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Authoritarian Environmentalism as Reflected in the Journalistic Sourcing of Climate Change Reporting in China

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ABSTRACT

This study investigates how Chinese news media cover climate change through the lens of authoritarian environmentalism, China's alternative model of environmental governance. Combining computational methods and manual coding, we analyzed the sourcing patterns of climate change articles across three news media types (party media, financial media, and metropolitan media) from 2013 to 2021. Results showed three features: First, state officials were predominant in all sourcing categories, drowning the voices of experts, non-governmental organizations, and citizens. Second, only a small percentage of sources concerned scientific knowledge, environmental problems, and collective action. Instead, most highlighted climate change campaigns as achievements of China's leadership. Third, critical opinions were gradually muted over time. These findings indicate that the issue of climate change has been utilized by Chinese news media as a tool to serve the legitimacy of authoritarian governance and promote the image of top leadership, rather than encouraging citizens and stakeholders to participate in environmental actions.

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In facing the global crisis of climate change, governments, politicians, institutions, and organizations have incorporated relevant discussions into their discourses. In the Western context, the issue of climate change has been a subject of partisan debate, and there is a significant presence of climate change skepticism and denial in the society (Dunlap, 2013). In contrast, China's model of "going green" represents an alternative way of governing environmental issues. The one-party system in China relies on ideological consensus, and the climate change issue is no exception. Since 2007, "ecological civilization" has become an explicit goal of the Chinese Communist Party (CCP) and is expressed in environmental governance frameworks, propaganda ploys, and eco-socialist blueprints (Chen & Zhao, 2022). Under President Xi Jinping's rule, the importance of ecology and sustainable development has been enshrined and incorporated into the country's political philosophy.

Against this backdrop, it is imperative to evaluate China's unique model of environmental protection. In this study, we examine China's climate change governance from the perspective of media coverage, which influences public opinion and is used by the CCP as an important tool for governance. Specifically, we focus on the sourcing patterns of climate change coverage because they reveal the actors who are heard regarding this issue. Previous studies on climate change reporting in China have seldom focused on sourcing practices, instead concentrating on news frames and language styles (e.g. Pan et al., 2021; Xie, 2015). Although climate change sourcing is only a tip of iceberg in China's whole environmentalism discourse, it plays an important role in conveying information

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to the audience, setting the public's agenda, and constructing people's beliefs, all of which exert a long-term influence on society.

Our analysis relies on a rich set of longitudinal data (2013–2021) on climate change across three types of news media: party media, financial media, and metropolitan media. We examine three dimensions of climate change sourcing patterns: sourcing categories (i.e. who are the sources), quotation topics (i.e. what are the sources talking about), and quotation attitudes (i.e. whether the sources employ a critical tone). The findings show that climate change sources in Chinese media are dominated by political figures who actively support the legitimacy of authoritarian governance rather than promoting scientific debate and encouraging stakeholders to take actions. An alarming finding is that, during recent decade, China's authoritarian approach to combating climate change is increasingly facilitated by the media system and its selected sources. Journalistic sources who used to debate the country's environmental policies have been removed from the media agenda. We discuss these findings through the theoretical lens of authoritarian environmentalism (Li & Shapiro, 2020) and propose a model to summarize how Chinese media strategically use sourcing to support authoritarian environmentalism.

Authoritarian environmentalism and the role of media

At a time when liberal democratic states have failed to adequately address environmental issues, combating climate change has moved to the forefront of China's politics and power plays. Enshrined in the country's constitution, "ecological civilization" represents China's ambition to resolve tensions between industrial development and environmental protection. Scholars have argued that China presents a model of "authoritarian environmentalism," which refers to how the authoritarian regime manages the environment, defines environmental problems, and regulates citizens to accomplish their goals using draconian methods (Eaton & Kostka, 2014; Gilley, 2012; Li & Shapiro, 2020).

