Exploring marine environmental issues in the Mass Media: insights from television, newspaper and internet searches in Chile

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Abstract

Mass media is a useful way to inform the public about marine conservation, however studies about its effectiveness are lacking. This research explores the role of mass media in the diffusion of marine conservation information. Coverage of marine environmental issues in the mass media are assessed for Chile using a diversity of sources, namely, newspaper and broadcast television. In addition, public interest about conservation topics was assessed using Google Trends for Chile. Results show that there is a relatively low coverage of marine news in broadcast television and in newspapers. During the last decade, internet searches show the interest in marine conservation issues decreased and the only conservation related term, whose search increased over time, is sustainability. There is a tendency towards an increase in the number of newspaper publications related to economic and business issues. There seems to be no strategy from the environmental ministry or research institutions focused on developing a storyline related to marine conservation news in the mass media. Results stress the need to develop a long-term communications plan in order to strengthen diffusion of marine environmental impacts and conservation issues through mass media.

Keywords: Newspaper; Broadcast television; Google trends; Sustainability; Marine conservation

1. Introduction

Human impacts on ecosystems are so profound that the beginning of a new geological era, the Anthropocene, has been proposed (Steffen et al., 2007, 2011; Rockström et al., 2009a,b; Goudie, 2013). The Anthropocene, an era dominated by humans (Steffen et al., 2007), also impacts oceans. Studies show that no portion of the ocean is unaffected by human influence and that 41% of marine ecosystems are strongly affected by multiple anthropogenic factors (Halpern et al., 2008). Global change drivers are threatening marine ecosystems functions and ecosystem services. In order to address the sustainability challenge and achieve a “safe operating space” (Rockström et al., 2009a,b), society as a whole must internalize and provide support in addressing marine environmental impacts and solutions. Civil society could actually play an important role in pushing for policies to deal with anthropogenic drivers (Philo, 2008; Happer and Philo, 2013). In this sense, informing civil society of the problems and solutions to confront anthropogenic drivers in the oceans is becoming a key concern for scientists, NGOs and funding agencies. Adequate communication and diffusion strategies are needed to raise awareness and commitment to sustainability (Legagneux et al., 2018; Do et al., 2015).

In marine environments, communication of conservation outcomes have the potential to motivate and sustain public support for conservation by informing and fostering an intuitive appreciation for marine biodiversity (Jacobson, 2009; Sampei and Aoyagi-Usui, 2009). A valuable tool to assess how society might become informed about marine environmental issues is to explore and assess the information circulating in

communication platforms such as the mass media (Carvalho and Burgess, 2005; Perales and García, 1999). Mass media includes television, newspaper, radio and internet which reach a large number of people. These could provide information which triggers civil society's awareness about the significant anthropogenic impacts to marine ecosystems such as plastic pollution, ocean acidification, overfishing, and trigger further action by civil society (Conway et al., 2010; Daigle, 2003; Mazur, 1998). While this knowledge deficit model has its critics (Ahteensuu, 2012; Brown, 2009; Brunk, 2006; Evans and Durant, 1995), research has shown that when people get engaged about these issues, a proportion becomes curious about them and they will want to seek more information about this topic and even take environmental actions (Contractor and DeChurch, 2014; Hahn et al., 2009; Bucchi, 2008; Trench, 2008; Dickson, 2005). Outreach programs developed by universities, NGOs and research centers are important, however, keeping civil society engaged through mass media, such as newspapers, broadcast television and online information, is critical to scale consciousness. Mass media strongly influences public opinion (McCombs, 2002, 2014; Soroka, 2003) and having a well-developed marine anthropogenic impacts and conservation narrative in mass media could be the most efficient way to share and gain support for environmental policy and practice (De Semir, 2003). The way journalists use to report on marine environmental problems has big importance in the effectiveness of diffusion. Johns and Jacquet (2018) stressed the need of using an adequate language in their reports because if they are too alarmist or too positivist, people tend to believe that news about marine topics are exaggerated and do not pay attention.

