



Analysis of mass media news on forest issues: a case study of Spain

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Abstract

Aim of study: The aim of this paper is to analyze how the news media influences the construction of the social perception of forests and forestry.

Area of study: The area covered by this study is Spain.

Material and Methods: The materials used for the analysis were the online news related to items such as forest, bioenergy and biodiversity, in two leading newspapers in Spain from 2009 to 2012. The hypotheses tested were divided into two sets, one focused on the messages and another focused on the sources on these messages. Summative content analysis was applied, combining both quantitative and qualitative data analysis. The messages and sources were systematically explored and monitored.

Main results: As main results, forest wildfires news is the most frequent issue mentioned in the media, however they require deeper reflection and debate. Keywords such as forest management, owners, harvesting, products, etc. are rarely found anymore; furthermore, new terms such as biomass, are not yet prevalent. On sources, official institutions, primarily the regional governments, dominate the news sources with a share of over 50%.

Research highlights: Mass media analysis is considered the most appropriate complement for perception studies as it provides relevant basic information needed to design a communication plan. Further research is required on the role mass media plays in how we perceive and react to the environmental problems around us.

Keywords: summative content analysis; policy analysis; ATLAS.ti; biomass; protected areas.

Citation: Fabra-Crespo, M., Rojas-Briales, E. (2015). Analysis of mass media news on forest issues: a case study of Spain. *Forest Systems*, Volume 24, Issue 2, e029, 11 pages. <http://dx.doi.org/10.5424/fs/2015242-06381>.

Received: 11 Jun 2014. **Accepted:** 28 Jan 2015

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Funding: The author(s) received no specific funding for this work.

Competing interests: The authors have declared that no competing interests exist.

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Introduction

Communication fluxes from the forest stakeholders to society are not sufficiently studied in Spain nor in many other countries. However, these fluxes constitute the basis for a communication plan, which is foreseen by the National Forest Program (Ministerio de Medio Ambiente, 2002) and by some Regional Forest Programs (Generalitat Valenciana, 2004; Gobierno de Cantabria, 2005; Gobierno de Navarra, 1998). These Forest Programmes have most of them included public perception studies; however they haven't been complemented in any case with mass media analysis.

The forest-related messages received by the public from news media reports are unknown; therefore, it is uncharted how they shape public perception. There is

no information on which degree the transition from the traditional forest messages as for wood production, have shifted already to the more modern messages of the sustainable forest management approach, as the biodiversity, bioenergy production or climate change mitigation. It is also unidentified who the main stakeholders providing information to the mass media are, whether they come mostly from the official sources, or from the core stakeholders.

Mass media is a powerful tool that is used to effect social change (Quigley, 2006). The news inundates us daily with headlines and images, entering our thought processes and influencing our decisions about everything from the trivial to the crucial (Cockerill, 2003). News is a built version of social reality, a socially created product and not an objective reflection of reality but ultimately a subjective selection of facts (Corbett,

2006). Public opinion research has repeatedly confirmed that media both reflects and helps to shape public attitudes about a wide range of issues and serves as a valid indicator of public attitudes toward these issues (e.g., Burgess *et al.*, 1991; Cockerill, 2003; Elliott *et al.*, 1995; Fan, 1988; McCombs, 2004; Fabra-Crespo *et al.*, 2012). Ample evidence exists of a strong relationship between the amount of news coverage of an issue and where such issues rank on the public agenda (Miller, 1997). The media has great influence on people by determining which stories are newsworthy and how much space and importance is given to them. Hence, issues that the media deems important eventually become important to the public. Public opinion influences the media to a lesser extent than the media influences the public (Ader, 1995). The media does not attempt to tell us how to think about a topic, but they tell us what topics to think about (Cohen, 1963). Clearly, how reporters and editors present information has the power to influence reader opinion and could potentially affect policy decisions.

The news media, including Internet outlets, are the most important and often the only source of information for most people regarding a wide range of natural resource and environmental issues (e.g., Atwater *et al.*, 1985; Fortner *et al.*, 1991; Ostman & Parker, 1987; Wilson, 1995). Therefore, environmental communication professionals bear a heavy responsibility (Fernandez, 2001). Often, journalists do not have adequate information or lack technical skills, and editors impose criteria of impact, emotionality, timeline, objectivity, balance, etc. It is essential for mass media managers to obtain the support of the audience, as a newspaper or television channel is observed as simply one more consumer product instead of as an informative tool (De Paz, 2007). Besides, the competence of web media and the flash news oppose the professional analysis of complex questions, such as those related to the environment.

