

## Forest bioeconomy in the media discourse in Spain

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**Abstract:** The media can play a key role in shaping public opinion and setting a policy agenda by conveying and influencing public discourse. This article evaluates how the Spanish media has covered the topic of the forest bioeconomy and what kind of discourse it has produced and reproduced around it. For this purpose, we analysed the content of 204 national and regional newspaper articles. The results reveal the scarce penetration of the forest bioeconomy in the media and some weaknesses in the narrative production and communicative dimension. The discourse is mainly constructed by governments with a limited presence of multiple stakeholders and an absence of conflict and divergent or alternative views. In addition, the discourse only addresses regional or local problems within the framework of an extended and dominant paradigm of economic growth considering the forest bioeconomy as an opportunity to combat fire, rural abandonment, smallholdings, and poor forest management. We conclude that the media is not using its strategic potential and capacity as a public space. To become agents of change, the media should reflect a forest bioeconomy based on successful experiences of innovation and valorization, and adopt a transformative social vision that gives relevance to the interconnection between multiple stakeholders, forest multifunctionality, and rural development.

**Keywords:** forest bioeconomy; media coverage; stakeholders' vision; communication strategies; narrative patterns.

## INTRODUCTION

The bioeconomy is based on including applications from biology and their associated technological processes into production processes and consumption patterns to promote sustainable development (Ingrao et al., 2018; Sanz-Hernández et al., 2019). Implementing a bioeconomy model involves a broad integration of natural resources and associated sectors (e.g., agriculture, fisheries, biomedicine, forestry, bioenergy, etc.) into economic processes (Koukios, 2015). However, a successful transition to this model also entails the consideration of socio-political and cultural dimensions in order to engage and involve stakeholders and society as a whole.

The European Union established a Directive for promoting the Bioeconomy Strategy in 2012 (European Commission, 2012). In parallel, several EU members have worked on their own plans to promote the creation of national bioeconomy systems in their countries. However, although a great deal of effort has been devoted to this new concept, implementing bioeconomy actions remains a challenge. In this context, Spain is one of 30 European countries that have shown an interest in

developing a national bioeconomy strategy (Spanish Government, 2016a, 2016b). This interest is based on: a) the political concern in adapting to new global challenges and social transitions towards sustainable economic systems; b) the increasing importance of bioeconomy-related issues in the Spanish science system (FECYT, 2017); and, c) the significant contribution made by sectors such as agrifood or biomass to the national GDP (Lainez et al., 2018).

During the 2009–2014 period, Spain was ranked ninth in the world in bioeconomy research and the third country in the European Union, behind only the United Kingdom and Germany. Spanish national research in the field of bioeconomy accounted for 1% of the total production, which is 28% higher than the worldwide average. However, the increasing interest in the study of the bioeconomy reveals some shortcomings, such as the considerable gap in the analysis of several bio-resources and/or sectors (Sanz-Hernández et al., 2019), and the lack of correspondence between the study of the bioeconomy and the dissemination of its results and implications.

The forest bioeconomy involves generating economic value through the use of forest products (Wolfslehner et al., 2016). This topic is of great consequence because of the potential uses of forests to achieve a sustainable economic development but also due to the sustainability of forest.

Within the European context, there is a consolidated tradition of forest management (Schuck et al., 1994) that has resulted in several policies and strategies, such as the EU Forestry Strategy in 1998 (European Commission, 1998) or the EU Forest Action Plan in 2006 (European Commission, 2006). Although the study of the forest bioeconomy has recently expanded, there are still several gaps such as its low prominence in social sciences (Sanz-Hernández et al., 2019). Furthermore, it is still necessary to increase knowledge of the multiple functions of forests, the many goods and services that forests offer (besides the traditional ones such as timber, pulp, paper and by-products), and of the socio-political dimensions and cultural practices related to this field. In particular, there are still few empirical studies exploring the relationship between the transition to a bioeconomy model and the role and influence of the media in the process of building social meaning.

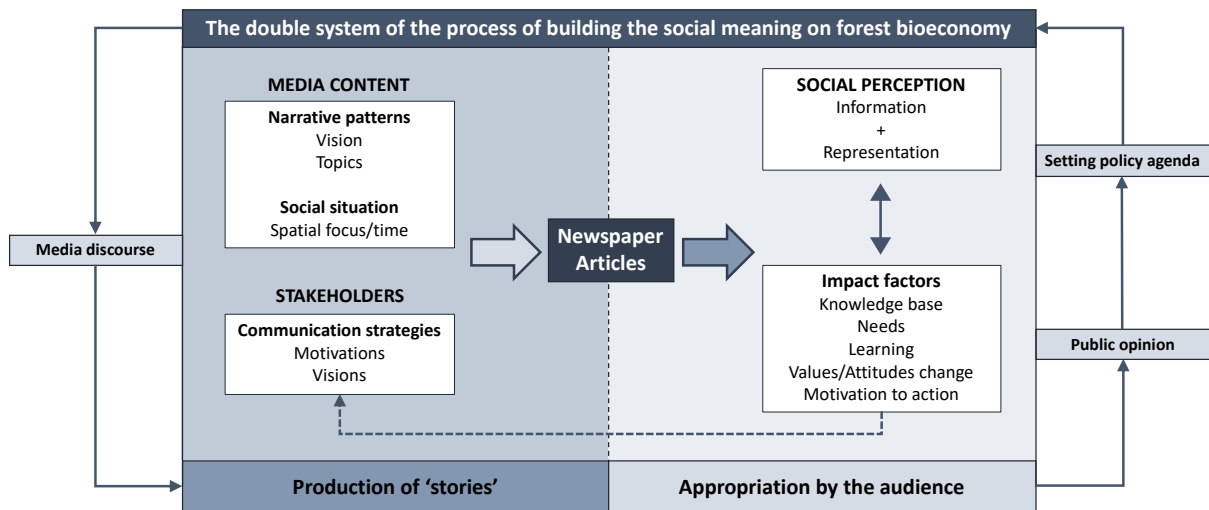
Although forests notably contribute to the Spanish economy, especially because of their link with the development of rural areas, general attention to these resources remains limited. The media still shows little interest in topics related to forest resources and their possible role as a potential solution for sustainable development in rural regions. Therefore, we believe that poor (or lack of) media coverage is a reflection of the slow progress of the development of the forest bioeconomy in Spain.

