

What news from the sea? Assessing the presence of marine issues in the Portuguese quality press

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ABSTRACT

The current study aimed at characterizing the marine news in a Portuguese quality newspaper between October 2002 and December 2010. The search for keywords related to the marine environment resulted in the collection of 1309 news items, with a mean number of 13.22 news per month. These modest values seem to be related to the low public interest and knowledge on environmental and science themes shown in several national surveys. Nevertheless, there were two peaks in the number of news corresponding to the oil spills of the tanker Prestige in Spain and the rig Deepwater Horizon in the USA. The most common themes on the studied news were pollution, marine species/habitats and fisheries, while others such as coastal planning or marine science research were less relevant. Additionally, it was found that news about marine sciences frequently used only a neutral tone (78%), with the occasional use of a positive (12%) and or a negative tone (10%).

1. Introduction

Media coverage about environmental issues can promote a higher engagement of the public in decision-making processes, justify investments in environmental management and research or simply stimulate more interest in these themes (Fischhoff, 2013; Greenwood and Riordan, 2001; Östman, 2014). This connection to the public has motivated researchers to examine the role of the media in communicating about environmental issues (e.g. Atinmo and Jimba, 1998; Djerf-Pierre, 2013; Jonsson, 2011). For example, Djerf-Pierre (2013) focused on the environmental news in a Swedish public TV channel between 1961 and 2010. This researcher noticed that environmental disasters such as oil spills (e.g. Deepwater Horizon in the USA) had a high impact on the news, and were followed by stories about the cleanup operations and related risks and incidents.

Other authors have dedicated their efforts to specific themes such as climate change (e.g. Boykoff and Boykoff, 2004, 2007; Brossard et al., 2004; Carvalho, 2007; Sampei and Aoyagi-Usui, 2009). For instance, Sampei and Aoyagi-Usui (2009) characterized news about climate change in three newspapers from Japan between 1998 and 2007. Results showed a growth in the number of news along time, with a sharp increase between January and July 2007 due to international events such as the publication of the IPCC report (2007) and the opening of the

documentary “An inconvenient truth” by the U.S. Politician Al Gore. These efforts were also extended to Portugal (e.g. Carvalho and Pereira, 2008; Horta et al., 2017). For instance, the study of news coverage in three national newspapers between 2007 and 2014 showed that news about climate change were usually focused on international political events (Horta et al., 2017).

There is also research concerning marine issues on the news. In a recent study done in Chile, it was found a low presence of marine news between 2011 and 2013 in four TV channels, a national newspaper, and searches on the internet (Thompson et al., 2018). In the analyzed newspaper, marine news about Chile represented about 10 news items per month and 0.6% of the total number of news, and often concerned the national production of aquaculture (Thompson et al., 2018). Another example is the multinational approach of Anderson and Marhadour (2007), which looked at differences of reporting about the Prestige Oil Spill (North Spain) between Spanish, French and U.K. newspapers. These researchers found that the Spanish coverage was much more intense than the other two mentioned countries due to the higher importance given to events closer to this country. A third example concerns a study of the national and local press about the local protests on the restricting recreational fishing laws in a Natura 2000 site, in which it was found that these resulted in less stringent laws (Castro et al., 2018).

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Also, a group of scientists expressed their concern that news about marine research often exaggerated environmental threats (Duarte et al., 2015). Moreover, it was argued that this prevalent pessimistic view about the state of the oceans often did not have enough scientific knowledge to support it. However, another group of scientists contested this, for example, due to the lack of evidence of such pessimism (Jacquet et al., 2015). More recently, a study reviewed 169 news on marine research in the U.S. press between 2001 and 2015 with the main purpose of assessing the tone used in these news. Results showed that a neutral tone was the most common, and that an optimistic tone was more frequent than a pessimistic tone (Johns and Jacquet, 2018). The study of the tone of news was also extended to controversial issues related to aquaculture (e.g. Froehlich et al., 2017; Olsen and Osmundson, 2017). For example, Froehlich et al. (2017) reviewed 1596 newspaper headlines concerning aquaculture which were published between 1984 and 2015 in developed and developing countries. Again, the authors found a generally positive tone for the press coverage on the theme, which appears to be more negative in the case of marine aquaculture.

