



Representations in the Brazilian media of the impacts of climate change in the coastal zone

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Abstract. This study aims to examine texts which deal with climate change in the coastal zone, and looks specifically at the coverage of Brazilian daily newspapers with national and regional circulation. The paper begins by introducing the study with a selective review of recent literature on climate change and media, looking both at international and Brazilian research. The literature review also focus on the impacts of climate change in the coastal zone and its links with policy, particularly in Latin America. The theoretical basis of the research is presented - social construction of meaning - with the questions which guide the work and a summary of the methodology. The final sections show results, analysis and conclusions with particular comments on the frequency of the coverage at national and regional levels and a detailed look at elements of the news discourse in a specific case. The predominance of issues set by an international scientific and political agenda in the Brazilian media and relative absence of references to the coastal setting on the national coverage point to the need of an urgent review of priorities in the mass communication of scientific and environmental themes in Brazil.

Keywords: newspapers, sea-level rise, social construction

Resumo. Representações na mídia brasileira dos impactos das mudanças climáticas na zona costeira. Esta pesquisa busca examinar textos que tratam especificamente do tema mudanças climáticas em zonas costeiras, com interesse na cobertura de jornais diários brasileiros de circulação nacional e regional. Inicia-se com uma introdução do estudo através da revisão seletiva da literatura recente sobre mídia e mudanças climáticas, focando estudos no âmbito internacional e brasileiro. Em seguida são focados os impactos da mudança climática em zonas costeiras e sua ligação com políticas públicas, particularmente no caso da América Latina. A base teórica – construção social do significado – é apresentada a seguir, assim como as perguntas da pesquisa e um sumário da metodologia. As seções finais mostram resultados, análise e conclusões, especificamente comentários sobre a frequência da cobertura em níveis nacional e regional, bem como um tratamento detalhado de elementos do discurso empregado pela mídia em um caso particular. A predominância de tópicos na mídia brasileira que são determinados por uma agenda científica e política internacional, somada a relativa ausência de referências ao contexto costeiro na cobertura de jornais nacionais sugerem a necessidade urgente de revisão das prioridades na comunicação de massa de temas científicos e ambientais no Brasil.

Palavras-chave: jornais, aumento do nível do mar, construção social

Introduction

Climate change and media

Climate change began to receive widespread attention in the United States and United Kingdom media by the late 1980s, triggered by a series of events ranging from scientists making their views on the rapid global warming explicit for the first time, politicians reactions to the growing concern that humans were implicated in the global climate change and the creation of the United Nations

Intergovernmental Panel on Climate Change, or IPCC (Carvalho & Burgess 2005, Boykoff & Roberts 2007). Since then, the coverage of climate change by the international English-speaking media has steadily increased (Boykoff 2008), although it has recently shown signs of a slight decrease (Revkin 2009). The trend of general increase in coverage is largely associated with either specific events (such as the release of Al Gore's film The

Inconvenient Truth, as well as his shared Nobel prize with the IPCC) or large scale disasters, such as the effects of Hurricane Katrina in the US (Boykoff & Roberts 2007, Boykoff & Roberts 2008). In spite of a tendency for improvement in terms of richer contextualisation and broader coverage of different aspects of the issue – for example, relatively fewer attention to “climate skeptics” and greater space for the political dimension of climate change - the overall quality of the coverage has been criticised (Carvalho 2007, Boykoff 2008).

Research has drawn attention to the how ideology and politics can determine the framing of news on climate change (Smith 2005, Carvalho 2007), specifically highlighting how supposedly objective scientific views can be given different meanings according to political interests. Carvalho (2007: 240) suggests a “politicised reading of *science reports* in the press” (italics as in the original), adding that “audiences could engage in a more active interpretation of representations of knowledge in the media and in a critical understanding of their implications”. Boykoff & Boykoff (2007) examine specifically how the normative dimension of journalism has interfered with the communication of human contribution to climate change. The authors mention how political, economic and professional norms are interrelated, and show how journalistic (professional) norms are the main factor causing the failure by the media to communicate “central messages” about the anthropogenic causes of climate change, and conclude that this “occurs not only because of complex macro-political and economic reasons rooted in power relations, but also, in part, because of the micro-processes that undergird journalism” (Boykoff & Boykoff 2007).

As the Brazilian media is concerned, the coverage of climate change issues has shown an increase similar to that recorded in the English-speaking media, and the general pattern of peaks in coverage related to specific events was also identified (ANDI, 2009). However, research on the Brazilian media representations of climate change are scarce, as noted by the authors of the aforementioned study, which quotes the almost total lack of records in the Scielo database (ANDI, 2009). Likewise, in spite of looking at a broader search base in our own review of the Brazilian literature on the theme, we were able to find only relatively few studies (Lavezzo Filho & Nunes 2004, Costa & Lages 2008, Silva Junior & Bortotti 2009). Only by widening the scope are we able to find relevant, even if indirect, references on communication of scientific knowledge to the general public. For

instance, the survey on public perception of science carried out by the Ministry of Science and Technology in 2006 (MCT 2007) showed that a sizeable portion of the Brazilian public is interested in scientific issues (41% of 2004 respondents). Furthermore, the survey also showed how the public considered journalists to be the most trustworthy sources of information (27%), well above scientists working at state universities (17%) (MCT 2007). These findings suggest that there is clearly potential public interest in a theme such as climate change in Brazil, and that coverage of the theme by the media seems to play an important role in how people construct the meaning of related issues - for example, impacts of climate change on coastal areas.