Forests are not just a socio-economic or environmental resource; they are also a socio-cultural issue for most people. There is little knowledge regarding what drives public preferences and their influencing factors, considering the wide range of ecological, social, cultural and economic variables involved. Hence, these preferences do not have a singular nature, as such, but multiple natures that are historically, geographically and socially constituted (Macnaghten & Urry, 1998). This is why in one country there can be a variety of social representations of forests and forestry as well as of rural areas, water, mountains, etc. The accelerated urbanization process of society has affected social perceptions by dissolving the roots of the population. In urban societies, this process increases the perception

of a complex reality as virtual and within a global dimension. That is very different for rural societies, which have a narrower local view and who do not need mass media to understand their world. Urbanization has converted forests into a tertiary resource that some of the population enjoys on weekends or holidays. Therefore, nature, in particular forests, has turned into an ideal to be reached with a high value for people (Bouza, 2002).

One important role of policy analysts is to identify stakeholders and their concerns by tracking their messages (Bengston *et al.*, 2009a). Analysis of public debate through news media is a window into broader social debates and is a means to indirectly gauge public attitudes and values (Webb *et al.*, 2008). Analysis of the news media, therefore, allows one to quickly take the pulse of ongoing public debates and discussions about environmental issues, to indirectly measure public attitudes and opinions associated with many topics and to track changes in debates over time (e.g., Fan, 1997, Fan & Cook, 2003). The news constitutes one of the only existing mechanisms to analyze social perceptions when no polls are conducted, and it provides an excellent follow-up of social perceptions. Analysis of the content of the news media has repeatedly been shown to produce results that parallel the findings of attitude surveys, as a single ex-post mechanism, for many public policy issues (e.g., Fan, 1997; Gamson & Modigliani, 1989; Salwen, 1988; Shah *et al.*, 2002), including environmental and natural resource issues (e.g., Bengston *et al.*, 2001; Kepplinger & Roth, 1979; Liebler & Bendix, 1996; Williams, 2000; Wilson, 1995).

The idea of monitoring the social environment through analysis of the news media dates back, at least, to sociologist Alvan Tenney's (1912) proposal and attempt to systematically survey newspaper content to gauge the social reality. In 1998, Bengston, together with other authors, began to analyze news media related to forests on such different issues as roads (Bengston, 1998), conflicts over natural resource management (Bengston, 1999), forest fires (Bengston, 2000), urban sprawl (Bengston, 2008), and wildlife (Bengston *et al.*, 2010), and they developed their own software for content analysis adapted to the requirements of mass media analysis, publishing articles with predictions of public opinion from the mass media. Today, with the Internet, we have fast access to a large amount of information. Prior to specific analysis of forest-related issues and the use of computer software, there were only a few publications on mass media analysis on environmental issues, as in Parlour & Schatzow, 1978.

The aim of this paper is to analyze how the news media in Spain influences the construction of the social perception of forests and forestry. This was achieved by analyzing the messages related to forest issues and their sources that the primary online mass media has released in Spain during the last few years.

The first set of hypotheses concern the following messages: (i) to what degree does wildfire-related news dominate the forest debate in Spain; (ii) are negative messages associated with some subjects and positive ones with others; and (iii) in different regions of Spain, are the messages different? (iv) are there sessional differences regarding messages or sources?

The second set of hypotheses concern sources of information: (iv) do only official sources contribute, or is there room for private stakeholder sources; (v) do a variety of sources contribute to the same news item so that contrasts of opinion are presented; and (vi) are Environmental Non-Governmental Organizations (ENGOS) considered more relevant sources for some issues than forest professionals, forest owners, industry, etc?

Materials and methods

Materials

Forests have increasing unclear semantic boundaries and are an arena where a myriad of different disciplines converge and overlap, i.e., climate change, renewable energy, water, soil, nature protection, and rural development; thus, they can hardly be considered a sector but rather a space of interest (Rojas-Briales, 1995). Accordingly, the search had to cover a wide range of news, as forest-related news is found mostly among environmental issues, but it also appears in renewable energy sections, in economic sections, etc. The news items were found using keywords such as forest, bio-energy and biodiversity. Then, irrelevant news was deleted because sometimes the subject deviated from forests, for example, an article about truffles that focused mostly on the gastronomic angle.

The material analyzed had to be in a text format (can contain images), be accessible online and be available for some time in free accessible databases. Among the news media outlets that met these criteria, two newspapers were selected, *El País* and *El Mundo*, as the two most read daily newspapers in Spain (3 million readers combined), their availability in an online library for the last ten years or more, their wide political spectrum, and they are mainstream media (no specialized news media). The online versions of both newspapers combine all of the regional print editions, creating a

more comprehensive collection of news and making it easier to compare between different regions.