Typically studies on communication of environmental issues have assessed the degree of informedness and concern regarding marine environmental impacts (Gelcich et al., 2014), the effectiveness of conservation campaigns (Gelcich et al., 2008, 2009, 2017; Bennett and Dearden, 2014; Petrosillo et al., 2007) and analysis of the discourses in environmental policy (Kusmanoff et al., 2017; Gelcich et al., 2005). The role of mass media in delivering marine environmental impact and conservation information has received less attention. Mass media can play a crucial role in informing civil society, especially in marine conservation topics, such as marine protected areas, marine biodiversity, state of the oceans, marine pollution, among others. In many cases, it is the only source of information that people access (Newman et al., 2017). Mass media is fundamental to help in the development of the public debate and facilitate changes in the conception of environmental topics at a collective level, and this can be critical to improve environmental policies (Philo, 2008; Happer and Philo, 2013; Mazur, 1998; Page and Shapiro, 1983).

Scholars have developed diverse studies to show mass media's importance in spreading environmental information, attract attention and raise awareness in civil society (Östman, 2014; Sampei and Aoyagi-Usui, 2009; Mazur, 1998; Schoenfeld et al., 1979; Downs, 1972). The media has been shown to play an active role in warning about environmental damage, lack of regulation, legislation analysis and strategies to care and protect the environment (Kushwaha, 2015). In order to achieve awareness, it is necessary that mass media has a

continuity in the transmission of environmental news because, if not, people tend to forget them regardless of whether these issues have been resolved or not (Sampei and Aoyagi-Usui, 2009; Mazur, 1998; Downs, 1972). In general, mass media are fickle when reporting important events because, in many cases, there is no relationship between outstanding environmental events and media coverage (Mazur, 1998). Usually, Journalist choose the most attractive issues to reach a high audience, as environmental issues are competing with other topics of social importance (Sampei and Aoyagi-Usui, 2009; Mazur, 1998). Marine environmental action (e.g environmental campaigns, development of marine protected areas) developed by governments, research institutions or NGOs could play crucial roles in generating the storylines needed to catch the attention of the media and stimulate a continuous number of news, generating a constant flow of marine information which could derive in increased awareness and engagement of civil society (Kitzinger and Reilly, 1997; Östman, 2014; Sampei and Aoyagi-Usui, 2009).

In addition to the role of mass media in informing the general public, the role of the internet in addressing the general public's interest in environmental issues is increasingly gaining attention (Kibirige and DePalo, 2017; Do et al., 2015; Postmes and Brunsting, 2002; Ratchford et al., 2001). McCallum and Bury (2013) analyzed public interest regarding conservation biology and environmental science through the search tool "Google Trends". The study describes the public interest by analyzing Google searches in the internet and how popular the search terms were. Online information was used, because it is the new dominant source of media influence (Baker et al., 2003; Norris and Cuneo, 2003; Ratchford et al., 2001). Their results show that the only term searched that had increased between 2004 and 2009 was sustainability. While this study has helped to understand the interests of the general public, the use of Google Trends has not received the attention it deserves in marine science.

In this study, we provide information on marine environment and conservation issues being communicated by the mass media, mainly from articles in newspapers, programs in broadcast television and the interests reflected in Google searches in Chile. Using this information, we assess and provide a baseline on the type of information on marine issues which is being delivered. These baselines are particularly important as countries strive to reach marine environmental goals associated to international commitments such as the Sustainable Development Goals and Aichi targets.

2. Methods

2.1. Research setting

The study was performed in Chile which is a country with 4 thousand kilometers of coastline. Chile, throughout its history, has shown great economic dependence on its marine ecosystems. On average 3,34 million tons (2002–2014) are fished every year from the Chilean EEZ which represent 8,9% of the exported economic contribution (FAO, 2016). Ocean exploitation has led to deterioration and significant losses in biodiversity (Fernández and Castilla, 2005; Halpern et al., 2008). This is unfortunate because Chile has

unique marine species and ecosystems, reaching high levels of endemism (Manzur, 2005). Chile is a signatory of the convention on biological diversity and sustainable development goals, as such, in recent years it has pushed to increase marine conservation and marine sustainable practices (Gobierno de Chile, 2014). In order to mitigate human impact on the Chilean marine environment, different marine conservation and management spatial measures have been developed. These areas are divided into natural sanctuaries, marine reserves, marine parks, national monuments, exploitation area for benthic resource and coastal marine space for native peoples (Fernández and Castilla, 2005; Zelada and Park, 2013). Currently, Chile has a total of 38 declared marine protected areas, which are equivalent to 47% of the Exclusive Economic Zone (Gobierno de Chile, 2018). Despite the progress in the development of marine conservation plans, these have not been accompanied by enforcement and civil society perceives the lack of an integrated communication plan (Conicyt, 2016).