Climate change in the coastal zone – science and policy

Nicholls *et al.* (2007) draw attention to how the understanding of the implications of climate change on coasts has improved and summarise the findings in their assessment as what they called “important policy relevant-messages” (Table I). The report clearly stresses the high cost of the impacts of climate change, both when short-term events (e.g. floods) and long-term process (e.g. sea-level rise) are considered. It also highlights the need for policies which are able to anticipate and respond to events and processes at both time scales. The general aim of such synthesis, or “executive summary” as it is called, is to communicate scientific findings to the actors involved in the policy-making processes, above all those making the decisions. Therefore, by following how these “messages” (as they are referred to by the authors themselves) circulate amongst the general public it is possible to assess effectiveness of the communication of scientific knowledge and policy advice.

There is a well-developed body of research which investigates the vulnerability and adaptation of coastal communities to climate change (Allison *et al.* 2009). This literature highlights particularities of climate change impacts on human population in coastal settings. Firstly, poor people living in coastal zones show relatively higher exposure and sensitivity to impacts from climate change in comparison with well-off groups or those living inland – for example, as reviewed by Daw *et al.* (2009) in the case of small-scale fisherfolk.

Secondly, livelihoods based on coastal natural resources are affected by composite impacts of climate change and social and economic processes (Glavovic & Boonzaier 2007). For instance, small-scale fisheries are affected not only by the ecological outcomes of rainfall variability or

Table I. Policy issues related to the impacts of climate change in the coastal zone, according to the assessment by the IPCC Working Group II on “Coastal Systems and Low-lying Areas” (Nicholls *et al.* 2007: 317). Issues selected have “very high” confidence levels according to the IPCC: experts have 9 out of 10 chances of being correct in their predictions or judgements. Statements in the “policy issues” column are direct quotes from Nicholls *et al.* (2007), page 317.

Policy issues	Highlighted aspects
“Coasts are experiencing the adverse consequences of hazards related to climate and sea level.”	Costs and loss of lives due to extreme events such as storms and floods.
“Coasts will be exposed to increasing risks, including coastal erosion, over coming decades due to climate change and sea-level rise.”	Increase in floods and cyclones, coral mortality and loss of wetlands. Impacts on fisheries and sources of freshwater with “serious implications for the well-being of societies.”
“The impact of climate change on coasts is exacerbated by increased human-induced pressures.”	Growth in human population, particularly, the increase of settlements in coastal areas.

changes in sea-surface temperature, but also by the interaction of these physical processes with so-called “adaptive strategies” - for example, changes to watershed management, land use and economic development brought about by a move from fisheries to aquaculture (Badjeck *et al.* 2010). Studies in the field highlight the need for the integration of climate change in policies and management regimes applied to coastal areas, particularly in the cases where livelihoods of poorest people and ecological sustainability are at stake (Badjeck *et al.* 2010, McIlgorn *et al.* 2010).

Thus, impacts on the coastal zone are the result of the interaction of different multiple stressors - sources of undesirable change - climate change being only one of them. It is argued that policies may become a stressor in their own right if policy-making does not consider the complexity of the coastal zone (Bunce *et al.* 2010). According to this view, a fuller representation by the media of climate change affecting coastal areas would require a treatment of both climate-related impacts and social and economic development. The contextualisation of climate change by the media becomes crucial to its understanding as its impacts are compounded by processes such as diverse as ecosystem conservation, urbanisation, tourism and fisheries development (O’Brien & Leychenco 2000, Bunce *et al.* 2010).

Climate change and public policy in the coastal zone – the Latin American context

The most up-to-date national level Brazilian policy aimed at tackling climate change, the “National Action Plan” (Rosa 2009), is the result of an extensive consultative process carried out by the “Brazilian Forum of Climatic Change”. This was an initiative led by the Brazilian government including government officials, scientists, state companies

from the energy sector and international NGOs (Rosa 2009: 45). The term “coast” is directly mentioned only once in the synthesis of the “action plan” provided by Rosa (2009), and there are no other indirect references to coastal or marine areas - the closest reference is a mention to “river banks”, yet specifically in the context of reforestation. Coastal zone figures in the “action plan” in the context of data generation - “Instalment of systems to collect data on the sea level on the Brazilian Coast” - under one of the three major components of the plan “Vulnerability and Transversal Actions” (Rosa 2009: 47). This is in clear contrast with the attention paid by the “action plan” to forests, with repeated quotes in several sections, focussing on the need to control deforestation as a means to curb Brazilian emissions of greenhouse gases (Rosa 2009).