Methods

Summative content analysis

Content analysis intends to determine who says what, to whom, why, to what extent and with what effect (Neuendorf, 2002). The advantages of content analysis are that it has internal and external validity, is unobtrusive and has low cost. Conversely, its limitations are that it can be decontextualized and reductionist. In addition, exploratory approaches may sacrifice methodological precision and the interpretability of research results.

Qualitative content analysis focuses on the characteristics of language as communication, with attention to the content and the contextual meaning of the text (McTavish & Pirro, 1990; Tesch, 1990) by the subjective interpretation of the content of text data. It begins with identifying and quantifying certain words or content in a text, with the purpose of understanding the contextual use of the words or content. It has been mentioned by Weber (1990) that the best content-analytic studies use both qualitative and quantitative operations.

Content analysis follows three distinct approaches (Shannon & Hsieh, 2005): conventional, direct, or summative. The key differences between these approaches center on how the initial codes are developed. The conventional and the direct have been excluded because neither of them combines qualitative and quantitative approach. The summative approach begins with counting words and then extends the analysis to include latent meaning and themes in the process of interpreting content (Holsti, 1969). With this method, the focus is on discovering the underlying meanings of the words or the content (Babbie, 1992). Qualitative content analysis results should strive for a balance between description and interpretation, where interpretation represents the researchers' theoretical and personal understandings of the phenomenon under study (Patton, 2002). This approach appears to be quantitative in early stages, but its goal is to explore the usage of the words/indicators in an inductive manner. A coding scheme is a translation device that organizes data into categories (Poole & Folger, 1981). In content analysis, this process organizes large quantities of text into much fewer content categories (Weber, 1990).

Extensive literature can be found on the traditional methods of content analysis (Krippendorff, 2003; Neuendorf, 2002), content analysis of the World Wide

Web (McMillan, 2000; Weare & Wan-Ying, 2000), computer-assisted qualitative data analysis (Lewins & Silver, 2007), qualitative and quantitative media analysis (Altheide, 1996; Riffe *et al.*, 2005), and environmental discourse analysis (Dryzek, 1997; Killingsworth & Palmer, 1992), which all share the same shortcomings of being time consuming and complex.

In this paper, summative content analysis was applied. ATLAS.ti 7 software for keywords analysis and model building (Atlas.ti, 2012) was used. First, a keywords analysis was used to create some quantitative figures (e.g. frequency of news by subject, etc.), following the methodology described by Bengston *et al.* (2009b). Keywords and sources were coded with ATLAS.ti, and a word cruncher tool was applied for analysis. Some more manual analysis was performed by applying filters in Excel software (e.g. classification of news by month, etc.) or in Word software (e.g. length of news in number of words). Second, a qualitative analysis was conducted by reading and contextualizing the contents, as required by the summative approach. Messages were analyzed because they are what encourage audiences to have certain ideas (Benoit & Benoit, 2008). Then, the main ideas presented regarding different forest-related issues were identified.

Results

Results for messages

A total of 1 065 news items in El Mundo and 815 news items in El País were recorded over the four-year period from 2009 to 2012, with most of the items being repeated in both newspapers (Fig. 1).

Forest news mentions several related terms (forests, forest management, harvesting, etc.). Traditional forest-related words, including “wood” (mentioned 54 times on average per year), and new terms, including “biomass” (mentioned 68 times on average per year), currently represent a small share of the terms used in forest-related news in Spain. Deforestation is closely linked to climate change, and thus it appears in many news items mainly focusing on climate change. Wood harvesting occupies a very small share of the news. Conversely, there are many news items where it is difficult to determine a main theme, as they are mixed and discuss several issues.

Wildfire-related news represented on average 65.6% (from 48 to 80%) of forest news, which leaves less than 100 news items per year dedicated to other forest-related news (Fig. 2). Wildfire news uses several key words (fires, flames, firemen, suppression, etc.). Wildfire-related news in both newspapers follows an