The media plays an essential role in focusing general public interest on specific issues (Baum and Potter, 2008) and in influencing social perceptions and setting public and political agendas (Cox, 2012; Sengers et al. 2010; McCombs, 2013; Lyytimäki et al., 2018). The aim of this work is to evaluate how the Spanish media has covered the topic of forest bioeconomy and what types of discourse have been produced and reproduced around it. For this purpose, we have examined the coverage of the forest bioeconomy in the press (print and digital) by analysing the main sources of information and public discourse of these sources (Dusyk et al., 2018). We have examined a total of 204 newspaper articles published up to July 2019 in the main national and regional newspapers in Spain.

The article is organised as follows. The second section expands on the theoretical framework supported by the relationship between the forest bioeconomy and media. The methodological framework is described in the third section. The results are presented in the fourth section, which is followed by the discussion in the fifth and the conclusion in the sixth.

## BACKGROUND AND THEORETICAL FRAMEWORK

Narrative, storytelling, and communication are essential human activities (Ricoeur, 1991; Bushell et al., 2017). Stories give meaning to events and actions and are always constructed with the audience in mind (Ricoeur, 1991). The construction of meanings (Gamson and Modigliani, 1989) is articulated in two essential systems: the production of stories (media discourses), and the appropriation by the audience (public opinion). Although in this study we have only focused on media discourses (Gerbner, 1985), a complete general framework is shown in Figure 1 to facilitate the understanding of the important link between public space and political communication (Ferry et al., 1992).



**Figure 1.** General theoretical framework to study forest bioeconomy on media.

Stories or ‘narratives’ are articulated in discourses, that are defined as ‘*an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and it is produced and reproduced through an identifiable set of practices*’ (Hajer and Versteeg, 2005, pp. 175). Discourses construct meanings and relationships and help to define a shared way of understanding the world, common sense, and legitimate knowledge (Dryzek, 2013). So, discourses are a vehicle of meaning and intermediation between individual and social spheres (Hermwille, 2016).

The transition to the bioeconomy is a gradual and non-linear process involving not only the dissemination of new technologies but also policies, user practices, and cultural discourses (Geels et al, 2017; Lyytimäki et al., 2018). Several studies addressing media discourses on environmental and sustainability issues have concluded that the media has a considerable influence on societal learning and on public agendas (Lewis, 2000; Holt and Barkemeyer, 2012; McCombs, 2013; Sadath and Rahman, 2016; Lyytimäki and Hildén, 2011; Mullally and Byrne, 2016). Some studies regarding bioeconomy issues have undertaken a discourse analysis on policy strategy and stakeholder positions (Giurca and Späth, 2017; Pülzl et al., 2014; Mustalahti, 2018).

Studies based on the role of the forest bioeconomy in media have only recently been published for the first time (Ranacher et al., 2019). In general, these studies that link the media and bioeconomy or the media and forest management have highlighted the following essential aspects: 1) the media has a significant influence on public perception of natural and environmental resources (Bengston and Fan, 1999) and contributes to the construction of public belief and attitudes (Happer and Philo, 2013;

Setyawati and Shaw, 2015); 2) the media can act as agent for social change (Hjarvard, 2008); 3) actors telling stories cannot control how narratives will be appropriated by the audience (Bushell et al., 2017), but the media can show different visions of the forest bioeconomy and thereby 'contribute to or lead' the design of the political agenda (Shanahan et al., 2008; McCombs, 2013; Setyawati and Shaw, 2015); 4) the media uses different bioeconomy narratives and creates diverse kinds of expectations (Peltomaa, 2018); and finally, 5) the media can focus on the conflicts (e.g., forest production vs. forest conservation) (Roos and Stendahl, 2016; Ranacher et al. 2019) or on the discussion between supporters of the 'non-intervention regime' and 'forestry approaches' supporters (Riedl et al., 2018).

For the purpose of this analysis, newspaper articles are considered as discourses (Gerbner, 1985; Conde, 2010; Abdullah, 2014; Sanz-Hernández, 2016) and contain messages that reproduce ideas and visions. The articles allow narrative patterns (narratives) to be identified. So, the media can be the key driver reflecting the positioning, framing, analysis, and proposals of stakeholders (Reed, 2008; Sanz Hernández, 2019a). In this paper we focus on two relevant aspects of the analysis of media content: stakeholder motivations and stakeholder visions.

Stakeholder motivations are very important because they incorporate the stakeholders' needs that are directly influenced by the public or media debate (Sténs et al. 2016; Sanz-Hernández, 2019b). Furthermore, there is a close connection between stakeholder motivations and the communication strategy, for example, on how the author of the speech (for example, a newspaper article) structures the communication for a specific reason and purpose (Sanz-Hernández, 2016). In this sense, Habermas (1984) makes a distinction between 'egocentric' communication actions, which are based on personal strategic calculation (their own particular interest), and communication actions based on general reasons and arguments. Stakeholders can try to legitimise their own ideological positions and objections (egocentric actions). On the other hand, they can reflect or propose solutions (arguments based on actions) (Sanz-Hernández, 2016).

The second relevant aspect is the stakeholders' visions regarding the bioeconomy phenomena. Bioeconomy is a highly diverse and ambiguous topic in scientific literature (Bauer, 2018). Three main academic discourses can be identified: a bio-technology vision, a bio-resource vision, and a bio-ecology vision (Bugge et al., 2016; D'Amato et al., 2017; Meyer, 2017; Staffas et al., 2013). Just recently, a social vision of the bioeconomy has been offered as a new approach, but much work on this issue is still necessary (Aquilani et al., 2018; Sanz-Hernández et al., 2019).