The apparent lack of attention to coastal issues in a high level policy plan is not easily explained, as the relevance of climate change to coastal populations is well established in policy and academic circles (Nicholls *et al.* 2007, among others aforementioned).

In the case of Latin America, for example, governmental policy originally aimed at improving living conditions of coastal urban settlements has been found to have the opposite effect, increasing the vulnerability of human population. In a review of policies applied in Buenos Aires, Murgida & Natenzon (2009: 149) highlight a program aimed at providing housing “for [the] underprivileged population” which did not consider “scenarios related to climate change and variability, [neither] the flood [...] recurrence maps” for Buenos Aires. The authors conclude that this is an example of how “the lack of an integrated vision” between government, urban planners and other sectors may cause “maladaptation, as well as an [increase in] risk and new aspects of vulnerability”.

Similarly, Romero *et al.* (2009: 225) found that “[the] lack of urban planning and management are allowing [for careless] watershed urbanization”, with particularly negative impact in the case of coastal cities with “complex topography”, such as Valparaiso (Chile). The increased risk of floods and landslides in coastal areas caused by extreme weather events is frequently highlighted in the literature (Romero *et al.* 2009, Sant’Anna Neto & Roseghini 2009). For instance, findings from a study by Sant’Anna Neto & Roseghini (2009: 244) suggest that the seasonal pattern of rainfall in the northern coast of São Paulo (Brazil) “presents a great potential to cause perturbations and reach a greater number of victims”, because rainfall tends to be more intense and concentrated in short periods of time when a large number of people to move temporarily into the region for the tourism season.

Summing up, the review of the literature shows that, firstly, there is indisputable evidence of how climate change can have direct and specific effects in the coastal zone. Secondly, research carried out in diverse contexts points to common problems related to the complex interaction between physical, social and economic processes in coastal areas. Finally, another concern shared by several studies is the need for improvement in public policies aimed at coastal development, which currently do not seem to effectively take climate change issues into account.

These considerations indicate how highly diverse factors may affect the ways in which the media represents climate change impacts on the coast. As a result, we argue that an attempt to understand this process of representation requires both an appraisal of inherent features of scientific journalism (and the media sector as whole) and the complex nature of environmental and political dimensions of climate change.

Material and methods

Theoretical framework - Media and representation

This research is based in a theoretical framework which understands risk as being socially constructed (Dake 1992, Beck 1992). By adopting this stance we assume that the perception of risk among social actors will depend on their background, the context in which they live, the access to sources of information and ability to articulate responses to phenomena, among other elements which directly or indirectly contribute to the process of social construction of meaning. It is important to note that such perspective acknowledges the material existence of the natural and

human phenomena, *e.g.* storms and floods, is independent of what humans think about them. On the other hand, the meaning that these same storms and floods have to us, for example, as causes of death and material loss, is the result of the complex interplay between individual perception and social relationships (Johnson 1986).

Such considerations are relevant for this research precisely because they imply that the understanding of perception of phenomena is only possible if we look at the cultural aspects underlying it. In the specific case of this research it means that if we wish to examine how the media represents a complex set of phenomena such as climate change, we need to look at who are the actors involved - media, scientists, politicians - and what are the relationships between them and their connection to the phenomena in question (Beck 1992). It also implies that all actors in this process have the ability to interpret phenomena and, consequently, to interfere in the way they are given meaning. Therefore, the journalist is not seen as objective and impartial messenger, neither the public as passive receptor of news.

More specifically, we adopt the concept of “cultural circuit”, which has been applied to studies of media representation of environmental issues (Burgess 1990), and particularly of climate change (Carvalho & Burgess 2005). In this model (Fig. 1), the production and circulation of texts is made possible through encoding and decoding processes, which are determined by specific contexts. Texts, understood as content in any form, are produced by the media (encoded according to diverse norms and criteria - visual, linguistic, professional, economic, institutional, etc.), and are then circulated in the “public sphere”. The readers will then consume these texts, decoding them in the “private sphere” (Habermas 1989). In the following stage, readers not only decode the texts, but also provide feedback and input for another cycle of production.

The construction of meaning during the production stage is determined by a professional context in which technology and institutions play a major role. Meanwhile, in the consumption of texts meaning is constructed in a personal context, in which subjectivity and everyday actions prevail (Carvalho & Burgess 2005). The assumption of a reader who is able to actively select which and how issues are relevant, interpret these issues and transform their meaning is also central to our approach (Burgess *et al.* 1991). It has been shown how not only readers, but all actors constantly revise and contest the meaning of environmental issues and their portrayal in the media (Smith 2005).