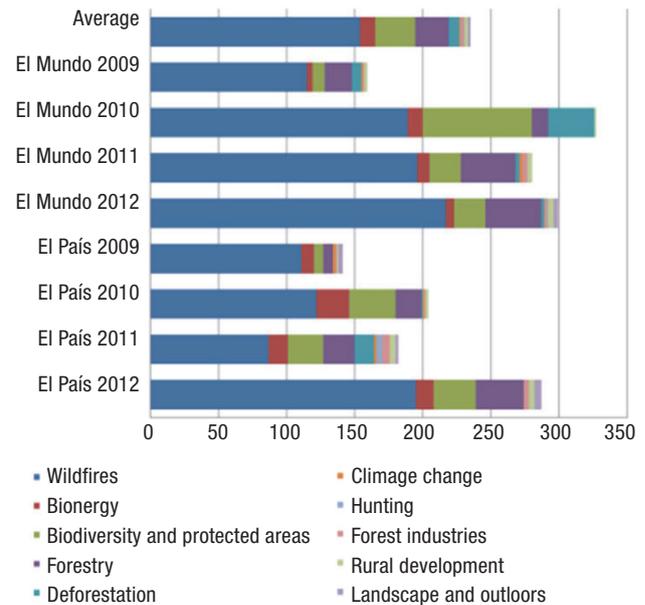


Figure 1. Number of news items by subject, by newspaper and year.

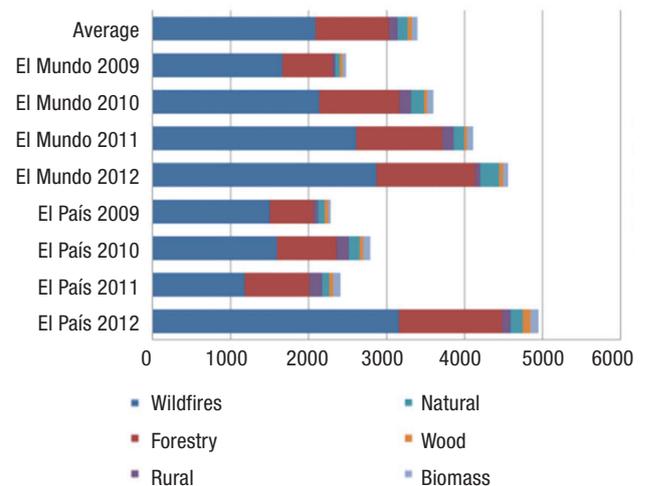


Figure 2. Frequency of the most repeated words.

ascending trend in absolute terms. However, in relative terms compared to other type’s news, it did not follow a clear trend.

Forest wildfire news occurred entirely during the summer season in Spain (Fig. 3 and Fig. 4), as 85% of such news appeared during the months of July and August. One characteristic of wildfire news is that the same news item is presented for several days and appears in different ways. For example, two large forest fires that occurred in Cortes and Andilla (Valencia Region) and burned 45 000 ha in 2012 remained in the news for five days. Wildfires have been reported in the

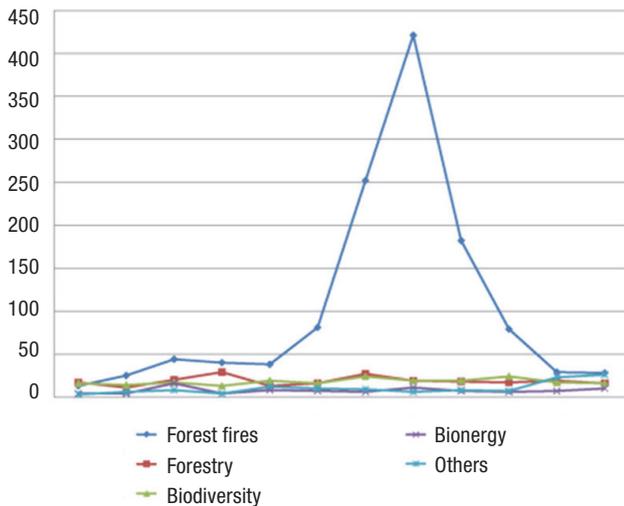


Figure 3. Frequency of news items by subject by month.

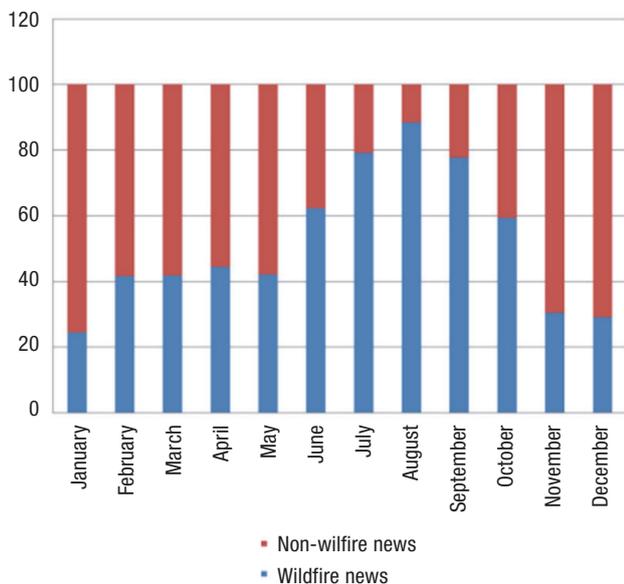


Figure 4. Frequency of news items by subject and month in relative terms.