China's authoritarian environmentalism has several unique features that differ from those used by democratic states to address environmental problems. First, it is a state-led environmental campaign in which the CCP yields dominant power. Since the rise of Xi Jinping, the supreme power of the Communist Party has been reasserted in almost all critical domains, including environmental issues (Wang & Zeng, 2016). Under this governance system, there has been limited participation by independent citizen organizations. More importantly, no supervision by the masses has been realized. Second, the term "authoritarian" denotes a top-down approach that includes non-consultative coercive measures (Li & Shapiro, 2020). Environmental goals can only be fully achieved at the cost of citizens' rights, livelihoods, and economic development. For example, people in large urban areas like Shanghai complained about and showed resistance against the compulsory waste sorting because the sorted food waste and recyclables were not properly utilized (Jiang, 2022). Local governments have also faced a trade-off between economic growth and environmental protection (Pang et al., 2019). Therefore, a conflict of interest between policymakers and policy implementers has arisen. Third, although led by the party-state, authoritarian environmentalism cannot be achieved without the coordination (sometimes passive and sometimes forced) of grassroots, citizen groups, experts, and elites. Thus, objectives, campaigns, and forced behavior modifications with rewards and punishments have reinforced each other in the practice of authoritarian environmentalism on the ground (Li & Shapiro, 2020).

Among the range of governmental tools (e.g. pollution crackdowns, campaign-style inspections, target-setting, forcible relocations, and big data monitoring), news media are important carriers of the state ideology in combating climate change from the top down. Since China's reform in the 1980s, the overall control of the media by the party-state has not fundamentally changed. State power has permeated the Chinese media's everyday practices, and China's Central Propaganda Department has continued to play a significant role in sustaining the CCP's dominance of the country's ideology and culture. As Stockmann (2012) observed, the changing media landscape in China,

under growing state control, has given rise to an increasingly covert propaganda machine. Therefore, environmental reporting has been co-opted by the state and used as a strategic tool for achieving political goals (Ahlers & Shen, 2018). Specifically, news media could be used to propagate anti-pollution campaigns. China has a long tradition of using the campaign approach to mobilize its citizens to achieve a specific set of goals. As the state increasingly intervened in the environmental realm, news media was used to mobilize industries, elites, and citizens to coordinate with the country's needs. Moreover, environmental reporting in China has characterized the state's efforts to manage environmental problems by portraying a responsible image of the leadership to the domestic audience (Xie, 2015). By focusing on how China manages the pollution problem domestically and envisages the Green Belt and Road Initiative for the benefit of the entire planet, news media portrayed China as a confident global power capable of leading the globe toward an ecological civilization.

Thus, media is a key factor in China's authoritarian environmentalism model. In a study of Chinese newspapers in 2005, Jia (2007) found that climate change reporting in China lacked detail, debate, and controversy. In addition, the voices of scientists and technocratic elites have been incorporated into the media discourse to produce "correct knowledge" about environmental issues in line with the government discourse. As Gilley (2012) argued, such authoritarian environmentalism is more effective in producing policy outputs than real, positive environmental outcomes.

In this study, we focus on how different Chinese news media have strategically used sources to portray and convey climate change issues to their audiences. Specifically, we compare three news media types: party media, financial media, and market-oriented metropolitan media (Tong, 2007). The first type, party media (e.g. *The People's Daily* and CCTV), is at the top of China's propaganda hierarchy. They have long been considered the mouthpiece and organ of the CCP, as well as a proxy for the attention of policy elites to a variety of issues in China (Shambaugh, 2017). The second type, financial media (e.g. *Caixin* and *twenty-first Century Business Herald*), has a focused audience base in the financial industry and among the professions. Under political control, financial media are also largely influenced by market forces because they must secure profits by themselves by expanding their readership, likability, and subscriptions (Lee et al., 2006). In particular, we introduce financial media as a distinct type because of its significant presence in China and its relevance to topics such as carbon finance. How China promotes its environmental campaigns could exert a deep effect on industrial growth and investors' expectations. We attempt to see whether financial media cover climate change from a perspective different from other news media types. The third type, market-oriented metropolitan media (e.g. *The Beijing News* and *Southern Metropolis Daily*), provides region-based news diets and investigative reporting to fit the tastes of a mass audience. Different from financial media that cater to the tastes of businesspeople, metropolitan media focuses on local reporting on various political, economic, social, and cultural issues to gain the market's attention in intensifying competition for the audience (Sun et al., 2001). In addition, journalists in metropolitan media are more likely to believe in fulfilling their disseminator and adversarial journalistic roles (Pan & Chan, 2003). In contrary to the journalism-party paradigm, the professional perspective among journalists has boosted investigative reporting in metropolitan media more than in other types of media (Pan & Chan, 2003).