2.2. Media searches

The search of news related to marine impacts and conservation focused on three of the main sources of mass media that are used in Chile. Newspaper, broadcast television and internet searches were studied, specifically newspaper “La Tercera”, television channels “Canal 13”, “MEGA”, “CHV” and “TVN”, and the Google search engine database. Using these sources, it is possible to get a general idea about the type of marine environmental and conservation information which is being delivered to civil society, its frequency and the main interests of people.

Mass media in Chile is characterized by a low number of owners (Ruiz-Tagle, 2011). In fact, this was reported to the Inter-American Commission on Human Rights by The Journalists' Association in Chile. They wrote a document named “Concentration of ownership of the media. The Chilean case” in 2015, in which they stated that open television is highly concentrated and linked to economic groups. Out of the 4 open access television channels, “Canal 13” and “Mega”, belong to a conglomerate which participates in the financial, mining, alimentary, real-estate and retail sectors. “Chilevision” is controlled by a foreign group, while “TVN” is a state channel, with main funding obtained by advertising and not by the government. In the same document, journalists have pointed out that Chilean television is linked to certain ideological groups that exclude social actors' critics of the current socioeconomic model (Colegio de Periodistas de Chile, 2015). Chile has two main nationally distributed newspapers, “El Mercurio” and “La Tercera”, both are private business named El Mercurio S.A.P and Copesa, respectively (Colegio de Periodistas de Chile, 2015). This concentration of mass media in the country has defenders, but also critics from both the industry and the academy, who argue that this leads to a homogenization of the agenda, declining of freedom of expression and unfair competition (CNTV, 2015; Álvarez, 2015).

2.2.1. Newspaper search methodology

For the Newspaper analysis, the nationally distributed newspaper “La Tercera” was

chosen because it is rated as a credible source by people, as a result of its trajectory and seriousness with which it touches contingency topics (Asociación Chilena de Agencias de Medios, 2015). It publishes the highest number of copies on a weekday, around 200.000 copies per day (FUCATEL, 2006) and is distributed across the whole country.

The analysis covered the news between 2011 and 2013. The 2011 analysis was made using the archives of the “Biblioteca Nacional de Chile”, which is the national library of Chile and has copy of every newspaper published in Chile. For years 2012 and 2013, the analysis was made through the website “www.latercera.cl”, selecting the news related to marine topics. News could be related to Marine production, including Salmon, Fishery and the Fisheries Act, to Research about ocean, coastal and marine animals, and to Conservation, including marine conservation and marine protected areas. Only news related to events which occurred in Chile were considered. Marine news were classified according to the section of the newspaper where they were published: “País” (National News), “Negocios” (Business and Finance) and “Tendencias” (Cultural, Technology and Science Trends).

2.2.2. Broadcast television search methodology

Broadcast programs of the open access main national television channels: “Canal 13”, “MEGA”, “Chilevisión” and “TVN” were selected, because they have the highest ratings and have a similar programming, regarding themes and schedule of the broadcast (Biobio, 2016). Broadcast programs between 2011 and 2013 were analyzed. To analyze the cultural programs, official records of the CNTV (spanish acronym for National Council of Television) which are published in monthly reports were used. CNTV establishes that a program is “cultural”, if it refers to a cultural topic and is transmitted on a high-hearing schedule. The list of cultural programs on broadcast television was reviewed and those including marine topics were selected for the analysis. The most common themes found were about fisheries and conservation. After selecting these programs, the total number of minutes dedicated to the broadcast of marine news in the four selected channels and their ratings was calculated.