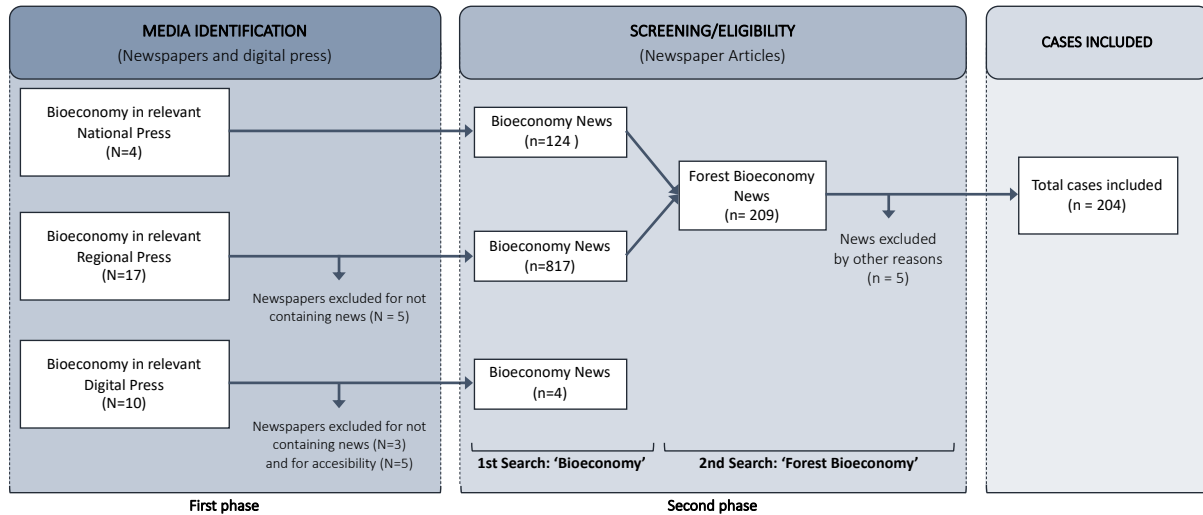
Bioeconomy is also a strongly debated topic. An example is the way in which academic literature has questioned the ecological and social sustainability of the bioeconomy model (Birch et al., 2010; McCormick and Kautto, 2013; Levidow, 2015; Kröger and Raitio, 2017). The scientific debate on sustainability is based on different bioeconomy visions and concepts (Pfau et al. 2014; Birner, 2018), on the stakeholders' interest and participation (Peltomaa, 2018), and on the best ways towards a transition to a sustainable model (Kensicki, 2004). Therefore, there is a need for an analysis of the media coverage of this debate from a critical point of view to establish whether the media shows a positive or negative vision of the bioeconomy, and whether it proposes solutions or merely poses problems.

## **METHOD**

Jasanoff (2015) has suggested that the analysis of newspaper articles can be an efficient approach to gather socio-cultural and socio-technical information. The study of news articles has been used in the

environmental field, and even in forestry, to analyse media discourses (Fabra-Crespo and Rojas-Briales, 2015; Irwansyah, 2016; Wei et al., 2016).

To understand the various media discourses, qualitative methods of data collection and analysis are highly appropriate (Sovacool et al. 2018). We have therefore collected and analysed a total of 204 press articles from the main national and regional daily newspapers (print and digital press) in Spain. The process of constructing the newspaper sample is shown in Figure 2.



**Figure 2.** Flow diagram of the news selection process

\*N= number of newspapers, n= number of newspaper articles

Initially, a total of 10 digital newspapers were selected. These have the largest circulation and readership in the country. Subsequently, a total of 21 print newspapers were selected, of which 17 were regional newspapers and 4 were national. The newspaper selection is based on three criteria: a) the relevance or the highest average print-run and the highest average circulation in both print and digital format (information from the *Oficina de Justificación de la Difusión*, OJD, an audit bureau of circulation responsible for accountability in media monitoring); b) the accessibility of articles, determined by their availability; and finally, c) their regional representation. Furthermore, media identifiable with specific ideological trends were considered in the selected sample even though this was not a criterion (Nogales and Mancinas, 2014).

*El País*, *El Mundo*, *La Vanguardia*, *La Voz de Galicia* and *ABC* are, in this order, the most read (non-sports) newspapers in Spain with the highest print-run and circulation figures. *El País*, *El Mundo* and *ABC* are national newspapers published in Madrid and considered newspapers of record in Spain. *La Vanguardia* and *La Voz de Galicia* are published in Cataluña and Galicia, respectively, and they are also considered newspapers of record in these regions. Other regional newspapers were also chosen because of their high average circulation.

Once the newspapers were selected, the relevant articles were chosen in a two-step process. In a first phase, the keyword ‘bioeconomy’ was entered in the search engines of all the newspapers. With this information, in a second phase a new search was conducted with the keyword ‘forest’. Although there are a high number of articles on forests in the national press (Fabra-Crespo and Rojas-Briales, 2015), we only focus on articles that expressly mention the word ‘bioeconomy’. The use of the keyword ‘bioeconomy’ could be seen as a limitation, due to the existence of several expressions that can refer to the same thing (e.g., bio-based economy or green economy). However, we believe that with this

keyword we can assess the penetration of this notion in the media. Furthermore, ‘bioeconomy’ is the most widespread expression in the regulatory and strategic framework.

Our search took place in July 2019, without any time limit so as to be able to analyse the development of forest bioeconomy news over time. The inductive and interpretative methodological framework (table 1) combines two types of data analysis that represent different degrees of structure (Sovacool et al. 2018, pp. 30) to analyse a large journalistic corpus from a threefold approach: chronological, thematic, and the stakeholders.

**Table 1.** Qualitative methodological framework to data collection and analysis to study forest bioeconomy (themes, visions and narrative patterns) in media discourse.