summer months for decades and are a gold mine for the media when there is a lack of other news. It has been common for journalists to cover this type of news without training or knowledge of the subject. Forest fires crucial period coincides with the core vacation period in Spain. The lack of news in that period might be a reason for an over proportionate attention that forest fires receive during that time. Disregarding the influence of forest fire-related news, there is an average of 25 other forest-related news items per month, which are spread out equally through the year and are not dependent on season.

Forest wildfire news can be classified as (1) informative, with the institutional goal of informing the popu-

lation on the level of fire risk, on dangerous weather conditions, etc.; (2) related to on-going fires, only discussing how the fire appeared, developed, or was extinguished; (3) related to incidents, such as accidents involving forest firefighters; or (4) analyzing the causes of forest fires from a scientific or/and technical point of view. The theme at the beginning of summer is on the resources (human and technical) put in place for the summer firefighting campaign, whereas at the end of the summer season, the theme is related mostly to describing the balance of the fire season.

The number of forest fire news items (Fig. 5) does not correlate with the number of fires during the year, the number of large fires (over 500 ha) or with the area burned. When they discuss ongoing fires or fires that have been extinguished, they always refer to the total hectares burned, which few readers are likely to understand in practical terms.

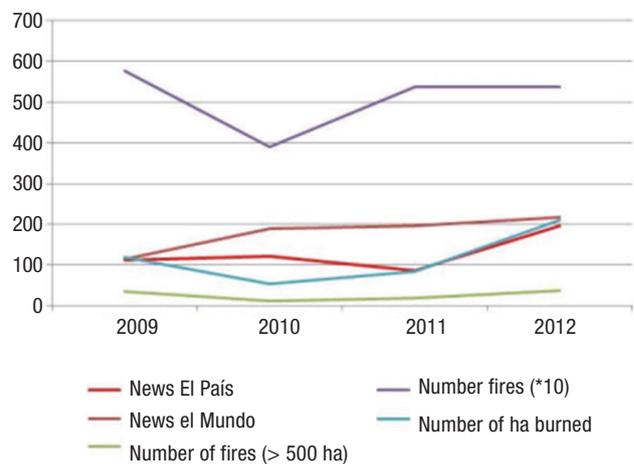


Figure 5. Forest fire statistics and forest fire news for the last four years.

The issues raised by forest professionals and other stakeholders are mostly related to the political preference for fire suppression resources instead of fire prevention resources.

Regarding bioenergy news items, they are linked to the renewable energy sector, interspersed with other types of energy, with virtually no ties to the forest sector. The main messages address creating rural employment, economic and business development, renewable energy, etc. The following are examples of news media reports on biomass as a renewable energy:

“...to produce a kWh with diesel costs € 8.89 cents while to produce one with pellets costs € 3.38 cents...”
 “...if we use biomass, our forests will be under a lower risk of forest fires, and in case one starts, it will be easier to suppress and less costly...”

“...managing the richness of our forests, taking care, and generating jobs are the objectives of the biomass project...”

Most of the news related to the forest industry is nevertheless focused on the bioenergy sector, and only a few of them deal with traditional wood product activities. The primary forest industry in Spain, ENCE, is the only source of a large share of this news.

Messages regarding biodiversity and protected areas are focused on the preservation of plant and animal species and on the risks affecting their habitats. Some messages are mixed with themes of protected areas. Many of the biodiversity stories include water and agricultural issues as well. Many of these news items are based on scientific findings with the sources being universities, research centers, etc.

Climate change is a universal subject that appears in many other types of news items, including some related to biodiversity and some related to forest fires, but few of these clearly address the relationship between climate change and forests and forestry itself.

After-fire reforestation tends always to be presented as a fight for numbers, either for hectares or number of trees. These items are concentrated in the months of October and November.

In order to examine the way that different news items are presented by both newspapers, some “style parameters” were analyzed. Forty-eight percent of the news items in *El Mundo* include a photo, and 8% include a video, while *El País* includes photos in 48% of items and videos in 10%. In both newspapers, the photos and videos are mostly linked to wildfires, and consequently, they appear mostly during the summer. Photos of fauna are also prevalent. The main difference between both newspapers is that *El Mundo* uses more maps to illustrate the locations of forest fires.