The current article has the main goal of characterizing the marine and coastal news in the Portuguese quality newspaper “Público” between October 2002 and December 2010. More specifically, it is aimed to a) assess attention according to the number of news items on marine issues; b) frame news concerning the main themes covered; c) study the tone of news about the marine sciences. The discussion of results includes a comparison with the available information about the national public interest on marine issues. This study will hopefully contribute to this fairly new theme in the literature on the role of the media in communicating about marine issues.

2. Portugal and its connection with the sea

Several authors mention that the long historical relation of Portugal with the sea became weaker after the reestablishment of the democratic regime in 1974, the loss of its African territories and its integration in the European Union in 1986 (e.g. Pitta e Cunha, 2011; Ruivo, 1999). The World Exhibition Expo ‘98 that took place in Lisbon (Portugal) between 22 May and 30 September 1998 aimed to revive this connection and was considered by both marine scientists and science communicators as a milestone for communication about the sea at the national level (Pinto and Costa, 2018). Indeed, this large exhibition entitled “Oceans, a heritage for the future” was visited by about 10 million people, was able to capture national and international media attention for several months and implied the creation of the Lisbon Oceanarium (see Pinto, 2018 for details).

Other important events concerning the public communication about the sea after Expo ‘98 include the construction of the aquarium Sealife in Porto (2009), the preparation and subsequent work on the Portuguese proposal for the extension of the continental shelf to the United Nations (2009) and the establishment of the national NGOs “Pong-Pesca” (2009). It should also be noted that marine science has been considered one of the areas with high scientific publishing in Portugal, reaching the top 20 of publishing countries in this field between 2005/2009 (18th place) and 2010/2014 (17th place) (UNESCO, 2017).

Moreover, communication about marine issues during the study period included two major oil spills. The first happened when the oil tanker Prestige sank in the coast of Galiza (NW Spain) on the 19th of November 2002 with approximately 77 000 tons of heavy crude oil (Anderson and Marhadour, 2007). This affected the coasts of northern Spain and the French Atlantic, and for several weeks there was also the threat that this spill could reach Portugal. The second occurred after an explosion on the 22nd of April 2010 on the Deepwater Horizon oil rig off the coast of Louisiana in the Gulf of Mexico (USA). After months of difficulties in sealing this well, which lasted until September that year, there were nearly 800 million liters of crude oil spilled and about 1770 km of shoreline polluted (Beyer et al., 2016).

3. The Portuguese press and the public awareness and interest in environment and science

The 1980s are considered a turning point in which news about science and the environment became more common in the national quality and popular newspapers (Fonseca, 2017; Granado and Malheiros, 2015). A simple definition of quality newspapers is that they aim to provide comprehensive coverage and analysis of international and national news of the day together with informed comment on economic, political and social issues, whereas popular newspapers deal with the main stories in their fashion, but its primary content is entertainment and sensationalism (adapted from Entwistle and Hancock-Beaulieu, 1992). Despite some instability in the science and environment supplements and sections in the last four decades, the majority of the national press today publishes regularly news pieces on these areas (Granado and Malheiros, 2015).

In what concerns the public knowledge and interest in Portugal about the environment and science, the existing information around the study period suggests that these are fairly low. For example, a national questionnaire in the year 2000 involving a sample of 1844 respondents revealed that only 38% of them considered having enough information about the environment (Almeida et al., 2004). Moreover, in two Eurobarometer reports, a similar percentage of 39% of respondents considered themselves informed about environmental issues- in both cases, one of the lowest values at the European level (European Commission, 2005a, 2008).

Another survey in 2000 about the national consumption of newspaper articles and popular science magazines also points to a reduced interest in science news when compared with other European countries (Freitas and Ávila, 2002). This is reinforced by three Eurobarometer reports about the relation of Europeans with science that point in the same direction (European Commission, 2001, 2005a, 2010). For example, 35% of the Portuguese interviewees reported in 2010 that they were not interested in scientific discoveries and technological developments (the EU26 mean value was 20%). Additionally, a study on television newscasts in the four Portuguese public TV channels showed that in 2011 only 0.8% of the news was about science and technology (ERC, 2012).