DATA COLLECTION	DATA ANALYSIS				
	CONTENT ANALYSIS Codification with a priori codes		NARRATIVE ANALYSIS To search for the meaning of narrative patterns through analysis of similarities, differences and interactions in media discourse		
Sample selection Screening/eligibility process	Data attributes	Codes	Subcategories	Similarities, differences, interactions	Conceptual category
News	Date Year Trimester	Date of publication	Time	Narrative patterns	Media discourse
	Newspaper	Print/Digital Press	Press		
	Global National Regional Local Rural	Scope	Spatial focus		
	Government/political parties Experts Social agents Private sector	Main actor in news	Stakeholders*		
	Fires Biofuels Biomasa Forestry Climate change Rural development Public Policies	Topics	Themes		
	High Medium Low	Centrality bioeconomy topic	Centrality		
	Legitimising Instructive-Dissemination Assertive Reflective Proactive	Motivation	Communication strategies		
	Problems Solutions Neutral	Intention			
	Biotechnology based Bioresources based Bioecology based Social based General	Bioeconomy Vision	Vision		
	Positive Negative	Bioeconomy position			

\*When analysing the leading figures in public interaction, we chose to incorporate the stakeholders’ approach based on Freeman’s original concept (Freeman, 1984). They are defined as impacted groups or individuals who influence others in the field in question. From an empirical standpoint, the stakeholders we have considered are only those who have expressed their opinion publicly. Unlike in other studies, rather than being selected by the researchers, the stakeholders depend on the selection of journalistic cases and contexts (newspapers and articles).

The most highly-structured type is the classical content analysis with pre-existing codes (Bernand et al., 2016). The a-priori analytical categories (data attributes and codes) were identified during the review process. Then, a database and MaxQDA software support allowed us to analyse the data attributes connected with the theoretical framework of the forest bioeconomy. Finally, we

systematically identified the themes and visions in the articles and reported this information numerically or graphically (Prior, 2008).

We also carried out a narrative analysis that, despite being less structured, is more appropriate for an in-depth study of the ‘storylines’, narrative patterns and discursive positions that stakeholders and media use to frame (i.e. perceive and / or communicate about) the forest bioeconomy. Discourses are inferred from similarities, differences and interactions of collected data.

## **RESULTS**

The analysis provided information on the coverage by the Spanish media of forest bioeconomy issues. Table 2 presents the information of the media exposure and the current status of the forest regulation and bioeconomy strategy of each territory to which the collected news refers.

A preliminary outcome from the analysis shows a significant difference in the coverage of the forest bioeconomy between digital and print press in Spain. While there is considerable interest in bioeconomy issues in the print press, the digital press shows little or no interest. We only identified 4 articles in the digital press regarding bioeconomy issues (*El Confidencial* - 3 news items, *Público* - 1 news item). However, none of them specifically addressed the forest bioeconomy. In the case of the print press, we found 941 news articles on bioeconomy of which 22% covered issues related specifically to the forest bioeconomy.

Once the articles were identified, we started analysing their content and narrative patterns by using a three-dimensional analytical approach: chronology and spatial focus, stakeholders’ perspective, and themes and visions.



**Table 2.** Characterisation of coverage media on forest bioeconomy and Spanish regulatory and strategic framework

Scope	Newspaper* (Autonomous community)	Number of articles found searching for the term 'bioeconomy'	Number of articles found for the term 'forest' within bioeconomy	% of forested area**	Forest Regulatory Framework and Forestry Plan	Bioeconomy Strategic Framework
<b>Digital National Press</b>	Público	1	0	36.3	Law 21/2015, of 20 July, which amended Law 43/2003, of 21 November, on Woodland ('Montes') Spanish Forestry Plan 2002-2032	Spanish Strategy on Bioeconomy (2016)
	El Confidencial	3	0			
<b>National Press</b>	El País	33	7			
	ABC	36	6			
	El Mundo	28	4			
	La Razón	27	4			
<b>Regional Press</b>	La Vanguardia*** (Cataluña)	456	104	49.5	Law 6/1988, of 30 March, on Forestry of Catalonia Catalonian Forestry Plan (2014-2024)	Catalonian Strategy on Bioeconomy (2021-2030)
	La voz de Galicia (Galicia)	67	32	49.2	Law 7/2012, dated 28 June, on Woodland of Galicia Galician Forestry Plan	Included to Galician Smart Specialization Strategy (RIS3) Galician Strategy on Circular Economy (2019-2030)
	El Correo (Basque Country)	11	4	54.8	Law 16/1994, of 30 June, on the Conservation of Nature in the Basque Country. Law 3/1998, of 27 February, on General Protection of the Environment of the Basque Country. Basque Country Forestry Plan 1994-2030 Araba - Foral Norm on Woodlands 11/2007 Bizkaia - Foral Norm on Forests and Administration of Protected Natural Areas Gipuzkoa - Foral Norm on Woodlands 7/2006	Basque Alliance for Bioeconomy Circular Economy Strategy of Euskadi 2030
	Levante (Autonomous Community of Valencia)	42	20	32.2	Law 13/2018, of 1 June, which amended Law 3/1993, of 9 December, Forest of Valencian Community	
	Heraldo de Aragón (Aragón)	10	0	32.3	Law 3/2014, of 29 May, which amended Law 15/2006, of 28 December, on the Woodland of Aragón Aragon Forestry Plan (in progress)	Included in the Aragón RIS3 Smart Specialization Strategy Climate Change Strategy of Aragón Circular Strategy of Aragón
	La Nueva España (Asturias)	46	5	42.8	Law 2/2017, of 24 March, and Law 6/2010, of 29 October, which amended Law 3/2004, of 23 November, on woodlands and forestry management.	Included in the Asturias RIS3 Smart Specialization Strategy
	Hoy Extremadura (Extremadura)	41	5	45.6	Included in the Law 6/2015, of 24 March, on Agriculture of Extremadura.	Green and Circular Economy Strategy of Extremadura 2030
	El Norte de Castilla (Castile and Leon)	40	7	31.3	Law 3/2009, of 6 April, on woodlands of Castilla y León.	Bioeconomy Program of Circular Castilla y León
	El Diario Montañés (Cantabria)	19	2	39.7	Law 5/1990, of 26 March, in Pastures on woodlands of Cantabria.	Circular Economy and Bioeconomy Strategy of Cantabria - In Process
	Diario de Navarra (Navarre)	24	2	41.9	Foral Law 3/2007, of 21 February, which amended Foral Law 13/1990, of 31 December, for the Protection and Development of Forestry Heritage of Navarra.	Bioeconomy Strategy
	La Verdad (Murcia)	47	4	27.2	Forestry policy action plan 2016-2020	Regional Strategy of Circular Economy
	Diario de Mallorca (Balearic Islands)	7	2	37.4	Law 3/2019, of 31 January, which amends Law 12/2014, of 16 December, on Agriculture of the Balearic Islands. Forestry Program of the Balearic Islands 2015	Included in the Balearic Islands RIS3 Smart Specialization Strategy
	Canarias 7 (Canary Islands)	7	1	17.7	Forestry Plan of Canary Islands 1999	Included in the Canary Islands RIS3 Smart Specialization Strategy
<b>Total</b>		<b>945</b>	<b>209</b>	<b>100</b>		

