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Doom and gloom versus optimism: An assessment of ocean-related U.S. science journalism (2001-2015)

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ABSTRACT

In recent years, some scientists have expressed concern about the negative representation of the state of the oceans in the media. To examine this concern empirically, we analyzed the content of 169 articles in mainstream U.S. newspapers covering ocean-related research between 2001 and 2015. Content was categorized according to main issue, basis of evidence, causal attribution, presence of solutions and uncertainty, and coded for doom and gloom and optimistic language. Science journalism about ocean issues most commonly addressed climate change and the status of ocean species or populations. The majority of articles cited peer-reviewed research. Most articles attributed change to anthropogenic causes, although ocean science articles addressing climate change were less likely to do so. Uncertain language and solutions were observed in nearly half of all articles. Optimistic language outnumbered doom and gloom language across all categories. While doom and gloom language was identified in 10% of all articles, optimistic language was present in 27%.

1. Introduction

Reporting by the mass media can profoundly impact public perception of environmental issues (e.g., Ogden, 2015) and has been, for instance, a powerful actor in the public understanding of climate science (Stamm et al., 2000; Carvalho and Burgess, 2005; Cooper, 2011; Brulle et al., 2012; Schmidt et al., 2013), extinctions (Ladle et al., 2004), and genetically modified organisms (Mintz, 2016). However, while the mass media have the potential to effectively communicate environmental issues, various factors such as competition for shrinking news space (Friedman, 2004), the prioritization of event-driven coverage (Hansen, 2010), and the relative invisibility and long timeframes of many environmental phenomena present major challenges for journalists. Furthermore, factors such as the journalistic norms of objectivity, balance, dramatization, personification, and novelty can be problematic in science and environmental coverage (Boykoff and Boykoff, 2007). For example, a 2004 review of U.S. news articles demonstrated how the journalistic norm of balance - or the proclivity to tell 'both sides' of the story - leads to coverage that questions the causes of climate change and problematic disagreement between scientists and science reporting (Boykoff and Boykoff, 2004). These factors, among others, have led to the mass media's potential to misinterpret, misconstrue, or otherwise misinform the public (Henderson-Sellers, 1998; Boykoff, 2008). Therefore, it is important to examine media coverage and the representation of complex environmental issues.

As an example, scientists have debated the potential benefits and consequences of the mass media's extinction-risk coverage. Some scientists have argued that overly simplistic representations of research and a failure to clarify scientific uncertainty around the time frames of various land animal and plant species extinctions may lead to accusations of frivolously 'crying wolf' (Ladle et al., 2004). Other scientists have contended that mass media coverage of the extinction risks posed by climate change, despite the potential negative effects of errors in reporting, is ultimately beneficial as it has raised public awareness considerably (Hannah and Phillips, 2004).

In recent years scientists have expressed similar concerns over the representation of the state of the oceans in science journalism. Duarte et al. (2015, p. 131) wrote that "recent media reports on problems in the ocean do not leave much room for optimism." Referring to press coverage of an article about marine biodiversity by Worm et al. (2006), Hilborn (2010, p. 5) wrote, "if you have paid any attention to the conservation literature or science journalism over the last five years, you likely have gotten the impression that our oceans are so poorly managed that they soon will be empty of fish…". In a similar vein, the website http://oceanoptimism.org noted, "We recognise and respect the many challenges facing our oceans, yet too often 'doom and gloom' stories are the only kind of ocean news we hear."

The representation of the state of the oceans is important, since the

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Table 1
Distribution of articles by topic, presentation of solutions and uncertainty, and causal attribution.

Category	Total % (n)	Solution present % (n)	Uncertainty present % (n)	Anthropogenic attribution % (n)
All	100% (169)	45% (76)	49% (82)	62% (105)
Climate Change	47% (80)	35% (28)	49% (39)	39% (31)
Species and/or Population status	39% (66)	62% (41)	38% (25)	71% (47)
Pollution	31% (52)	46% (24)	60% (31)	83% (43)
Offshore Drilling	14% (23)	13% (3)	78% (18)	96% (22)
Aquaculture	3% (5)	100% (5)	60% (3)	100% (5)

failure to accurately report ocean health issues, or a tendency to bias ocean coverage with hyperbolic doom and gloom rhetoric, is likely to send very different messages to the broader community. For example, Duarte et al. (2015, p. 131) expressed that the current framing of ocean health issues runs the risk of conveying "an overly negative message that may lead society into pessimism or the belief that the ocean is beyond restoration." Hilborn (2010, p. 5) expressed concern that popular media depictions of ocean issues distort reality and ignore a more balanced diagnosis of the world's fisheries, favoring instead a counterproductive, "apocalyptic rhetoric that obscures the true issues that fisheries face" and fails to recognize "the long, hard work of fishery managers, scientists and stakeholders in the many places where management *is* working" (p. 8, emphasis in original).