The average length of a news item is 598 words, with *El País* having slightly longer items than *El Mundo*. Forest wildfire news items are the shortest (on average 422 words), mostly because many of them are just brief informative notes on the evolution of the fires.

Findings show that variations in tone and language significantly impact public attitudes about relevant policy actions (Cockerill, 2003); therefore, the positivity, negativity or neutrality of the headlines was recorded. The results for this parameter show (Table 2) that wildfires are most often presented as negative, while the rest of the news items are quite evenly distributed among these three categories. The differences between the two newspapers are not significant; however, *El Mundo* presents wildfires with an even more negative view, while the remaining forest-related news is skewed towards a more positive view.

Table 1. Average length of news items by theme in number of words

Theme	El País	El Mundo	Average
Climate change	609	752	681
Rural development	672	662	667
Deforestation	808	516	662
Landscape and outdoors	734	558	646
Forest industries	739	512	626
Forestry	653	533	593
Biodiversity	667	510	589
Hunting	789	360	575
Bioenergy	632	414	523
Wildfire	476	367	422
<i>Average</i>	678	518	598

Table 2. Classification of negative, positive or neutral news titles (%)

	Wildfire related			Other forestry related		
	Negative	Positive	Neutral	Negative	Positive	Neutral
El País	75	6	19	30	34	36
El Mundo	82	4	14	35	53	12
<i>Average</i>	78	5	16	32	43	24

News media coverage of wildfires and other natural disasters often focuses on immediate and dramatic events, rather than on the broader context in which they occur (Smith, 1992). Forest fires represent 65.6% of the forest-related news in Spain. These stories are treated as emergencies, but they are a consequence of many of the management strategies employed in Mediterranean forests. In fact, to emphasize the dramatic nature of the news, terms such as devastate, threaten, destroy, danger, and damage are frequently used with negative headlines.

Spain is a country with contrasting types of nature in different regions due to historical, geographical and social factors. The news items were classified according to geographical area: international (5.5% *El País*, 16.1% *El Mundo*), national (Spain) (16.9% *El País*, 6.7% *El Mundo*) and regional (77.6% *El País*, 77.2% *El Mundo*). The international stories centered on large forest fires in Greece (2009) and Russia (2010) and on the new forest legislation concerning deforestation in Brazil (2011).

Within Spain, the most highly represented region in the *El País* newspaper is Galicia (32.3%), and the

second is Catalunya (13.8%), while the most represented Spanish regions in *El Mundo* are Comunitat Valenciana (23%) and Galicia (18.3%). The statistics show that during the period 2009-2012, 25% of the forest fires > 1 ha, while representing only 10% of the total burned area, occurred in the region of Galicia (Ministerio de Agricultura, Alimentación y Medio Ambiente, 2012).

Not considering the news related to forest fires, in *El País*, Galicia has the highest number of news, and Andalucía has the second most; in *El Mundo*, the most represented region is Castilla y Leon, and the second most represented is Comunitat Valenciana. This could be correlated with the higher number of readers for each of the newspapers in the different regions.

Results for sources

Eleven different sources were recorded, three of them corresponding to the local/regional/national government. Approximately half of the news items have sources from official origins, primarily the regional governments (39% in *El Mundo*, 34% in *El País*). The sources of each of the news items were recorded, and both newspapers revealed a very similar distribution of sources (Fig. 6).

Only 15% of the news items use more than one source, which indicates that in only a small proportion of cases, a journalist searched for several sources to present contrasting viewpoints, which would enrich the debate. This is the case in almost all the forest wildfire-related news, as this type is mostly informative and fact-based but does not present opinions. Consequent-

ly, sources for these items are mainly from different public services (local administrations, firefighter services, etc.). Non-State forest stakeholders are rarely considered as sources, and it is more common that only the affected public is interviewed to gather direct experiences. Thus, the news does not address the underlying causes of forest fires. News items with several sources are related mostly to hot topic debates, as conflicting mass media reports offer different sources' opinions, for example:

"...you cannot put forests and plantations in the same statistic as the FAO does, and companies take advantage of that to expand their plantations worldwide..." ENGO source

"...we are not in an economic position to invest much more in our forests..." Government source

"...it is incredible that we are importing wood from tropical countries, resin from China and biomass from north Africa when we could have them from our forests with a proper management..." ENGO source

Non-State forest stakeholders (professionals and owners) have a limited impact as sources of news (5.2% in *El Mundo*, 6% in *El País*). Scientists hold quite a similar share (5.7% in *El Mundo*, 6% in *El País*) and are mostly consulted for forest biodiversity-related news. Companies (including industries) are recorded with quite a similar share, mostly for bioenergy-related issues when they are taking initiative in the field. ENGOs enjoy a slightly higher presence as a source for forest-related news (8.5% in *El Mundo*, 8.8% in *El País*), which is higher than forest stakeholders.

