotesque. This type of description perpetuated over time does not inspire the kind of imagery necessary to elicit support based on aesthetics (Goedeke 2004) and it needs to be changed previous to conservation measures can be applied. However, manatees have two qualities that can translate into a good deal of public support: rarity and unique ecological role. In Florida, the manatee's endangered status alarmed those who supported it and made the need for protection indisputable. The species' ecological uniqueness and importance as an umbrella species were united, which meant that were the manatee protected then a plethora of other species and systems would be protected by default. Finally, the manatee also came to be defined as an important indicator species (Goedeke 2004). These aspects should also be worked with local communities in other parts of the world.

Both in South America and Africa, manatees face serious problems in recovering to their pristine (or early modern) populations. They are still being captured by local people that use them as a food and medicinal resource (Fig. 5), from the effect of by-catch in other traditional fishing activities (e.g. Silva 2001) or habitat destruction due to anthropogenic pressures in marine and riverine habitats. Local and international efforts have been developed since the late twentieth century in order to disseminate the importance of manatees in the balance of the aquatic ecosystems. For instances, in Brazil, a National Action Plan for the Conservation of Sirenians is being set since 2011 (Luna et al. 2011) and presently in Angola, the so-called Fundação Kissama is developing educational campaigns for the general public

Fig. 5 A manatee captured in a shore trap by the local ethnic group "*Fula*" in Guinea Bissau, during the twentieth century. (Source: http://senegambia.blogspot.pt/2005/03/guinus-616.html)

through the publication of books (Fig. 6). Globally, human populations have caused increased demands on natural resources and the endangerment of numerous species, particularly on parts of the world with limited resources. In such cases, attitudes and perceptions of resident human populations regarding natural resources are often the deciding factor in the success or failure of local species conservation efforts (White et al. 2011) and these must to be taken into consideration.

Discussion

The creation of a global system of transport and communication that begun in the early modern period, meant that human beings travelled long distances more readily than at any time in human history (Richards 2003). Verbal and written information passed between the world's regions and within regions at new levels of accuracy and quantity, and identifying, naming, and classifying of the world's landforms, seascapes, climates, minerals, human groups, animals, and plants proceeded at a dizzying pace (Thomas 1983; Richards 2003; Costa 2009). Moreover, the Atlantic as a unit started to emerge in this period and became itself a subject of inquiry and multiplicity. It allowed connecting people and regions to develop commerce networks and to create a new sense of a Global World and a new perception of Nature and its elements as a whole. In fact, the fifteenth century heralded the onset of Europe's global ocean exploration (Roberts 2007) and the first contacts with new and exotic marine animals.

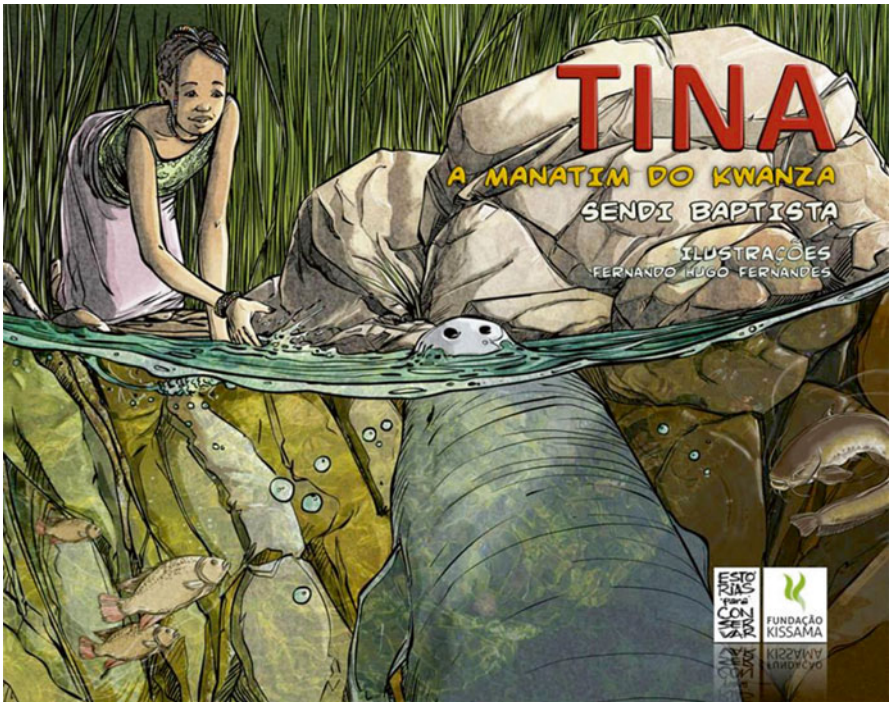

Fig. 6 Illustration by Fernando Hugo Fernandes of a manatee of Kwanza River in a book by Sendi Batista ("Estórias para conservar" collection by Fundação Kissama) (Source: https://www.facebook.com/fundacao.kissama)