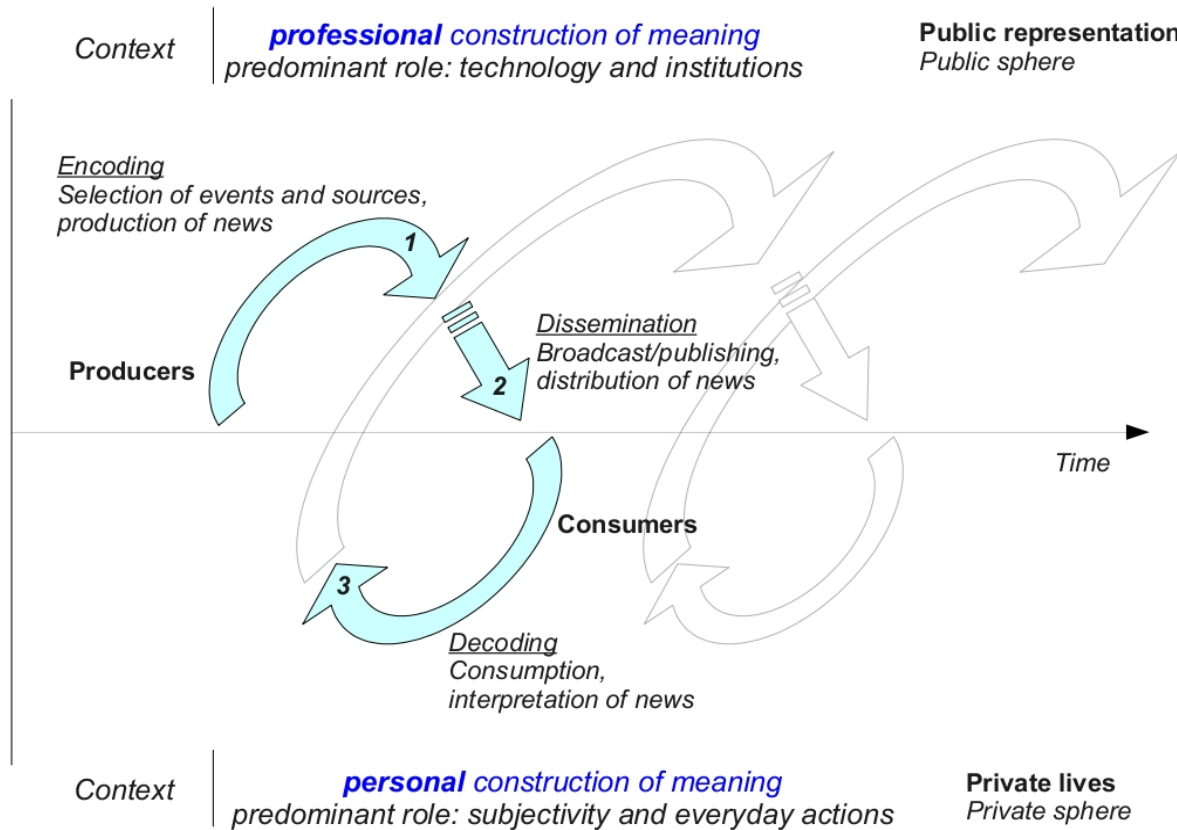


Figure 1. Analytical framework: “Circuits of culture” model, adapted from Carvalho and Burgess (2005). The news production cycle consists of three phases (numbered arrows in the diagram): news are produced (1) and distributed (2) in the public sphere. Then, news are consumed (3) in the private sphere and subsequent cycles are originated (light grey arrows).

Research questions and methodology

This research project is a component of a Brazilian network aimed at the multi and interdisciplinary study of climate change in the coastal zone (“Rede CLIMA – INCT para Mudanças Climáticas, Zonas Costeiras”). This project seeks to answer the following research questions: (1) how journalistic coverage contextualises the climate change theme, especially in terms of social and economic processes, (2) how different actors determine the framing of theme in the media, with special focus on the role of institutions and (3) how the media articulates the discourse on factors affecting vulnerability and adaptive measures which are particularly relevant in coastal zones (for example, urbanisation and integrated coastal management).

The research aims to examine the coverage of daily newspapers at three levels – local (defined by the towns in the estuarine area of the Patos Lagoon (Southern Brazil), state/regional (State of Rio Grande do Sul) and national – for a 12 month period (second semester of 2008 and first semester of 2009). Texts which deal specifically with climate change in the coastal zone have been selected and

organised in a database. The texts will be explored with qualitative techniques and critical discourse analysis (Bazeley 2007, Wodak & Meyer 2006). At the time of writing the research is part of an ongoing project and its scope will be gradually expanded in following stages, when we expect to include other media, as well as extend the analysis to other periods. The choice of geographical context is due to the very nature of the research, which is integrated with another existing project (SACC-HD) in which we look at the perception of climate change and vulnerability among fisherfolk in the small-scale fisheries of the Patos Lagoon.

Results and discussion

As mentioned above, the findings obtained so far are the result of ongoing analysis and limited to part of the total database of articles. Nonetheless, it was possible to identify patterns in the general coverage which are in line with those shown in the literature. Moreover, we were also able to select a case of particular relevance to the understanding of how the media discourse is developed with respect to our specific research focus. Findings from both quantitative analysis and in-depth case

study are presented and discussed in the following sections.