2.2.3. Google Trends search methodology

Google trends was used to analyze people's interest in marine topics and conservation in general. This search engine was chosen because it is the most used search engine in the world, with around 1.6 billion unique monthly visitors (Ebizmba, 2018). Data reported by Google are standardized and normalized values (Berleur et al., 2010), which allow to compare searches in time, even when the overall number of searches differ from one time period to another. The normalized values range from 0 to 100. Results calculated from Google Trends show the relative popularity of a search term. Thus, decreases or increases in a value are due to changes in popularity of the searched term in comparison with other searches performed in the same place and at the same time. The values obtained were used to estimate a linear regression and determine the trend in searches, if any.

Key Words related to marine environmental and conservation topics in Spanish and

restricted to Chile were selected to do the analysis, in order to evaluate if people are searching those words and if the searches made in Chile have increased or decreased during the 2004–2015 time period. The selected words used for the analysis were: “Conservación” (Conservation), “Medioambiente” (Environment), “Biodiversidad” (Biodiversity), “Pesca” (Fisheries), “Ecología” (Ecology) and “Sustentabilidad” (Sustainability).

3. Results

3.1. Newspaper

The newspaper “La Tercera” published around 1.800 news per month with an average of 10 news related to a marine topic (0.6%; Fig. 1). News were classified in three big topics: Marine production, Research and Conservation. The last two topics showed a low number of news, between 0 and 5 news per month, while 78% of the marine news related to “Marine Production”. This topic showed three big peaks, the first two correspond to news about the new Fisheries Act which was discussed throughout 2012 and the last one corresponds to news about an outbreak of the ISA virus which affected Chilean salmon aquaculture in 2013.

Fig 1. News trends on marine topics about Marine Production (dark gray line), Marine Research (light gray line) and Marine Conservation (gray line) in the newspaper “La Tercera”.

Most of the marine news were published in the Business and Finance section and were about productive activities in the ocean (Table 1). The Production topic had three subtopics: Salmon, Fisheries and marine policy with special reference to the Fisheries Act, representing 44%, 27% and 29%, respectively. News found in the Salmon topic included headlines such as, “Vaccine company accuses a lowering of standards in the salmon sector” or “Salmon production will face a complicated 2013: prices will continue to fall”. In

the Fisheries news, headlines such as “Main fishery company will paralyze operations after complying with mackerel quota” or “Rapa Nui fishermen combine tradition and technology” were found. Some of the news that appear in the topic Fisheries Act include “Government presents changes in the Fisheries Act that regulate artisanal fishing” or “Senate opens debate about parliamentarians disability to vote in the Fisheries Act”. In Conservation, news such as “CITES protected 347 species, including Sardinero, which inhabits the Chilean seashore” or “Project seeks to create the world's largest marine reserve on Easter Island” were identified. The Research topic has themes like “Investigation on the risks of heavy metals in Quintero's bay” or “Patagonian fjords harbor unique corals in the world”.

Table 1. Average number of publications in the year 2011 to 2013 about Marine Production: Salmon farming, Fisheries and the Fisheries Act; Research and Conservation according to the section in which they are in the newspaper “La Tercera”.

Section in the Newspaper	Production (n/3 years)			Marine Research (n/3 years)	Marine Conservation (n/3 years)
	Salmon	Fisheries	Fisheries Act		
National News	1	6,7	7	5,3	7
Business and Finance	41	17	21,3	0	0,3
Cultural, Technology and Science Trends	0	1,3	0	10,7	4,3

3.2. Broadcast television

Broadcast television transmitted around 440,000 min of television per year, of which 23,000 min (5.2%) were cultural programs. Of these cultural programs, around 6,6% (1524 min) were about marine topics in 2011, 0% in 2012 and 6.5% (1493 min) in 2013. In essence, there is a low number of marine cultural programs between 2011 and 2013. The highest and lowest number of minutes of marine cultural programs were shown by “MEGA” and “CHV”, respectively (Table 2).

Moreover, most marine cultural programs had low ratings (between 3.4 and 13.2 rating points), the maximum of these corresponds to half of the rating in a high audience program. “TVN” had the best rating in 2011 with the series “Frontera Azul” and the episode “Un paraíso en peligro” with 13.2 points of rating (Table 2). A key element explaining this relatively high rating were the hosts which were famous actors which draw the attention of the viewers. Despite this, it was on the fifth place in the rating ranking compared with the other programs transmitted at the same time.