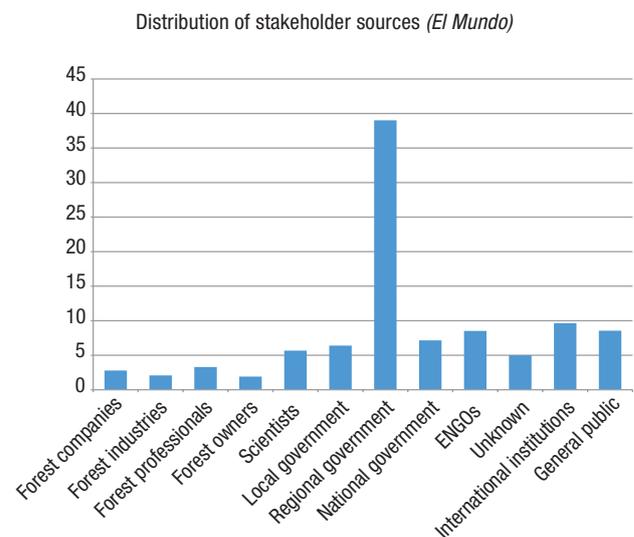
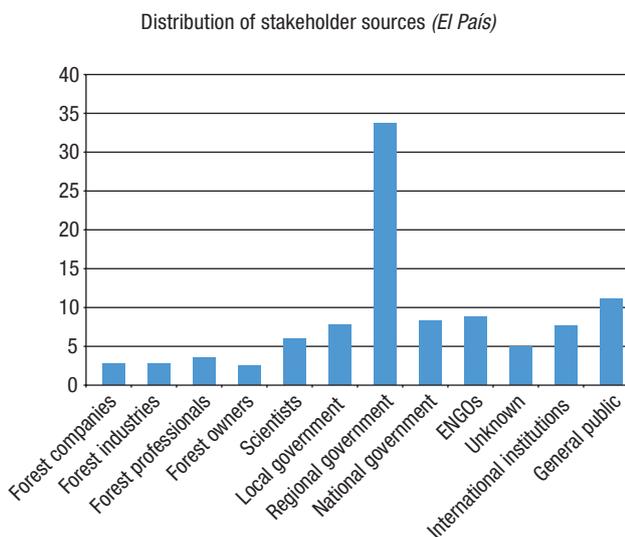


Figure 6a and 6b. Sources of forestry news information.

Discussion

Discussion on materials and methods

The market penetration share of the primary Spanish mass media platforms (AIMC, 2014) is as follows: television 88.6%, radio 61%, magazines 41%, Internet 60.7% (54% of people search for today's news), and newspapers 37.6%. Has to be noted that Internet penetration is up from 41.5% in the data research three years earlier (AIMC, 2011). Therefore, one limitation of this research is that the analysis of online newspapers does not cover the most influential platform for mass media in the country, which is television, but is either not so far in market share. Each media platform has its own style, and some research (Sheppard & Bawden, 1997) states that more in-depth information, in terms of context, commentary and analysis, is available from newspapers than from television.

In the USA, the Forest Service has a permanent unit that analyzes forest-related news from the database CyberAlert, an online news clipping service that obtains news articles about the Forest Service from over 25 000 news sources across the country. This database searches a wide range of sources that are available online, including major national and regional newspapers and television. Unfortunately, in Spain, such databases or services do not exist; furthermore, the large newspapers have only made their news items available online in the last few years. This makes the analysis much more manual and, consequently, slow, costly and more susceptible to bias.

Discussion of the messages

Wildfires clearly dominate the news and thus the discussion in Spain. This is magnified because in the past, they only made the news when a vast area was affected, but presently, any attempted arson is covered immediately. In addition, the visibility of fires and the accessibility to burned areas might play an important role. Discussions are focused mostly on firefighting or on the direct cause of the fire and have a lesser focus on prevention. Causes of the fire problem are a small fraction of total wildfire-related coverage. Rarely is it presented any linkage with climate change for example. Otherwise, media discussions of forest fire prevention policies follow the pattern of firefighting discussions.

Most of the media are pressured to either downplay problems in the environment or to cover them dramatically (Cox, 2006). Forest fires is the single issue that brings public attention high into the social and political agenda. The anxiety that it generates due to

the impossibility to control them over a given period of time might be a reason for that as well as their very impacting visibility. As a result, forest fires have become sensationalist press, often influenced by the most radical ENGOs, opposition political parties, etc., who receive political advantage by discrediting the current government.