The analysis was developed in two stages, defined on the one hand by the geographic scope of the newspapers, and on the other hand by a specificity of the news coverage. To begin with, we analysed the coverage of climate change in its broadest sense, as done by the newspapers aimed at audiences in all Brazilian territory. Then, we narrow our focus to target the coverage of climate change issues only in the context of the coastal zone. Also, a newspaper primarily aimed at the southern Brazilian audiences is included. By presenting the analysis in the structure outlined above we intend to gradually introduce the theme to the reader: first, with a general view of how the Brazilian media has handled the climate change issue, then with a more localised and specific analysis. The inclusion of the newspaper with regional scope at the national level would lead the analysis of results in a different direction – it could be equally valid, but would not support the gradual interpretation aimed in this paper, and would not be helpful in terms of the comparison with other studies which look at national media coverage of climate change (e.g. ANDI 2009).

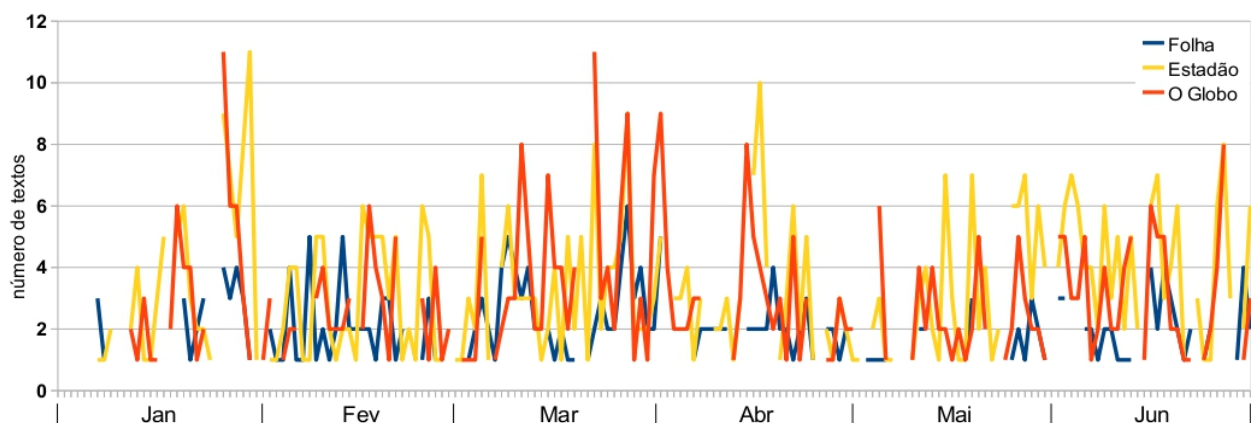
Frequency and level of the coverage

Firstly, we looked at texts containing the expression “mudança climática” (climate change) in

the online editions of three of the Brazilian newspapers with largest readership and nationwide distribution – “A Folha de Sao Paulo”, “O Estado de Sao Paulo” e “O Globo” - during the first semester of 2009. The number of texts selected was as follows: “Folha”=279, “Estadão”=528 and “O Globo”=423. The frequency of texts throughout the period is shown in the figure 2. There is a relatively similar pattern in the coverage of different newspapers, with a few pronounced peaks. The increase in coverage seems to be related to specific events: in the end of January the surge in news was related to several events: the World Economic Forum in Davos, a meeting of the IPCC held in São José dos Campos and, above all, to the new climate change policy being implemented by the US under Barack Obama. In contrast, at end of March, the coverage peaked in response to a single event: the WWF campaign called “The Planet Hour” (“A Hora do Planeta”) in which major cities around the world switched off their lights to show support for energy saving policies and control of CO² emissions. Finally, in mid April, the US policies lead the news coverage again when a change in the status of CO² (which became to be regarded as pollutant) reinforces the move in policy towards more control of emissions.

These findings are corroborated by the trend observed in other studies, where the newspaper reinforces the move in policy towards more

Frequency of articles containing the expression “climate change” first semester 2009



N (no. of articles)

Folha	279
Estadão	528
O Globo	423

Figure 2. Frequency of articles containing the expression “climate change” first semester 2009. <http://migre.me/38jIW>

control of emissions.

These findings are corroborated by the trend observed in other studies, where the newspaper coverage of climate change is guided by specific events (Boykoff & Roberts 2007), and shows a particularly tendency by Brazilian newspapers to increase its coverage of the theme in response to international events. A very similar tendency of a national coverage largely dictated by an international agenda was observed in 2007 in the study organised by ANDI (2009) in Brazil. Accordingly, Billet (2010) mentions the “strong international focus” of the news addressing climate change in India between 2002 and 2007.

In the next stage of analysis we narrow our focus, adding the regional level of news coverage (represented by the newspaper “Zero Hora”) and restricting the selection of texts to those containing simultaneously the terms “mudança climática” (climate change) and “costa” (coast). The resulting number of texts was as follows: “Folha”=14, “Estadao”=42, “O Globo”=22 and “ZH”=2. The frequency distribution of texts is shown in figure 3. A smaller number of texts was expected, but the extremely low count in the regional newspaper is somewhat surprising as its readership encompasses the whole state of Rio Grande do Sul and tends to provide national as well as regional news coverage, thus could have more closely followed the coverage given by national newspapers - in 2008 “Zero Hora” circulated

approximately 180,000 copies/day, compared to 246,000 by “Estadao”; 281,000 by “O Globo” and 311,000 by “Folha, the largest circulation in Brazil (ANJ 2010).