Nevertheless, other surveys mention a specific concern about the sea. For instance, in two Eurobarometer surveys, the Portuguese considered water pollution (seas, rivers, lakes and underground sources) as the biggest (European Commission, 2005b) and third most important environmental threat (European Commission, 2008). In another study about attitudes towards marine and coastal environments carried out in 2010, the 983 respondents from Portugal argued that pollution from the industry and litter were the two main threats to the marine environment (Potts et al., 2016).

4. Methods

This study reviewed news published in the daily quality newspaper “Público” between October 2002 and December 2010. Since previous researchers considered large oil spills to be important, the choice of this time frame aimed to include the Prestige and the Deepwater Horizon oil spills (Anderson and Marhadour, 2007; Djerf-Pierre, 2013; Potts et al., 2016). This is a period that intends to represent the recent past after Expo ‘98- as mentioned above, an important mark in the communication of marine issues in Portugal- in which digital news and editions of daily newspapers at the national level were already common (Bastos, 2009).

The newspaper “Público” was chosen because it has been considered one of the most influential daily publications in science and the environment in Portugal since its creation in 1990 (Granado and Malheiros, 2015). Moreover, it was decided to focus the analysis in this publication, since quality newspapers usually set the national news agenda (Nisbet and Lewestein, 2002; Boykoff, 2009). During the studied period, the mean number of copies of this newspaper was about 63 500 per day

(including digital copies), which were distributed across the country. This is the daily quality newspaper with the highest number of copies and the second-highest number of copies in daily newspapers overall (APCT, 2019). Moreover, these news from the printed/digital editions were usually published online on the site of the newspaper.

The corpus of articles were news stories focusing on marine and coastal issues, excluding sections such as cartoons, meteorology, obituaries, advertisements, job offers, letters to the editor, editorial, etc. Using the software program Adobe Acrobat Reader DC (Adobe Systems Incorporated, version 2019), the digital version of the newspaper (excluding supplements) was searched for the following keywords (originally in Portuguese): acidification, aquaculture, aquatic, beach, climate change, coast, coastal, codfish, coral bleaching, current, depth, dolphin, erosion, fish, fishers, fishery, fishing, hake, invertebrate, mackerel, marine, ocean, ocean warming, oceanic, overfishing, plankton, plastics, pollution, sardine, sea, sea level, seaweed, spill, tide, whale. This choice aimed at including common words related to the marine environment, as well as marine species and threats.

The news item was the unit of analysis. We examined media attention to marine issues by measuring the number of news per month, the number of news highlighted on the front page and the total number of news. The size of the news was also estimated according to five different categories ($\leq 1/4$ page; $> 1/4-1/2$ page; $> 1/2-1$ page; $> 1-2$ pages; > 2 pages), which was later compared with the total size of the newspaper.

News were also characterized by the first author according to its main themes: 1) pollution; 2) marine species/habitats; 3) fisheries; 4) coastal planning; 5) marine science research; 6) marine policy; 7) marine environmental and science communication; 8) climate change; 9) aquaculture. These categories were based on two previous studies (Johns and Jacquet, 2018; Thompson et al., 2018), to which it was added other categories. Since several news items were considered to have two main themes, they counted as one hit for each of the categories.

Also, the Wilcoxon signed-rank test was used to compare the number of news about the marine environment per week during the six weeks before the Prestige oil spill with the six weeks after that event. A similar procedure was done in the case of the Deepwater Horizon oil spill. The Friedman test was used to assess if there were annual and seasonal variations in the number of news per theme besides the oil spills. In these latter tests, the years in which these two major environmental disasters were on the news (2002, 2003 and 2010) were excluded from the dataset. All statistical analyses were done using the software program SPSS Statistics (version 25, IBM).

The tone of the news items on marine research was also assessed by the first author, according to three different categories: negative, positive and neutral. Adapting from previous studies, the presence of negative tone was defined as using inflated language around doom, death or lack of renewal, using words such as “catastrophe”, “chaos” or “destruction”. The presence of positive tone was characterized by optimistic expectations, progress and a sense of wonder, using words such as “discovery”, “spectacular” and “richness”. When neither of the above applied, it was considered a neutral tone (Johns and Jacquet, 2018; Froehlich et al., 2017; Risbey, 2008).