Firefighting operations are expensive and difficult to maintain; however, they are preserved because they are observed as politically necessary, as otherwise citizens believe that the authorities do nothing to combat fires. In this regard, mass media conditions public opinion, which shapes policy decision making, creating a negative feedback loop.

Forest managers may want to consider working to ensure that prevention policy issues are highlighted throughout the year because research on other natural hazards has found that information provided during the "window of opportunity" is more likely to have a positive response when people are already aware of the problem and possible solutions (Monroe *et al.*, 2005).

Media give little space to less visible problems (biodiversity, etc.), and they are not highlighting enough important issues, such as climate change, fossil energy substitution (biomass), and rural employment, perhaps due to their complexity. In many parts of Spain, the structural problem of finding sustainable ways of managing forests economically, socially and environmentally is complex and still unresolved. There are many forests without management, where biomass accumulates and increases fire risk. The modernization of Spanish society changed forest uses and representations from those of the traditional agrarian societies more than 60 years ago.

Wildfires are seen in general from a negative perspective; coherently the messages about them are negative as well. However, a method need be found to disassociate wildfires with the view of forests in general, otherwise the negative image spreads across the forest sector, and the result is that forests themselves are regarded as negative for society because of the risk of wildfires. Wildfires need therefore to be treated clearly as natural risks and emergency issues. Conversely, the remaining messages should be more strongly positive, and there are sound reasons for this. During these years of financial crisis and extremely high unemployment in Spain, a sector that creates employment at a high rate by unit of investment (e.g., bioenergy) need be more visible in mass media and give very positive messages.

An imbalance between the quantity of news items and their themes in different parts of Spain is found, in parallel with the fact that forests and forestry differ greatly from one region to another. Hence, mass media

and public opinion should be monitored and analyzed region by region because they cannot be interpreted from the average results for the entire country. Public forest services, legislation, subsidies, they are all organized at the regional level, and thus it does the public debate.

Discussion of the sources

Forestry in Spain certainly doesn't have economic relevance, except for the northwestern region, and consequently, there is a weak forest stakeholder network, which is reflected by its low presence in mass media. Despite this, there has more recently been an increase in both forest owners and professional associations at the national and regional level, which could have generated a greater volume of news in the form of communication flows. However, these associations are not playing an influential role in mass media and only have a few mentions, slightly less than the share of the ENGOs. In some regions, forest platforms have been recently organized in order to give more visibility to the sector by presenting a single representative voice to be heard in representation.

As official sources contribute to over 50% of news items, journalists must be relying on their press releases, not questioning and contrasting their statements with other professional sources. This is partly because, regrettably, often the same journalist is reporting on such different themes, such as pine nuts and the harvesting of renewable energies, and consequently, the discussion loses quality.

Conclusion

Perception studies on forest issues should be complemented with mass media analysis as part of the basic information needed for sound decision making in the design, implementation, and review of communication strategies, either linked or not to National/Regional Forest Plans. Furthermore, content analysis methods for new media (blogs, multimedia, etc.) still need to be refined, in order to be able to automatize the processes, for the advantage of a permanent continuous monitoring.

Forest messages, other than those about wildfires, almost disappeared, and keywords such as sustainable forest management, forest owners, forest harvesting, forest products, etc. are rarely found anymore. Furthermore, new terms such as biomass, are not yet prevalent. Messages related to forest fires require deeper reflection and debate, for example on the balance between

the expenses for prevention versus suppression and the forest-urban interface, and should not tie them only to risk and emergency concepts. Social preferences, reflected into the mass media messages, have shown to be varied and linked to the geographical diversity.

In relation to sources, forest stakeholders (owners, professionals, companies, etc.) might be encouraged to improve their communication strategies if they wish to be more present in mass media and therefore, to gain influence on public perception and consequently, increase their lobbying power. Therefore, the news will gather broader viewpoints, and this will increase the value of news and its discussions. Furthermore, a holistic communication strategy should include a variety of sources, such as scientists (e.g., Rego *et al.*, 2010), forest owners, firefighters, and ENGOs (e.g., Greenpeace, 2009).

A crucial question remains on what type of a role mass media plays in how the society perceive and react to the full range of issues forests are facing (social, environmental and economic), their underlying causes as well as shaping the collective imaginary around them. Further research is needed to link the news with changes in perception through a regular monitoring of the mass media (a forest communication observatory might be suggested), not only of newspapers but of television, the Internet, etc. A specific, targeted approach might be appropriated in the case of forest fires.

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