The most common program themes were: (a) the lifestyle of small-scale fishermen along the Chilean coastline, highlighting fishing gear, tradition, culture and difficulties in carrying out there trade, (b) the marine biodiversity found in the Chilean ocean and (c) productive

projects that could end up producing negative impacts on both coastal human communities and marine biodiversity. Most of these programs had one or more hosts that traveled through the different landscapes, interacted with communities and showed their customs, as well as the main species present in the areas.

Table 2. Information about marine cultural programs in broadcast television: Years; the average, highest and lowest rating; minutes of programs per year and the percentage in relation to the total minutes of cultural programs; and mode of the programs schedule, among the years 2011 to 2013.

Year	Average rating	Highest rating	Lowest rating	Minutes of programs per year (%)	Mode of the schedule
2011	5,5	13,2	3,4	1524 (6,6%)	Saturday and Sunday afternoon
2012	-	-	-	-	-
2013	3,2	8,7	4,8	1493 (6,5%)	Sunday afternoon

3.3. Google Trends

Findings show that all the searches in Chile done in Spanish about conservation issues were decreasing in popularity (Conservation, Environment, Biodiversity, Fisheries, Ecology, among others), except for the term Sustainability that is the only one that has increased over time (Fig. 2). There are two terms, Environment (Medioambiente in Spanish) and Biodiversity (Biodiversidad in Spanish), which consistently show an increase in the popularity of the searches during one month every year. Searches on environment rise in June, which coincides with the world environment day (June 5) and searches on Biodiversity increase in November of each year, but there are no clear reasons of why.

Fig 2. Linear regressions of the search trends of conservation issues in Google Trends from 2004 to 2015

4. Discussion

In Chile, as in many countries, there has been important investments in marine science and conservation over the past decade (Douve, 2008), there are also several university and government initiatives which seek to communicate marine scientific and conservation information. Foremost among these is the Explora program. This program was created by the Conicyt (spanish acronym for National Commission of Scientific and Technological Research) in 1995, with the purpose of encouraging citizens to think, analyze and understand the environment. Conicyt develops different kinds of activities, such as the program “Océanos” to inform and teach about the importance of ocean preservation and to generate an “oceanographic culture” in Chile. Such initiatives aim to keep civil society better informed about marine conservation issues and have provided a very important venue for scientists to communicate key findings. However, the impacts of such initiatives are typically focused to selected groups of society who willingly decide to participate, or who attend as part of programs carried out in classrooms or small seminars. Scaling the

communication of problems and solutions through mass media is still a key gap, as evidenced in this study, for perusing ocean sustainability.

Mass media has an important impact on society due to its influence on human behavior (Sampei and Aoyagi-Usui, 2009; McCombs, 2014; Soroka, 2003; Östman, 2014). Mass media has been shown to determine general public's concern, with research showing positive relationships between the amount of information that the media provides and the concern of civil society (Sampei and Aoyagi-Usui, 2009). In addition, some authors have shown that the mass media could be a valuable tool to educate the general public (Kushwaha, 2015; Legagneux et al., 2018; Perales and García, 1999). It is for this reason that understanding the type of information that mass media communicates regarding marine environmental issues and conservation is key. Mass media could potentially deal with the big communication gap between scientist, civil society and decision-makers (Legagneux et al., 2018). The analysis of the results suggests that, during the period under analysis, civil society had little access to information about marine environmental stressors, other than those which affect economic revenue. This lack of information could be one of the reasons of why civil society's indifference towards these issues (Hines et al., 1987; Bamberg and Möser, 2007; Stern, 2000; Kollmuss and Agyeman, 2002). The news shown in the newspaper were, in general, about Marine Production systems using aquaculture, and more specifically about business aspects related to salmon aquaculture. During the period under analysis, space for news on marine research and conservation was traded off for that on profitability. Unfortunately, while marine cultural television programs can play a critical role in informing about research and conservation, they still lack space and captive audiences.