5. Results

5.1. Attention to marine issues

Between October 2002 and December 2010, the newspaper “Público” published a total of 1309 news related to marine issues, which corresponds to an average of 13.22 news per month. Considering the size and the number of news items versus the total number of printed pages in this newspaper, this corresponds to approximately 0.35% of the space available in this periodic publication.

The variation in the number of news items per month revealed two main peaks (see Fig. 1). The first happened in December 2002 due to the

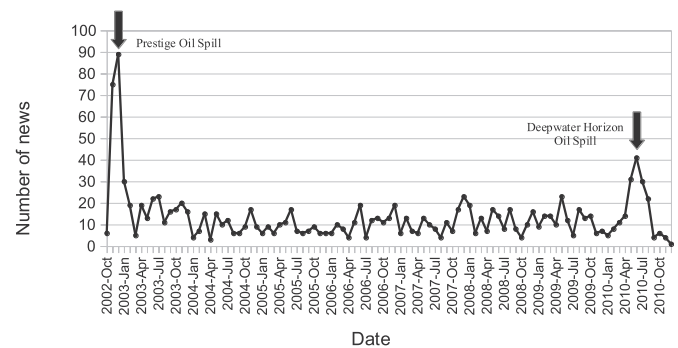


Fig. 1. Variation of the number of news per month on marine issues in the newspaper “Público” between October 2002 and December 2010.

reporting of the Prestige oil spill. Although this press coverage continued in the following months, the highest number of news happened during and shortly after this event. The second peak refers to June 2010 and is related to the Deepwater Horizon oil spill. The number of news items per month about it was lower than in the case of the Prestige, but media coverage extended for a longer period in line with the duration of the event. Considering the number of news highlighted on the first page (see Fig. 2), it is interesting to notice very low values ($n = 169$; 12.91% of news). Nevertheless, there is a single peak during the Prestige oil spill, which is also indicative of higher attention given to this event.

In total, there were 244 news related directly to the disaster of the Prestige and 74 news about the Deepwater Horizon. Overall, this represented about 24.29% of all the news during the study period. Moreover, during these two peaks, it was noted higher attention given to other issues concerning the risks of sea pollution (e.g. problems with oil tankers). Also, the analyses using the Wilcoxon signed-rank test confirmed that the differences in the number of news per week in the six weeks before and after each of the two oil spills were statistically significant (in both cases, $Z = -2.207$; $p = 0.027$).

5.2. Main themes covered

As expected, the most usual theme was pollution (34.42%; see Table 1). Besides the oil spills mentioned above, related issues such as marine transportation of pollutants and actions of anti-pollution were also news. Other recurrent subjects, usually on the pages of the newspaper between the late Spring and Summer, was the eco-labeling of Portuguese beaches (which awards a “blue flag” if they are clean, safe and accessible to all; Foundation for Environmental Education, 2019) as well as the presence of litter in the coastal areas. In these news, the main protagonists were international organizations such as the European Union, governmental organizations such as marine institutes, private businesses such as oil companies, national NGOs, local populations and

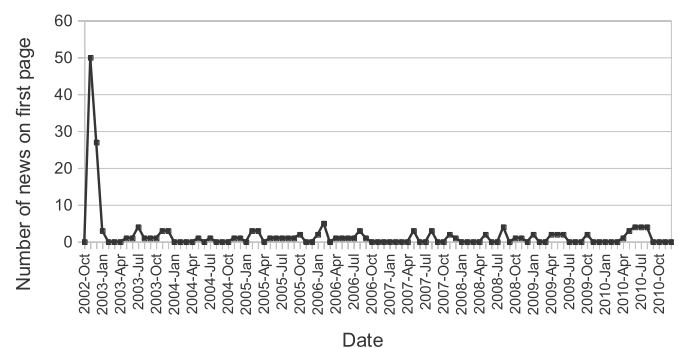


Fig. 2. Variation of the number of news per month highlighted on the first page on marine issues in the newspaper “Público” between October 2002 and December 2010.

Table 1

Main themes concerning marine issues in the newspaper “Público” (October 2002 and December 2010).

Themes	Number of hits (n = 1409)	Percentage of Articles
Pollution	485	34.42%
Marine Species/Habitats	321	22.78%
Fisheries	246	17.46%
Coastal Planning	108	7.67%
Marine Science Research	100	7.10%
Marine Policy	60	4.26%
Marine Environmental and Science Communication	33	2.34%
Climate Change	30	2.13%
Aquaculture	26	1.85%

fishers.