In short, we go beyond the simple differentiation between state media and market-oriented media, which has been widely adopted in previous research (e.g. Han et al., 2017; Duan & Miller, 2021), to further distinguish two subtypes of China's market-oriented news media (i.e. metropolitan media and financial media) in terms of climate change sourcing practices. By comparing different news media types based on longitudinal data, we aim to present a nuanced description of how state power has captured news media in fulfilling authoritarian goals in the context of climate change reporting.

Journalistic sourcing and climate change reporting

Journalistic sourcing, which refers to how reporters select sources in their news stories, is a key aspect of news production and construction. In a review of the news sourcing literature from

1970 to 2008, Carlson (2009) concluded that “sourcing routines reinforce notions of who possesses social power” (p. 526). Similarly, Denham (2010) noted that “media agendas typically are not set, but are built, reflecting institutional imperatives and an ongoing negotiation between media personnel and their sources of information” (p. 311).

Journalists worldwide tend to rely on government officials and popular politicians as sources in news stories rather than on citizens’ voices (Shoemaker & Cohen, 2012). An increasing number of empirical studies have examined the dominant political elite sources used in news production (Bennett, 1990; Turcotte, 2017) and the lack of ordinary citizens’ voices (Jones, 2019; Wheatley, 2020). With the development of social media and citizen journalism, although citizen sources became more prominent, elite sources remain the primary definers of news in media outlets (Kleemans et al., 2017).

Concerning news coverage of topics related to scientific issues (e.g. climate reporting and health reporting), elite orientation has also been identified (Hart et al., 2020; Mellado et al., 2021). Comfort et al. (2020) compared the sourcing patterns in climate change news in China, India, Singapore, and Thailand and found a heavy reliance on politicians and scientists across all countries. In contrast, activists, business interests, and members of the public have been represented at very low levels. Journalists have increasingly turned to official sources as scientific issues have become more politicized. In China, NGOs and activists can only use social media to shine light on the grassroots voices (Zhang & Skoric, 2020).

The politicization of sourcing in climate change has been particularly prominent in the Chinese context, where the government is capable of exerting increasing pressure to influence the findings of scientific research and its interpretation in news stories. Comfort et al. (2020) showed that, compared with India, Singapore, and Thailand, Chinese news media made the most references to officials in their reporting. Government officials appeared in over half of Xinhua News Agency’s articles, much more than the experts cited. Duan and Miller (2021) also found that among Chinese newspaper articles from 2013 to 2015, official government sources doubled the references to scientists. However, long-term tracking of changes in journalistic sourcing in China is rare. Media control has become tightened in the past decade under Xi. The small modicum of freedom that China’s press once enjoyed has been further eroded (Moser, 2019). In this study, by investigating changes in sourcing patterns, we aim to examine the increased personalization of power, centralization of authority, and the menace of media capture in the country (Jaros & Pan, 2018). Therefore, we collected longitudinal data between 2013 and 2021 to track changes in sourcing types in China’s climate change reporting to answer the following research question (RQ).

RQ1: What types of sources did Chinese news media use in climate change reporting from 2013 to 2021? Were there any changes in sourcing type selection during this period?

News media not only select sources from different fields to fulfill their tasks but also present certain perspectives on an issue based on the voices of the sources (Han et al., 2017). In the tension between journalistic professionalism and state power, Chinese news media have been inclined to present source voices to portray climate change from a political perspective rather than a scientific one, and interpret it as a global issue rather than a domestic problem (Xie, 2015). However, previous research has mostly investigated official newspapers (e.g. *People’s Daily* and *China Daily*). Studies drawn on recent samples from a wide range of China’s news media types are scarce. We propose the following question to examine the topics in climate change quotations across media types and time:

RQ2: What topics do different sources address in climate change news stories during the study period? Were there any changes in the sources’ quotation topics during the period?