It is worth mentioning that several terms with equivalent or closely related meaning were used in the search and selection of texts: for example, “aquecimento global” (global warming), “mudança global” (global change), “praia” (beach), “litoral” (litoral), etc. Despite the low quantity, the results from the combination “mudança climática” (climate change) and “costa” (coast) yielded the largest number of texts between all possible relevant term matches.

The paucity of articles dealing with climate change in coastal settings is remarkable when one considers the significance of climate-related risks in these areas (Nichols 2007). The texts in this subset follow the general pattern observed above and did not refer to the specific Brazilian coastal context. These findings help to put into perspective the relative absence of consideration for coastal processes in the national policies aimed at tackling climate change (Rosa 2009). The tendency in question also suggest that the mismatch between existing public policies and the needs of vulnerable coastal populations in Brazil an Latin America (Romero *et al.* 2009, Sant’Anna Neto & Roseghini 2009, Murgida & Natenzon 2009) is unlikely to be challenged by a mass media which responds to issues set by an agenda removed from local

Frequency of articles containing the expressions “climate change” and “coast” first semester 2009

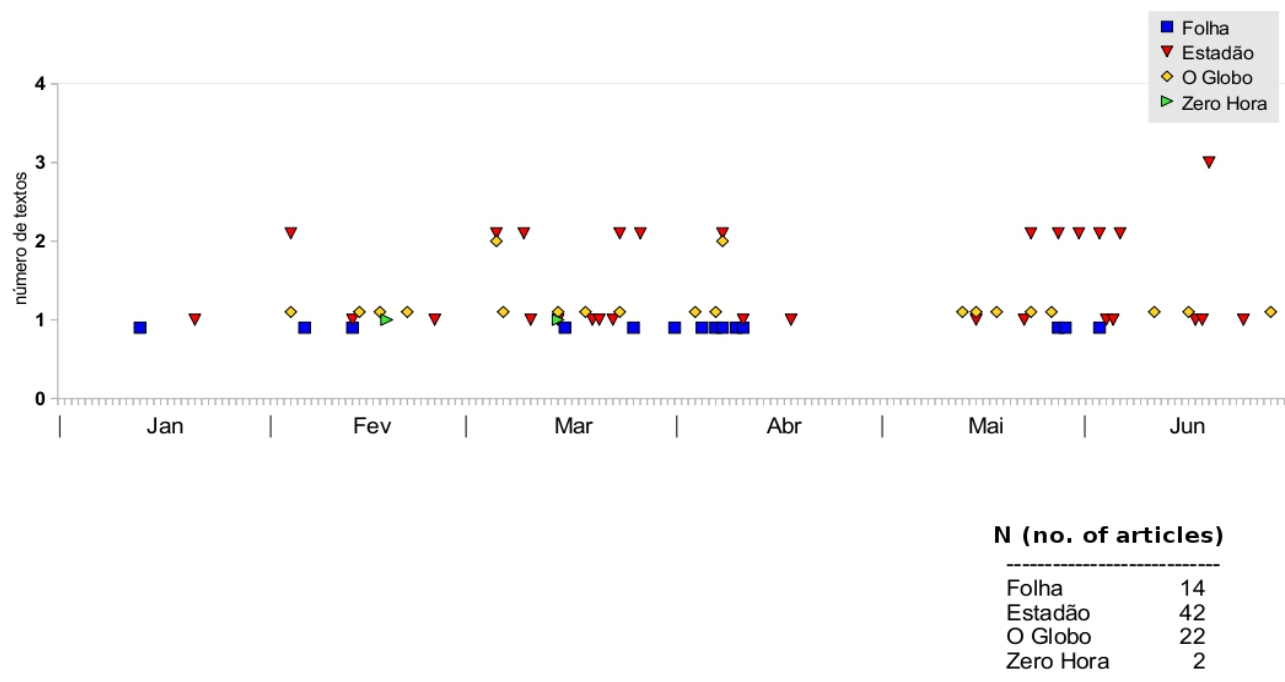


Figure 3. Frequency of articles containing the expression “climate change” and “coast” first semester 2009.

concerns. Our study indicates that not only the national newspaper coverage of climate-related impacts on the coast was arguably insufficient, but it was practically non-existent in regional newspapers. Where the debate outlined in the previous paragraph is concerned, one group of occurrences seemed particularly interesting, as it was the only occasion in which all four newspapers reported almost simultaneously on the theme of climate change in coastal zone. Indeed, on closer examination it proved to be a revealing case, which we present in detail below.