Some news cause a big impact in the media, catching the interest of society and generating big changes. In our analysis of the newspaper, three big topics in terms of the amount of news was observed. The biggest of these was about the virus ISA which impacted society after a strong outbreak in 2013, causing salmon mortality of around 15–20% (Godoy et al., 2013; Globefish, 2014), generating environmental, economic and social problems. Due to the outbreak and media coverage, government and civil society realized that legislation was too weak and with serious gaps in the audit of the salmon's farms. The way the issue was communicated in the mass media triggered the need for changes in salmon aquaculture regulations (Roa, 2013). Issues such as these, with high media coverage generating public awareness generally have strong impact, however after the media coverage stops to cover the news, the general public generally loose interest in topic (Sampei and Aoyagi-Usui, 2009; Downs, 1972; Mazur, 1998). Thus, it is critical to develop long-term plans about marine environmental and conservation initiatives to maintain momentum on policy processes, accountability of ocean uses and a conscious population. Unfortunately, during the time period analyzed in this study there was no clear tendency or strategy from the government or NGOs to create an environmental narrative in the mass media. An efficient strategy, should be based on research on audience preferences, in order to design strategies on how to motivate civil society's engagement in marine environmental issues. It is also important to explore the existence

of key leverage points for the communication of environmental concerns. Lessons from the most viewed television programs in our analysis, show that the type of host of the programs (journalist, scientists, famous or known people, etc.) and the preferred schedule and timing are both key to achieve initial buy-in.

Citizen science could also play an important role in encouraging civil society to participate in marine environmental and conservation issues. In this way, people become aware and committed since they realize the benefits of conserving and protecting their natural resources (Silvertown, 2009). The “National Seabirds Stranding Network” is a clearly example of citizen science in which civil society reports about seabirds stranding. This project has obtained a positive effect, improving strategies in marine conservation. Moreover, this kind of activities increase the pro-environmental behavior, creating awareness in civil society (Östman, 2014). It is essential that civil society and scientist participate together in these kinds of activities to include all the stakeholders and achieve a better understanding of their environment (Conrad and Hilchey, 2011; Gleason et al., 2010). A few citizen marine science programs are currently being developed in Chile, one of these is “Litter Scientist” in charge of the Dr. Martin Thiel (Cientificos de la Basura, 2017). This program began in 2007 and deals with generating knowledge and awareness about litter in the Chilean coastlines. The initiative is carried out with schoolchildren who are in charge of collecting information along different shores in Chile. The program raises awareness and educates with the hope of achieving environmental stewardship.

Encouraging the use of digital technology to increase awareness of marine environmental issues is fundamental to achieve success in communicating about the oceans (Mitchell et al., 2016). To build up a marine conservation diffusion strategy using the internet it is critical to figure out a way for people to find the information easily. For example, a good plan might be to use the Sustainability term, which results show increasing searches for, to increase social attention about marine conservation in Google or in other search engines. Sustainability is the only term with a high positive slope in both national and international searches, as shown in our results and those presented by McCallum and Bury (2013). Sustainability as a term, is capturing the interest of civil society, thus it could be better for journalists to frame conservation stories more in the context of sustainability to improve the likelihood that the story is found by an internet search. In essence, once the right strategies have been created to diffuse information about marine conservation, people can be reached more efficiently and concisely, hopefully generating more awareness and, therefore, more commitment to this issue.

By assessing mass media coverage of marine environmental and conservation news, this study has provided a panoramic view that can be used as a baseline for follow-up studies aiming to improve communications of marine environmental issues. In addition, by highlighting news and civil society interests, it becomes easier to target specific leverage points to address this complex issue, especially as countries begin dealing with the challenge of achieve their ocean related marine sustainable development goals.

5. Conclusion

Mass media could be a powerful tool to spread information about new discoveries and important marine conservation and environmental issues. In Chile, the potential of using the mass media is clearly underutilized. Our review of three years of broadcast television and newspaper revealed that the coverage of marine issues maintained low throughout time. In newspapers, there are some specific moments when the number of news related to marine topics increased, specifically addressing economic and business issues. In general, the interest in marine conservation topics in Google are decreasing except for the term Sustainability which increased over time. There is a strong need to improve the diffusion of marine topics through mass media. An active participation of NGOs and government in setting long term narratives, agendas and best practices seems critically important. It is key to catch the interest of journalists and have a constant flow of marine environmental news in mass media as a way to contribute in building awareness of the need to transform towards sustainable oceans.

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