As discussed, a general trend has been that official sources have predominated news reports on environmental issues. Thus, officials have played important roles in constituting the media agenda conveyed to the public. In the context of China, where most people trust mainstream media and official sources (Zhang et al., 2014), examining the roles of officials in climate change reporting

helps determine how the public understands climate change issues. Drawing on a content analysis of Chinese mainstream newspapers from 2005 to 2015, Han et al.'s (2017) study showed that official sources were more likely to relate to the use of conflict, collaboration, responsibility, and leadership frames, while non-official sources were more likely to relate to environmental, human impact, and human-interest frames. However, nuanced comparisons between different official types remain underexplored. In this study, we compare the roles of state-level and local-level officials in climate change reporting, which could reflect the extent to which the core spirit of party-state and coercive environmental policies is transferred to and rephrased by local-level administrations, especially regarding the environment–economy trade-off. Therefore, we raise the following research question:

RQ2a: How do state-level and local-level official sources discuss climate change issues in news stories during the study period?

In addition to officials, we further investigate how expert sources have been represented in climate change stories in China. The highly trusting public expects experts to be objective and knowledgeable in their field, providing instructions and guidance on issues of environmental concern (McKaughan & Elliott, 2018). However, some previous studies have found that experts communicated research results much less than in the past. Instead, they increasingly served as commentators on issues outside their area of expertise (Albaek et al., 2003). In climate change reporting, it remains to be determined whether experts have been given enough leeway to discuss climate change, and whether they can fulfill their roles in disseminating climate change-related knowledge to enlighten the public. Therefore, we pose the following research question:

RQ2b: How do expert sources talk about climate change issues in news stories during the study period?

Sourcing patterns of climate change reporting could differ across media types. As discussed, news media have been increasingly used to fulfill political goals by environmental authoritarian regimes, in which state news media play a significant role. However, because the power of the state permeates China's media landscape, both state and commercialized news media have become weaponized in building a positive image of the country and capturing global narratives in China's ideological and political struggles. To date, there have been only a few studies on cross-media comparisons of sourcing patterns, which mainly focused on broad comparisons of official news media with commercial news media (e.g. Duan & Miller, 2021; Han et al., 2017). In the present study, we compare three media types:

RQ3: Do the proportions of each source type and quotation topic vary by three news media types (i.e. party media, financial media, and market-oriented metropolitan media) in the study period?

Methods

Data collection

We chose the party newspaper *The People's Daily* (《人民日报》, PD hereafter), the financial newspaper *Twenty-first Century Business Herald* (《21世纪经济报道》, BH hereafter), and the metropolitan newspaper *Southern Metropolis Daily* (《南方都市报》, SMD hereafter) to represent the three news media types. PD, as the official newspaper of the CCP's central committee, is the most important channel for official information release in China. It provides direct information about the policies and viewpoints of the central government. Thus, the content of PD reflects the policy attention and agenda in China (Wu, 1994). BH, launched in 2001 as part of the Southern Media Group, is one of China's leading daily business newspapers in terms of user scale and social influence. SMD officially began publication in 1995 with a clear regional positioning in Guangdong Province based on an investigative tradition. Journalists from SMD used "guerrilla reporting tactics" to push the envelope on critical reporting (Tong, 2007). All three newspapers have extensively influenced China's current media landscape.

We retrieved the full texts of news articles about climate change published in the three newspapers from 2013 to 2021 from the newspapers' digital databases based on the keywords climate change (气候变化), low carbon (低碳), carbon emissions (碳排放) and global warming (全球变暖). We obtained 5,587 articles in total, including 2,816 pieces in PD, 1,359 pieces in BH, and 1,702 pieces in SMD. Some articles might be irrelevant, but our main unit of analysis was the quoted source, so instead of excluding irrelevant articles, we chose to exclude irrelevant sourcing quotations in the next stage of data collection.

Source identification

After collecting the news articles, we used Python Lexical Analysis of Chinese (LAC) to retrieve all the human names that appeared in the articles. LAC is a lexical analysis tool used to realize Chinese word segmentation, part-of-speech tagging, and named-entity recognition, with tested accuracy surpassing 95% (Jiao et al., 2018). LAC has been widely used in content analysis of the Chinese language texts (Ma & Jiang, 2020).