How (and why) we are told about sea level rise

Between 15 and 16 March 2009 the online editions of the three papers analysed reported on exactly the same story: a rise in sea level threatened to flood New York by 2100. The news originated in a scientific paper published online in the journal *Nature Geoscience*, on that exact same day (15 March 2009) (Yin *et al.* 2009). All three Brazilian papers only reproduced stories written originally by international news agencies (Reuters and EFE), with almost no differences in the content – with notable exception for the version presented by “Zero Hora” in which it says that the sea level “*might* increase from 36 to 51 cm”, while the text in the “Folha” article reads “*will* increase”.

The path taken by the news in this case is represented in figure 4. It also shows the main features determining the context in each step of

news production and consumption (in italics). The blue arrows represent the steps followed by the text until the “final” reader. The grey arrows represent the possible feedback from the reader towards the beginning of a new cycle of news production, and potentially changing human behaviour and influencing phenomena. The grey cross at the centre of the diagram represents the potential interaction between different contexts. This representation of how news were produced is based on both empirical evidence and our interpretation, which is in turn related to the analytical framework followed in this research, as articulate in detail below.

Each step in figure 4 can be clearly identified based on direct analysis and/or inferences from the research paper and the news articles. Actors and the relationships depicted in the sequence of events throughout the production of the news follow from the analysis of the paper and articles: for example, the intermediary role of international news agencies is not assumed or extrapolated, it arises from the simple annotation of sources in the opening of each news article. On the other hand, the features of the context in each step are not presented in the texts themselves and are inferred - though in all instances presenting objective aspects of each context. For example, the requirement of instruments for gathering of information about natural phenomena or the existence of deadlines and editing in newspapers production are well-known, concrete aspects of these settings.

How did we hear about New York ending up underwater?

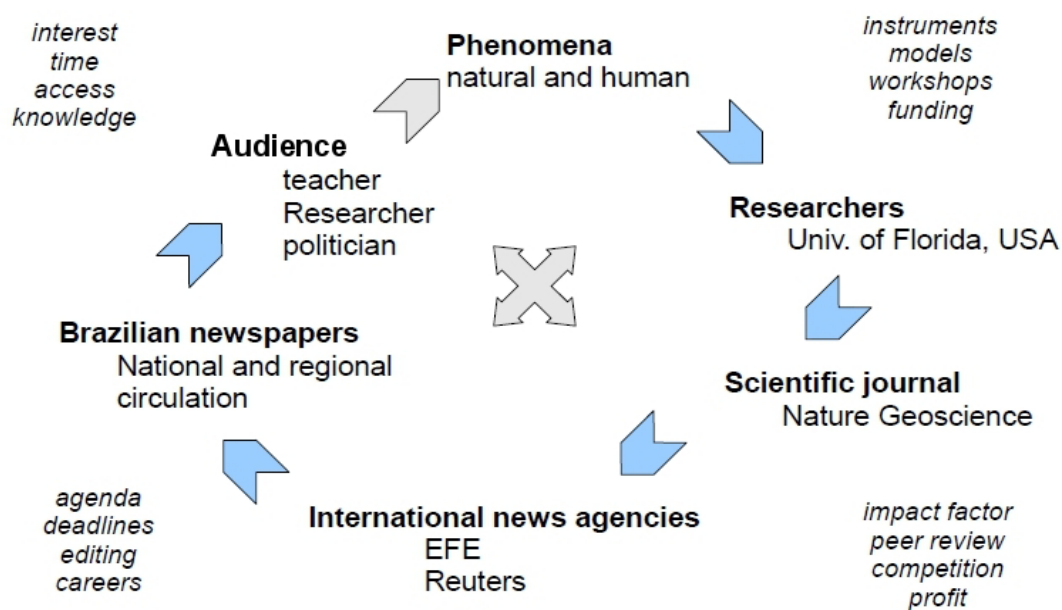


Figure 4. News circuit: stages of production and consumption of news in the story about sea level rise and flood threat to New York in 2100.

The contexts are obviously more complex than a handful of concepts can describe, and those shown in the diagram seek to add to the interpretation of the news cycle without reference to excessively technical or subjective descriptions which would detract from the analysis and add bias to the interpretation of results.

The cycle itself is related to a particular interpretation of news production, as indicated above in the section “Theoretical framework – media representation” (Material and Methods). Such interpretation follows from an understanding of society which assumes the existence of a private and a public sphere (Habermas 1989). As this study is concerned, each sphere is related to different but interconnected contexts of production and consumption of news; the production of news takes place initially in the public sphere, where professional, technological and institutional factors determine the context – shown in figure 4 as academic institutions, journals and news outlets. For instance, the role of the market-related aspects of the public sphere in determining the social construction of news has been focus of media studies for more than a decade – for a comprehensive review, see Gamson *et al.* (1992).

In the following stages, news are consumed in the private sphere, where personal and subjective factors are predominant in defining the context – in figure 4 represented by the individuals who make up the different groups of news readers – teachers, researchers, politicians, etc. These steps are not insulated from each other, quite the opposite, there are feedbacks and interferences, as well as individual actors which can stride both spheres - as noted, for example, by Doulton and Brown (2009) in the case of academic researchers and non-governmental actors which can be involved in several stages of the production and consumption of news. These connections cannot be fully appreciated at the level of analysis aimed at in this paper, neither can they be fully depicted in a single diagram. Nonetheless, we seek to acknowledge their existence, and draw attention to their potential role in the news cycle production by representing them as grey arrows in figure 4.