The second most common theme was marine species and habitats (22.78%). This included a wide spectrum of issues including the monitoring and conservation status of different species, threats to specific sites or the management of marine protected areas. Moreover, there was a particular interest in charismatic groups of animals such as cetaceans, sharks, marine birds, and turtles, with events such as stranded whales or conflicts within the “International Whaling Commission” often capturing media attention. Governmental organizations, national and international NGOs, universities and researchers were usual actors in these news.

Since fisheries is a sector with a long tradition in Portugal, with socio-economic relevance particularly in the coastal areas of the country, it is not surprising that it was also part of the news (17.46%). They included subjects such as the negotiations of fishing quotas for Portugal in the European Union and/or with other countries, changes in the national legislation, conflicts between local populations and/or fishers and governmental institutions or the national status of fish stocks.

Other issues on the news were coastal planning (7.67%), including programs promoted by municipalities and/or governmental institutions to address coastal erosion or the approval of management plans for protected areas; and marine science research (7.1%), in which the main protagonists were researchers and research institutions, focusing on issues such as the discovery of new species and habitats and, to a lesser extent, climate change. Other research themes such as biotechnology, fishing, and pollution were scarce.

Additional themes were marine policy (4.26%) including programs for international cooperation on marine issues; marine environmental and science communication (2.34%) such as new exhibitions or books, climate change (2.13%) such as the ice melting on the poles; and aquaculture (1.85%) including new national projects in this field. In the latter case, a justification for such a low presence of news may be explained by the modest size of the national aquaculture production during the studied period (FAO, 2019).

According to the Friedman test, annual variations in the number of news items per theme were not statistically significant (Chi-square = 6.013; $p = 0.305$). However, there were significant differences in the number of news per theme between the four trimesters (Chi-square = 8.791; $p = 0.032$). In total, the highest number of news was found in the second trimester and the lowest number of news was recorded in the third semester (see Table 2 for details). This decrease in the number of news in the Summer may be related to lower professional activity since this is generally a time of holidays in Portugal.

5.3. Tone of the news about marine sciences

Most of the news about research were written only in a neutral tone (78%), presenting the facts, protagonists and other details without the use of emotionally charged language. Although the other news also used neutral language, some excerpts used hyperbolic language (see Table 3).

Table 2

Number of news per themes according to trimesters (excluding 2002, 2003 and 2010).

Themes	Trimester 1	Trimester 2	Trimester 3	Trimester 4
Pollution	29	41	34	30
Marine Species/Habitats	50	75	45	55
Fisheries	32	55	30	53
Coastal Planning	30	12	24	16
Marine Science Research	21	22	18	21
Marine Policy	11	17	7	17
Marine Environmental and Science Communication	8	7	3	6
Climate Change	8	6	3	8
Aquaculture	2	6	2	9
Total	191	241	166	215

More specifically, it was noted the presence of a positive tone in 12% of news, which was usually associated with the discovery of new species, sites or habitats, as well as scientific advancements in areas such as biotechnology. In the case of the presence of negative tone, it was detected in 10% of these news, and usually concerned environmental threats such as climate change, coral bleaching, overfishing or habitat destruction.

6. Discussion

The current study helps to fill a knowledge gap about the presence of marine issues on the news. In this case, it was found a modest number of news in the studied newspaper between October 2002 and December 2010. Since this periodic publication is considered a national reference for science and environment (Granado and Malheiros, 2015), it is probably one of the highest for the overall national press. Moreover, recent research mentions a similar value of about 10 news items per month on marine issues in Chile (Thompson et al., 2018). However, considering that information about news on marine issues in other countries is missing, it is difficult to have a broader view about this subject.

As described above, there are several indicators relative to the studied period that suggest a low level of public interest and knowledge in Portugal on environmental and science themes. Although marine issues are only a part of it, there is nonetheless a good correspondence between the reduced number of news and the public interest in these types of news.

Another possible contribution to this result may be the traditionally low number of journalists which is specialized in science and environmental themes (Granado and Malheiros, 2015; Machado and Conde, 1988). For example, the journalists working regularly on science issues

Table 3

Examples of news excerpts using a positive or negative tone.