In the current study, if one article mentioned a human name more than once, the name was counted only once. However, if the same name appeared in several articles, the name was counted multiple times. We obtained 59,884 human names that appeared in all climate change-related articles in the three newspapers across the nine-year period.¹ Because the sample size was large, we applied stratified random sampling to select 20% of the names in each media outlet in each year for further manual coding and analysis, which yielded 11,961 cases.

After the human names were successfully retrieved and randomly sampled, we manually filtered out those that were mistakes to ensure the accuracy of name detection. In addition, we further filtered out names that were not appropriate journalistic sources. The criterion was that if a person had directly or indirectly expressed opinions in the article, he or she would be classified as a climate change-related source. Finally, we obtained 2,293 valid climate change sources for further analysis. The stratified random sample yielded a balanced sample distribution over the nine-year study period. The sample distribution of each newspaper in each year is shown in Appendix A.

Manual coding

After human names and relevant quotes were automatically retrieved by computational methods, manual coding was the best strategy for further identifying the source types and quotation topics. As described above, before coding the key variables in this study, the coders decided whether human names were climate change-relevant sources. In the following step, quote type, source origin, source type, quote topic, and quote attitudes were coded, respectively.

The authors discussed each item and trained three research assistants in coding the variables. After three rounds of practice, 5% of the climate change source items were randomly selected for the reliability test ($N = 598$). Krippendorff's alpha was used to estimate intercoder reliability. An alpha value of 0.80 represents very good intercoder reliability, and a value of 0.67 represents acceptable intercoder reliability (Krippendorff, 2004). Most of our coded items achieved a good or acceptable reliability score, indicating sufficient agreement among the three coders. After intercoder reliability was satisfied, each coder then coded one-third of the samples. The complete coding scheme and reliability scores are provided in Appendix B.

Results

Sourcing types and quotations

To address RQ1, we focused on four source types: government officials (national level and local level), experts, people in business sectors, and ordinary citizens. First, the descriptive findings

derived from the entire sample from 2013 to 2021 (see Table 1) showed that state officials (35.9%) ranked first among all source categories, followed by experts (20.3%), local officials (15.1%), and people in the business sector (13.5%). Ordinary citizens were rarely quoted as sources (4.3%).

The trend across the years in the study period demonstrated an increase in state-level official sources, especially in the regional newspaper SMD, where the use of local-level officials declined. T-test results showed that the 2021 sub-sample cited significantly more sources that were state-level officials [$t(573) = 2.93, p < .01$], but fewer sources that were local-level officials [$t(573) = -2.79, p < .01$] compared with the 2013 sub-sample. The decrease in the voices of local-level officials in climate change reporting implies the strengthening of state control in the environmental domain. Local officials who were concerned about balancing economic development, livelihood, and environmental protection were quoted less frequently in metropolitan newspapers. However, the frequency of expert sources remained the same: $t(573) = 0.75, p = .45$. Figure 1 shows the trend in source-type frequencies from 2013 to 2021.

To address RQ2, we examined the main topics discussed in the quotations included in the news sources. The descriptive findings derived from the entire sample from 2013 to 2021 (see Table 1) showed that the topic of policy (51.4%) ranked first among all three newspapers, including announcements about state environmental policy and interpretations of CCP determination, followed by topics on business (18.5%) and achievements of climate change campaigns (13.6%).

Table 1. Number and percentage of sources per newspaper by source type and quotation.