\* The print newspapers without articles related to the search 'bioeconomy' were Diario Sur, El Periódico de Extremadura, PeriodicoCLM, La Tribuna de Toledo and La Rioja. The digital media without availability of online consultation were El Español, Eldiario, Ok Diario, Libertad Digital and Periodista Digital. The digital media without articles on bioeconomy were Yahoo El Huffinston Post, Economía Digital and Voz Populi. Finally, the Heraldo de Aragón (print media) did not contain any news articles with the keyword 'forest bioeconomy'.

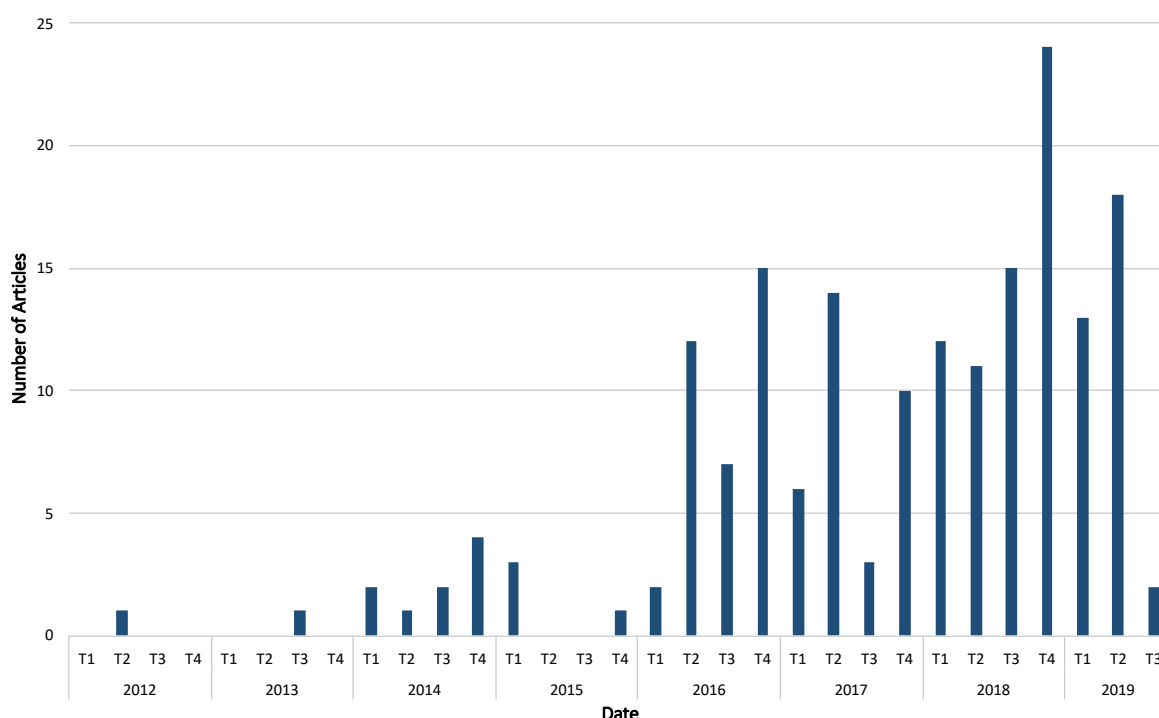
\*\*The % of forested area is included to represent the potential of this sector in each autonomous community. Data obtained from the Anuario de Estadística Forestal (Forestry Statistics Yearbook), 2018.

\*\*\* La Vanguardia is a newspaper edited in Catalonia, but it also covers national information from all the autonomous communities in Spain.



### Chronology and spatial focus: the increasing regional impact of forest bioeconomy

Our analysis reveals that the first article dealing with forest bioeconomy dates back to 2012, coinciding with the promulgation of the Directive for promoting the European Bioeconomy Strategy. However, it is in 2016 when the number of articles begins to grow, coinciding with the launch of the Spanish Bioeconomy Strategy. From 2016 onwards, a considerable rise in the publication of articles related to the forest bioeconomy is observed, which has become consolidated since 2018 (Figure 3).



**Figure 3.** Chronology of articles published on forest bioeconomy

The spatial analysis highlights how the coverage of the bioeconomy is mainly in the regional press rather than national newspapers. Of the total number of items identified, 128 articles (13.5%) were published in the national press, while 817 articles were published in regional media (86.5%). The differentiation in the coverage of the bioeconomy in general becomes even more evident in the case of the forest bioeconomy. The results show that the impact of this topic in the national press is minimal, with only 21 published articles (10%).

Another relevant result is that most of the articles appear in three regional newspapers: in Catalonia (*La Vanguardia*), Galicia (*La Voz de Galicia*) and the Autonomous Community of Valencia (*Levante*). This result can be explained by various circumstances: i) the economic importance of forests in these regions (MAPA, 2019); ii) the existence of a regional regulatory framework for forest management; iii) the fact that bioeconomy is a main issue in the political agenda in these regions (see table 2); iv) the existence of forest-related organizations (e.g. the platform ‘Juntos por el Bosque’- ‘Together through the forest’); and finally, v) the large impact of forest fires in these regions during the last decade, some examples being the big fires in Catalonia (2018), Galicia and Asturias (2017), or Valencia (2012).