Negative tone	Positive tone
<i>To capture them, they use bottom trawls that destroy everything. When they are gone, they leave a once rich world dying (#433)</i>	<i>In the last three years, this academic army has been collecting samples of all the living forms that exist in the oceans, in the four corners of the Earth (#341)</i>
<i>It's the lowest growth rate [of corals] in the last 400 years and a disturbing sign of the precarious health of the oceans (#989)</i>	<i>The team of divers was overwhelmed by what they found in the Pacific waters (...). In what may be the epicenter of marine diversity, scientists describe an underwater world filled with visual wonders (#677)</i>
<i>It may be worse than previously thought (...). A catastrophic rise in sea level in the event of the collapse of the great ice sheet in western Antarctica ... (#998)</i>	<i>(...) the biologist Lília Santos, considers that this could be an excellent economic opportunity for the country (#991)</i>

in the Portuguese media in 2015 has been estimated in about ten professionals (Granado and Malheiros, 2015). This lack of expertise can potentially inhibit journalists from writing about themes in these domains. A third factor may lie in a reduced initiative of stakeholders in establishing contacts with journalists. A recent study involving 14 marine scientists and science communicators in Portugal suggests this may be the case, despite some improvements in the last decade (Pinto and Costa, 2018).

The framing of news showed that marine pollution was the most common theme. Again, this result is coherent with several national surveys that elected water pollution, and also marine and beach pollution, as major environmental issues (European Commission, 2005b, 2008). More specifically, the high attention to two large oil spills confirmed previous research about the environmental news in a Swedish TV public channel, in which they were one of the most important issues in the daily news (Djerf-Pierre, 2013). Other authors found that geographic proximity to the oil spills was directly related to the frequency and intensity of reporting (Anderson and Marhadour, 2007). In the present study, the Prestige oil spill had a higher number of news and highlights on the front page than the Deepwater Horizon oil spill, which may also be explained by the proximity and potential threat that the former represented to Portugal.

Another result worthwhile mentioning was the discrepancy between the high national scientific production in marine sciences (UNESCO, 2017) and the mean value of about one news item about marine sciences per month. In other words, the high scientific productivity of Portugal in this domain had little translation in the number of news items about marine sciences for the general public. Also, in a study mentioned above about the presence of marine issues in the Chilean media, marine research represented only 13% of the news, whereas marine production (fishing and aquaculture) was the main theme in 78% of the news (Thompson et al., 2018).

The majority of these news items used only a neutral tone, with a slightly higher number of news with a positive tone than a negative tone. This is similar to the results obtained by Johns and Jacquet (2018) even though these authors found a significant difference between the positive and negative tones. Therefore, the results presented here show that a pessimistic view about the health of the oceans which was advocated by Duarte et al. (2015) also does not hold in the case of the Portuguese quality press.

Our findings have implications for communication about marine issues in the media. First, there seems to be sufficient media interest in several themes to promote more communication about the sea. For example, since news about charismatic species captured some media attention, it may be possible to use them as flagships to approach broader issues such as threats to marine biodiversity.

The results also show that different protagonists in these news included scientists, NGOs or national and international government bodies. Therefore, these stakeholders could develop medium-term plans for this communication, and improve their connections with the media (Thompson et al., 2018). For example, the promotion of activities such as workshops involving journalists may promote a greater interest and knowledge of this professional group on marine issues. Other initiatives such as citizen science and community-based projects supported by these different protagonists also have the potential to generate media interest on marine issues (Martin et al., 2016; Tiago et al., 2017; Thompson et al., 2018).

It should also be acknowledged that there is a trend found in many countries including Portugal of a decrease in traditional newspaper coverage, accompanied by an expansion of online news (Bauer et al., 2012). Therefore, these online news are an increasingly important media in current and future communication. Although this is dividing the media space and thus may decrease the impact of traditional newspapers, it can also be seen as more opportunities to communicate about the sea.

Further studies on the news about the marine environment in

different media, the main themes approached, the drivers and inhibitors for the production of these news and their impact in the public perception about the sea could help to better understand the role of the media in communicating about marine issues with the general audiences.

Declaration of competing interest

The authors declare there is no conflict of interest.

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