The latter aspect is particularly relevant to a critical perspective on how the media represents environmental issues. It connects directly to what Carvalho and Burgess (2005) call “diachronic model” (see Fig. 1), a explanation of how news are produced and consumed which expressly aims to include changes to society through time. In that perspective, the so-called “circuits of culture” are not closed circuits, but a succession of interrelated

cycles which allow us to understand how construction of news changes along with changes in society and culture. By adopting this view we may be able to unravel the mechanisms which lead to long-established patterns of news production, such as the focus on extreme climatic events (Boykoff & Roberts 2007), as well as explain sudden changes to the news agenda, as in the case of attractive news headlines offered by celebrities statements (Boykoff, 2009). The diachronic model of circuits of culture helps to clarify the roles of different actors and the existence of feedbacks along construction of news, as the interaction of research community and media and the consequent evolving focus on climate change thorough 19 years of news coverage demonstrated by Burgess and Carvalho (2005).

Some aspects of this case are illustrative of how the social construction of meaning affects the communication of scientific findings, as well as their relevance for policy. Firstly, the focus on the impact of sea level rise in New York seems to render the news more attractive. The coverage in all three papers suggests that editors and/or journalists from independent news companies, thus irrespective of specific professional contexts, judged the same news to be relevant. As to what criteria they used, we can only speculate, but it might be related to the fact that the text stresses the risk of floods and extreme events, with views on possible disaster scenarios. The tendency to report on episodic events has been identified in the literature (Boykoff & Roberts, 2007), which also points out to the loss of context that the excessive focus on the “disaster” aspect can cause to the reporting of environmental news. Furthermore, these findings suggest that despite the existence of well-defined policy issues relating coasts and climate change in the Brazilian and Latin American context (see introduction), the media tend to ignore this connections in the representation of the theme. In this case, this is done by literally reproducing news related to a foreign context. A similar detachment between news and policy has been noted in other studies, which highlight how the media focus on narrow issues in detriment of broader discussion of social and policy-related topics (Hayes *et al.* 2007).

Secondly, the reproduction of content from international news agencies might be related to financial and institutional aspects of journalism which are reason for concern in the specific case of reporting environmental and scientific issues: these are not regarded as priority and often do not receive funds or editorial support, with few corporations interested to maintain specialised staff (Hannigan, 2006, Gamson *et al.* 1992). As a result,

environmental news end up being covered with ready-made content which allows the news companies to save on resources and personnel. For these reasons, it is reasonable to argue that we are more likely to be informed about the impact of sea level rise in New York, as told by indirect sources, than to hear an account of how the Brazilian coast could be affected by climate change, told by a local journalist with the ability to provide rich context to the story.

Conclusions

Findings from this study show that Brazilian newspapers tend to represent the climate change theme along similar lines used by the English-speaking press, that is, largely following high-profile events. The predominance of issues set by an international scientific and political agenda in the Brazilian media and relative absence of references to the coastal setting on the national coverage point to the need of a urgent review of priorities in the communication of scientific and environmental themes in Brazil. Moreover, as it has also been noted in other studies, the coverage of climate change in Brazilian newspapers is overwhelmingly concentrated in a few major vehicles of large circulation. The study by ANDI (2009) showed how in a comprehensive sample of 50 newspapers only six – four general daily papers and two specialised in economic issues, all with national circulation – published 37% of all news articles on climate change issues between 2005 and 2008 in Brazil. The authors repeated the study in 2008 and found that 48% of the coverage of climate-related news was done by those same newspapers (ANDI, 2009). These trends represent a considerable

obstacle to the advancement of a coverage which reflects the existing knowledge of coastal processes and their relation to public policy. Science has been able to approach the impacts of climate change on coastal zones in a nuanced manner, acknowledging its complexity and generating knowledge potentially applicable to improving peoples lives in vulnerable areas. However, the mass media vehicles analysed seemed to represent the issues in a detached way, focussed on issues removed from Brazilian reality, overlooking both local problems and scientific expertise. The concentration on topics which must appeal to a broad national audience leaves little room for localised accounts of impacts, while a specialised agenda may limit the coverage, in the case of Brazilian newspapers, to economic issues. Such findings and interpretations reinforce the relevance of a critical perspective on the study of the representation of climate change impacts in the Brazilian media. Further, the coastal zone emerged as a clearly valid focus of this research effort, given the urgent need of concerted policies and accompanying communication aimed at increasing the chances of preventing disasters and implementing successful adaptive measures for coastal human populations.

Acknowledgements

Luceni Hellebrandt is funded by the CNPq (grant no. 381476/2009-0). This research is linked to the project SACC-HD Climate change, oceanographic variability and the artisanal fisheries in the SW Atlantic: a human dimension approach (CRN2076), funded by the Inter-american Institute for Global Change Research – IAI.

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Received May 2010
Accepted October 2010
Published online January 2011