The themes of the articles concern regional forest bioeconomy issues in the vast majority of cases. In total, about 96 news articles provide a regional analysis of the forest bioeconomy (48%), 38 have a national scope (20%), and 44 cover international issues (22%). Finally, 22 articles cover local issues or make no specific reference to any particular area of study (10%).

### **Bioeconomy actors and communication strategies: experts, reasons, and arguments**

The analysis has allowed us to study the emphasis and relevance that the media places on the various actors and their roles regarding bioeconomy issues. We have identified the main groups of stakeholders, their motivations, and communication strategies.

1. **Governments and political parties.** This group includes the stakeholders with the highest visibility in the analyzed articles, although they are usually accompanied by other forest actors such as experts. We have identified a total of 81 articles (41%) reporting on legislation, regulations, and political opinions relating to forest bioeconomy topics. The participation of governments and politicians at a local and regional level is especially worth mentioning. Most of these articles are based on forest planning and on the link between forests and sustainability. However, it is worth mentioning that in most of these articles the political discourse does not play a central role.

2. **Experts.** The influential and continuous participation of experts is also noteworthy (58 articles, 28%). Experts are represented in opinion articles, interviews, or forums and provide relevant and in-depth analysis. From a technical standpoint, they communicate on the current situation of forests, explain research on the quantification of forest resources and services, or propose dissemination actions for participating in the debate on environmental and forestry policy and planning. This group has changed its discourse from a technical to a more social vision emphasising global challenges such as climate change, the social benefits of forests, governance challenges, and the demographic threat.

3. **Social agents.** This heterogeneous group includes private individuals, lobbying organizations, associations, and NGOs. These stakeholders have a lower impact on the written press, even though the number of articles is not negligible (22%). In general, their messages are based on individual and local problems, and on the opinion of certain collectives (NGOs) on development problems or sustainability. This group includes articles on events organised by associations (e.g. professional associations of the timber sector, communicating their claims). NGOs also criticise the indolence in forest management, rural abandonment, and the lack of participation in the design of forest policies (e.g., Forest Platform Valenciana). Finally, social agents lead the articles that report conflicts and tensions between forest actors; for example, between ecologists and companies (e.g., *Bierzo Aire Limpio* against *Forestalia* in Galicia).

4. **Private sector.** This group accounts for 9% of all the articles and its participation is quite low. These articles refer to innovative companies whose business focuses on forest bioeconomy. Most of these articles are interviews that spread awareness of the companies' business and their relevance.

In general, the main discourse of the articles stresses the need for improvements in forest management and in the use of forest resources for promoting sustainable development. Although most of the articles share similar ideas, they reveal notable differences in their communication strategies depending on the stakeholder group (Table 3). Through the analysis of the agents' motivations and their communication strategies, we can state the following conclusions:

a) in general, political parties do not pay much attention to forest bioeconomy issues. The news items reveal that this topic is not yet included in the political agenda despite the establishment of a broad regulatory and strategic framework at both regional and national levels.

- b) associations and lobbying organizations warn about the mismanagement of forests and the need for implementing forest reforms which include public participation.
- c) theoretical articles analyzing bioeconomy and its contributions are written by technicians and experts and, in general, there is a small group of people authoring most of the articles. These articles provide the best analysis of the bioeconomy and the need for implementing a bio-based economic model.
- d) the vast majority of articles (69%) use proactive and reflective communication strategies. This communication is based on reasoning and arguments to build consensus.

**Table 3.** Stakeholders' motivations and communication strategies

Communicative Action	Communication strategy	Description	Main stakeholder And presence in each issue (%)	Presence in media (% of the total)
<b>Communications actions based on egocentric calculations of utility</b>	<i>Legitimising strategy</i>	It proposes the defense of ideological positions, hence its analysis can reveal the power dynamics between different actors.	Government/political parties (50%)	3%
	<i>Instructive-dissemination strategy</i>	It focuses on procedures to reduce the problems and to transition to bioeconomy by emphasizing the need for training and instructing. It emphasises importance of the information dissemination and social learning.	Experts (50%)	12%
	<i>Assertive strategy</i>	It adopts an oppositional or alternative discourse calling for protest, rebellion or where to lay the blame	Social Agents (47%)	16%
<b>Communicative actions based on reason and argumentation</b>	<i>Reflective strategy</i>	It includes a variety of texts that ranged from description/quantitative analysis, either by experts or the media, using official sources, to texts from more qualitative approaches which aspired to show all the main facets of forest bioeconomy. Frequently, it incorporates a critical social attitude, looking to gain recognition and build consensus.	Experts (58%)	31%
	<i>Proactive strategy</i>	It includes theoretical proposals for improvement or action strategies to solve problems in forestry sector from bioeconomy approach.	Government (39%) Experts (28%)	38%

### Topics and visions: Solutions to combine sustainability and economic growth

In this sub-section we extend the previous analysis by examining the main themes covered in the articles. This analysis has allowed us to identify the specific interests in the media (table 4) and the vision of the forest bioeconomy that predominates in the information provided (table 5).

**Table 4.** Main topics on articles about forest bioeconomy

Scope	Newspaper	Main Topic							
		Fires	Biofuels	Biomass	Forestry	Sustainability - climate change	Rural development	Public policies	Others*
National Press	<i>El País</i>	0	0	0	4	2	0	1	0
	<i>ABC</i>	1	0	0	3	2	0	0	0
	<i>El Mundo</i>	3	0	0	0	0	0	0	1
	<i>La Razón</i>	2	0	0	0	0	0	2	0
Regional Press	<i>La Vanguardia</i>	13	4	9	15	32	4	16	11
	<i>La Voz de Galicia</i>	1	2	4	8	4	1	8	4
	<i>El Correo</i>	0	0	0	2	0	0	0	2
	<i>Levante</i>	5	0	0	0	3	7	2	0
	<i>La Nueva España</i>	0	0	0	2	1	0	2	0
	<i>HoyExtremadura</i>	0	0	0	0	2	0	2	1
	<i>El Norte de Castilla</i>	0	2	0	1	1	1	1	0
	<i>El Diario Montañés</i>	0	0	0	0	1	0	0	1
	<i>Diario de Navarra</i>	0	0	0	0	0	2	0	0
	<i>La Verdad</i>	0	0	0	0	2	0	2	0
	<i>Diario de Mallorca</i>	0	0	0	0	0	0	1	0
	<i>Canarias 7</i>	0	0	0	0	1	0	0	0
Total		25	8	13	35	51	15	37	20

\*The item that refers to other types of news mostly comprises articles on activities and/or talks and conferences by experts and politicians, which are disseminated within the context of the forest bioeconomy.