However, the evidence for claims of constant doom and gloom in media depictions of the ocean is lacking (Jacquet et al., 2015). Empirical support is superficial and no research has systematically examined the U.S. media's portrayal of the state of the oceans. In an effort to provide the groundwork of empirical evidence needed to further explore the debate over whether or not news media tend to emphasize doom and gloom and fear-inducing rhetoric over more balanced and/or optimistic appraisals, the goal of this work was to examine the ways that ocean-related issues have been represented in major U.S. news media outlets from 2001 to 2015, including how ocean-related issues rank on the news media agenda, as evidenced by their frequency of coverage. In addition, this research explored how ocean-related issues have been framed in U.S. news media, including how these narratives attribute causality, address uncertainty, provide evidence, and indicate solutions. Finally, adapting methods used in prior analyses of climate discourse, we examined the frequencies with which doom and gloom or alarmist rhetoric as well as ocean optimism were used in recent discussions of the state of the oceans.

2. Methods

This study reviewed 169 articles published in four major U.S. newspapers (The *New York Times*, the *Washington Post*, the *Los Angeles Times*, and the *Wall Street Journal*) between July 2001 and February 2015 that addressed the state of the oceans. These newspapers, for reasons of geography, influence, circulation, and impact have been used in several past analyses to represent US media and were therefore deemed appropriate for this study (Boykoff and Boykoff, 2004; Wilkins, 1993). This start date was chosen because in July 2001, Jackson et al. (2001) published one of the most highly cited papers in marine ecology (cited 3178 times as of December 2017 according to the Web of Science), which articulated a large-scale view of anthropogenic ocean-related changes and generated substantial media coverage.

The sample was compiled using the search terms 'ocean' and 'science' in the ProQuest Newsstand database. With the purpose of exploring how marine science is presented in news media, opinion editorials, letters to the editor, book reviews, and editorial columns were excluded, similar to other media content analyses of environmental issues (e.g., Hedman, 1981; Boykoff and Boykoff, 2004). The subject area of 'studies' was also selected as a search parameter to confine the sample to journalism about scientific studies, as this ProQuest Newsstand category generally implies that the article is about, or makes mention of, scientific research. Within these selection parameters, 403 news articles appeared from 2001 to 2015. A preliminary reading reduced the sample size to 276 after duplicates and articles that did not address ocean science were removed. In addition, articles were screened to confirm that they related to at least one contemporary ocean-related issue and those that did not were excluded from the sample. For example, an article might have focused on a novel approach to studying air pollution or ocean toxins without directly addressing pollution (#108 in Table S2), or described research on a mass marine extinction that occurred 360 million years ago without addressing current species or population status (#127 in Table S2). This screening process produced a final sample of 169 articles. Of these articles, 34% appeared in the *Los Angeles Times* (58 articles), 32% in the *Washington Post* (53 articles), 26% in the *New York Times* (44 articles), and 8% in the *Wall Street Journal* (14 articles) (Table S1).

After a preliminary reading of all articles, five primary issue categories were identified: 1) climate change; 2) pollution; 3) species/population status; 4) offshore drilling; and 5) aquaculture (see Table 1 for percentage and number of total). Articles were assigned to a category if that issue was the dominant focus of the article. Similar to other media analyses (e.g. Feber et al., 2017), several articles covered more than one dominant issue and were counted as one hit for each of the relevant categories, therefore percentages do not sum to 100. For example, an article might have focused on the negative impact of industrial fishing on species abundance and sustainability but also discussed climate change and the projected poleward shift in the ranges of exploited fisheries, and was therefore classified under both species/population status and climate change. Most articles addressed one (120 articles, 71%) or two (38 articles, 22%) of the five dominant categories. The remaining 11 articles (7%) addressed 3 categories.

Articles were classified according to causal attribution (whether or not impacts were attributed to anthropogenic factors), whether they proposed a potential solution, including an intervention, policy, or management strategy perceived as potentially limiting or reversing the scope of the problem, as well as the type of evidence cited (peer-reviewed research, governmental or other scientific reports or documents, or no evidence provided). Articles were also classified according to whether they included language that referred to uncertainty regarding the issue, for example, if the results of the study were called into question, or content was politicized, including when uncertainties about aspects of the science were used to cast doubt on the science overall (Oreskes and Conway, 2010; Steketee, 2010; Bolsen and Druckman, 2015).

Finally, articles were examined for doom and gloom as well as optimistic content. This examination used methods similar to Risbey's (2008) and Russil and Nyssa's (2009) work on representations and tropes used in climate change communication. As is often the case in qualitative content analyses, the terms used in the coding process may have a range of meaning to different audiences, and therefore some necessary degree of subjectivity is involved. Ereaut and Segnit's (2006) characterization of alarmism was used to establish the presence of doom and gloom language with support from Hulme's (2006) critique of catastrophe discourse, and Risbey's (2008) clarification of terms. The authors characterized alarmism as using inflated or extreme language, the use of a quasi-religious or apocalyptic language around doom,