Exploitation of several marine species started in this period, but for centuries only with effects in local populations. Marine resources were historically harvested, however, until the advent of industrialization, rapid depletion and ecological tipping effects were hindered by lack of technological advances. Simultaneously, most new and exotic large marine animals were mainly perceived as monsters and potential dangers (Szabo 2008) and as mythical prophecies from the Christianity coming alive or even as mirrors of human notions of right and wrong (Poulsen 2002). The sea is historically associated to a multiplicity of myths (Cardoso 1998). Marine marvels, such as the animals we have been discussing, were considered not just part of nature but rather they transcend it; they were both monstrous and mundane and many times were equated with supernatural creatures that one should fear (Szabo 2008). The sea, the place of origin and habitat of these animals, was itself a place to fear and even an instrument of punishment both for people and the animals (Cardoso 1998; Poulsen 2002).

Historically, people's perceptions and practices towards these marine species – whales, sharks, sea lions, sea turtles or manatees – were built on negative perceptions and predatory contacts (Thomas 1983). Both fear and economic value contributed to the decimation or near decimation of species. Overall, different types

of exposure to these animals contributed to the construction of early modern perceptions (e.g. Poulsen 2002; Szabo 2008). But in some cases, an historical evolution and some changes of those perceptions took place.

It appears that species can be socially and culturally reinvented, improving their chances of protection (Goedeke 2004) and allowing for a true sea-change for some marine animals and populations. For instance, modern perceptions of whales while long separated from the past monstrous whale traditions, retain some of the ancient fascination with these great creatures (Szabo 2008). Today people show genuine concern for the conservation of some species of marine fauna. This was the case with sea turtles where perceptions about the importance of its presence in marine ecosystems changed along with a positive valuation. The manatee benefited (or is starting to benefit) from just such a process, going from ugly monster to charismatic, gentle giant worthy of being saved (Goedeke 2004). Several marine animals warrant a multi-faceted history of their exploitation, economic value, cultural significance, scientific novelty, and changing place in the ecosystems. As seen above, several of these organisms were, at any given time, tightly tied to communities of local producers, which, in turn, were affected by changing markets, evolving technologies, scientific studies, regulations regarding access, and contradictory opinions regarding sustainability.

In addition to the case studies presented, other examples need attention, in particular in world regions were little attention has been given either to historical sources and present day conservation such as Africa and South America (for a review see Schwerdtner Máñez et al. 2014). One example may be related to the recent change from whale hunting to whale watching in some regions, and how this process evolved locally and globally. Future research should focus on drivers, patterns and moments of change, and differences and similarities between distinct geographical areas and cultures. As said before some species have become charismatic and flagship species for the marine environment conservation and its sustainable use. But others did not. For instance, the historical and cultural reasons for the continuous captures and consumption of tuna in different geographies and cultures leading to the overexploitation of several commercial species over time are also worthwhile exploring (see Christensen, this volume). This would relate with the ecological impacts on marine populations and ecosystems, the social and cultural impacts and influences in local maritime societies and global trade markets in the past and the present day.

Marine mega fauna exploitation and use, and their products' trade, may work as an analytical framework of investigation and comparison for the Atlantic which, in turn, may emerge as a coherent unit of past, present and future scientific understanding. Considering detailed case studies from different oceans and time periods may allow us to examine important shared processes of social and environmental change over the long term of several centuries. Even if some of the case studies may take a kaleidoscopic effect, each of them has connections and juxtaposed details, colors and shapes that will form a pattern (Richards 2003).

The puzzle of the Atlantic Ocean (and particularly the South Atlantic Ocean) is far to be completed but as research on this topic develops, more issues and questions

will arise as well as new questions. It is important to understand if there is an Atlantic or oceanic pattern, or rather local comparable patterns. Also, what sorts of marine environmental impacts occurred and what shared historical drivers and processes might the case studies demonstrate. The analysis of past processes may add to understanding of the history of interactions between human culture and non-human nature in the early modern and modern world as it is ever more relevant to present day actions and to future practices.

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