The most extensively explored topic in the context of the forest bioeconomy is the concept of sustainability, a very relevant and transversal issue explicitly or implicitly linked with climate change. To date, the Eurobarometer survey (European Commission, 2019) shows that 89% of Spaniards perceive climate change as a serious problem compared to 79% of Europeans. This perception is reflected in the media, and it has been covered at both national and regional levels. The bioeconomy is presented as an alternative for the future in order to contribute to increasing resilience to the impact of climate change and to generate environmentally friendly added value from sustainable production systems that use biological and waste-based resources (biomass).

In addition to articles focusing on sustainability, other topics have also been addressed, such as forest fires. A relevant group of articles (12%) highlights the idea that a forest-based bioeconomic model could prevent and reduce these catastrophes. However, most of the articles on fires do not contain a detailed analysis of their economic and social impact.

There is also an important group of articles reporting regional and local policies. The focus of most of these articles is on solutions that the forest bioeconomy can provide to rural regions, especially to prevent fires or rural abandonment. Finally, many articles show a significant interest in different forest bioresources.

Finally, to extend the analysis, we have studied the relevance of the visions of the bioeconomy in the analyzed articles. We have considered a high (48%) or a medium (33%) focus depending on how much they have concentrated on the forest bioeconomy (Table 5).

This analysis has allowed us to observe the existence of two predominant visions of the forest bioeconomy. The first, covered by 25% of the articles, focuses on forest resources and in including raw materials in production processes to achieve a sustainable development. This corresponds to significant media interest in different forest bioresources (Table 4). The other recurrent vision is based on social sustainability, promoting inclusive local practices and social engagement. These two visions that are covered by almost 50% of the articles address the issue of sustainability from different perspectives. The perspective of 19% of the articles focuses on technical innovations to promote economic growth. Finally, only 4% of the articles have an ecological perspective.

**Table 5.** Predominant visions in forest bioeconomy

Bioeconomy vision	Description	Visibility (% presence in news with high or medium centrality)	Spatial focus
<b>Forest bioeconomy based on technological innovations</b>	Economy based on research and technological innovation for economic growth and industrial development. Development of competitiveness and generation of employment.	19%	Global/National
<b>Resource-based forest bioeconomy</b>	It focuses on processing and upgrading of biological raw materials, replacing non-renewable resources and establishing new value chains. Sustainable economic growth.	25%	Local/rural
<b>Forest bioeconomy with an ecological vision</b>	The bio-ecology vision highlights ecological sustainability processes that optimise the use of bio-resources, promoting biodiversity, and avoiding monocultures and soil degradation.	4%	Global/National
<b>Forest bioeconomy with a social vision</b>	The socioecologic vision highlights social sustainability processes that promote inclusive local practices, and social engagement to transform.	23%	Local/rural

To complete the analysis, it is important to evaluate the existing gaps in the articles' contents. We have not identified articles with a negative perspective of the bioeconomy model. All the articles present the bioeconomy as an opportunity for economic growth, and just 9% mention problems regarding the implementation of a bioeconomic model (e.g. water shortages or insufficient resources to supply the forest industry). Furthermore, the articles are general and do not include more detailed analysis of forest management or the different possibilities of new bioresources. The press articles do not appear to feature the multifunctional possibilities of woodland and forests and all the goods and services that could be exploited. Only 6% of the articles have related forests with emerging markets, business models, or resources for rural development from the perspective of the forest bioeconomy.

## DISCUSSION

The analysis has allowed us to observe the different narratives regarding the forest bioeconomy in the Spanish media. The first narrative represents the bioeconomy as an 'opportunity'. Some articles argue that the forest bioeconomy provides an opportunity for economic growth and, in some regions, will reduce the demographic vulnerability of rural and unpopulated areas. In general, these articles are positive about the bioeconomic model.

Another recurrent narrative considers that the bioeconomy may be essential to guarantee economic growth and promote employment in rural areas. This 'growth' narrative appears in articles where the perspective is based on bioresources and biotechnologies. In contrast to the previous narrative where bioeconomy is seen as an 'opportunity', this one emphasizes technological innovations as the base on which to improve industrial competitiveness. In general, this second narrative has a national and even global focus compared with the local and regional focus of the bioeconomy as an 'opportunity'. The third narrative refers to the promotion of rural territories. This narrative has gained visibility from 2017 onwards, in parallel with the increased political interest and the inclusion in the Spanish political agenda of depopulation issues. In the press, depopulation appears as the main reason for forest abandonment and mismanagement. As this narrative has become more important, other items have been incorporated such as gender (including the role of women in the new productive model), inclusion, social engagement, or the 'lack of voice and representation of forest spaces'. The articles with this narrative are the most assertive, calling for political measures to protect forests, to prevent fires and to achieve efficient management of forest resources.

Another group of narratives, not as recurrent but very relevant, stresses the development of skills and competencies that the implementation of the bioeconomy brings about. This narrative appears late in the articles and ranges from news items related with experts' meetings and associations reporting on regional and local R&D projects, to articles analyzing successful business and training initiatives in forest bioeconomy.

All these narratives (bioeconomy as an 'opportunity', bioeconomy as 'growth', inclusive bioeconomy focused on social and territorial demands, and skills for the bioeconomy) articulate the most widespread and dominant discourse about the forest bioeconomy. The presence of this discourse is increasing in the media. However, the rise in the number of articles is not supported by other data that could allow us to state that the media is acting as an active agent for social change (Hjarvard, 2008), encouraging debate towards a new productive model. On the contrary, the media discourses contain weaknesses that are reflected in three findings:

- a) It is the government who is most concerned to report on forest bioeconomy issues. In the case of Spain, very relevant actors as such as the private sector and civil society (e.g., experts, NGOs, or associations) are not actively participating in this public debate through the media. Furthermore, the media has not covered the conflicts of interest among stakeholders (mainly between ecologists against biomass industries, and between ecologists and governments), despite the fact that these conflicts can become one of the main threats to the new productive model.
- b) What is being said about the forest bioeconomy is reflected in an official and dominant political discourse that emphasizes the benefits of a bioeconomy model as a political and economic option combining sustainability and economic growth. However, there is a lack of coherence between the objectives of the 2018 EU Bioeconomy Strategy and the messages about the forest bioeconomy in the media. The EU strategy is based on sustainability and circularity ideas, but the media discourses are mainly reproducing the economic vision without addressing clearly the concept of circularity. More harmonised and comprehensive information in the media discourse is required to overcome the clear imbalance in the Spanish media coverage regarding the three-dimensionality that defines the notion of sustainability. Similarly, some key issues such as the role of the media in expanding social knowledge of the industrial symbiosis, sectoral convergence, or the valorisation of forest bio-waste remain pending.
- c) Stakeholders' motivations and communication strategies show a poor diversity. The strategy most commonly used by stakeholders to convey messages is the expression of their proactive personal and institutional positioning. The media is not showing its strategic potential and capacity as a public space (Ferry et al. 1992). Generating a rich in-depth public debate requires the participation of multiple stakeholders. Additionally, it is essential to cover all positions and opinions and to highlight the main problems associated with forest bioeconomy that still do not have enough visibility on the public agenda (McCombs, 2013; Setyawati and Shaw, 2015). The Spanish media has not covered the different conflicts between linked stakeholders and critical analyses. To become agents of change (Peltomaa, 2018), the media has to reflect a forest bioeconomy based not principally on theoretical proposals and reflective analysis, but also on successful experiences of innovation and valorization, and experiential and practical strategies that can have a major impact on society. Likewise, the media should adopt a transformative social vision of the bioeconomy focused on new systems of governance and management oriented to all stakeholders, the multiple functions of forests, and rural development.

## CONCLUSIONS

The role of the press in the social representation of the bioeconomy has been insufficiently studied. The aim of this paper was to examine how the press in Spain has covered news related to the forest bioeconomy. The paper concludes by highlighting three factors related to the scarce penetration of this subject in the Spanish press: the low visibility in the media, the lack of depth and richness of the content of communication, and the limited presence of different approaches and participating actors. Thus, current media discourses reflect the limited importance that issues concerning forests have for politicians, for journalists and also for civil society.

In Spain, stakeholders seem to ignore the fact that the media can influence what society thinks and what it concerns itself with (Irwansyah, 2016). They are not using the media to build public opinion around the forest bioeconomy but neither is the media acting as an active agent. To build social meaning for the forest bioeconomy (production of stories and appropriation by the audience) requires from multiple stakeholders to be continuously interacting with each other in a constant consensus/dissent scenario.

The analysis has allowed us to conclude that current communication on bioeconomy issues is failing within the process of construction, implementation, and promoting social acceptance of the 'bioeconomy model'. This failure in the communicative dimension can reduce the effectiveness of societal transformation.

The Spanish case reveals two main flaws in the communicative strategy on the forest bioeconomy. First of all, public debate should be placed at a national scale and be led and coordinated from the national government level in close collaboration with regional governments that also have forestry and economic competences (see forest regulatory and bioeconomy strategic frameworks in table 2). Debate is currently placed at local and regional levels, attracting little interest from the national and online press. Second, there are several communicative gaps in three determining aspects for advancing towards a forest bioeconomy model in Spain.

Firstly, there is a decoupling between research and the transfer and effective communication of the research results. Spain is making significant progress in research but our study reveals that communication and dissemination of knowledge and innovation relating to forest bioeconomy issues is very limited. Current messages focus excessively on traditional forest resources (e.g., timber, paper) without communicating new advances and innovations. The socialization of this information is key to inspiring confidence and building future scenarios. To close the gap between scientific knowledge and the message requires a closer link between journalists and scientists and the development of joint work. This will improve the design of messages for a better understanding of the informative content (complex and specialized), and will also give space to new communicators in a debate currently monopolized by politicians and experts and by using a distant or very specialized language. This requires more effort to build a social meaning for the forest bioeconomy (the production of messages and shaping of public opinion), since the mere repetition of messages does not improve the efficiency of communication or increase the desire to participate in the public debate among the multiple stakeholders.

Secondly, there is also a disconnection between policy level and the business level. Media discourse lacks messages that emphasize the interaction between the strategic political frameworks, the strategies and innovative capabilities of businesses, and the reality of forests (immersed in problems such as poor management, fires, smallholdings, and rural abandonment).



Thirdly, the media has to make visible the need to strengthen links between the various parts of the forest value chain (input supply, production, trade, and consumption or disposal) and between actors (input/technology providers, forest owners, processors, buyers, retailers and users/consumers).

In summary, this paper provides evidence to conclude that despite the incipient importance of the forest bioeconomy and its growing presence in the media, the stakeholder's efforts in terms of communication are neither sufficient nor adequate to move towards a forest bioeconomy model. There is a need for multiple stakeholders (especially policy-makers, entrepreneurs and journalists) to engage and work closely together to improve communication.

Finally, this study has focused on media discourses but has not analysed other processes of building social meaning for the forest bioeconomy (such as public opinion or social perceptions). This limitation can be overcome by carrying out further studies to evaluate audience appropriation. Furthermore, it is necessary to bring together perspectives from different countries to allow a broader audience to reflect on practices and perceptions in their own context.

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