	PD (N = 1,215)	BH (N = 672)	SMD (N = 406)	Total (N = 2293)
Source type				
State official	472 (38.8%)	231 (34.4%)	120 (29.6%)	823 (35.9%)
Local official	192 (15.8%)	47 (7.0%)	107 (26.4%)	346 (15.1%)
International organization	111 (9.1%)	49 (7.3%)	13 (3.2%)	173 (7.5%)
Other politicians	16 (1.3%)	10 (1.5%)	5 (1.2%)	31 (1.4%)
NGO	18 (1.5%)	24 (3.6%)	5 (1.2%)	47 (2.0%)
Business sector	118 (9.7%)	159 (23.6%)	33 (8.1%)	310 (13.5%)
Expert	220 (18.1%)	147 (21.9%)	98 (24.1%)	465 (20.3%)
Ordinary citizen	68 (5.6%)	5 (0.7%)	25 (6.2%)	98 (4.3%)
Quotation topic				
Policy	639 (52.6%)	323 (48.1%)	217 (53.4%)	1179 (51.4%)
Business	144 (11.9%)	225 (33.5%)	56 (13.8%)	425 (18.5%)
Achievement	235 (19.3%)	45 (6.7%)	32 (7.9%)	312 (13.6%)
Environmental problem	131 (10.8%)	53 (7.9%)	66 (16.3%)	250 (10.9%)
Public action	31 (2.6%)	3 (0.4%)	15 (3.7%)	49 (2.1%)
Scientific knowledge	35 (2.9%)	23 (3.4%)	20 (4.9%)	78 (3.4%)
	PD (N = 1,028)	BH (N = 322)	SMD (N = 557)	Total (N = 1,907)
Quotation attitudes				
Critical	28 (2.7%)	44 (7.9%)	29 (9%)	101 (5.3%)
Neutral	426 (41.4%)	366 (65.7%)	197 (61.2%)	989 (51.9%)
Positive	574 (55.8%)	147 (26.4%)	96 (29.8%)	817 (42.8%)

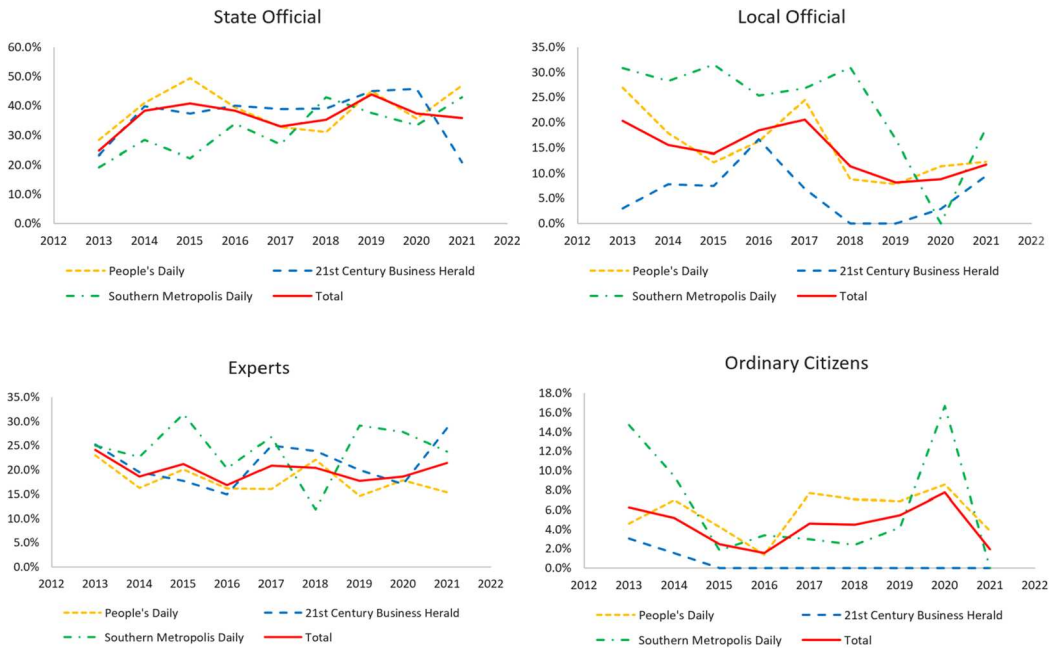


Figure 1. Percentage of Focal Source Categories per Newspaper by Year.

Note: To make the analysis more focused, we only included source type of state official, local official, expert, and ordinary citizens in this figure.

10.9% highlighted the severity of environmental problems. However, the sources seldom discussed scientific knowledge (3.4%). Public actions in environmental protection accounted for the least number of occurrences (2.1%), which included participation in activities introduced by the government, such as tree planting, garbage classification, and new energy consumption promoted by the local authorities. These findings indicated that climate change was mainly framed as a policy-oriented issue and an achievement of the Chinese government.

The findings also showed an increase in policy topics over the study period, especially in the party newspaper PD. The sources tended to avoid discussing environmental problems. T-test results showed that compared with the 2013 sub-sample, sources in the 2021 sub-sample discussed more policy [$t(573) = 1.74, p = .08$], less environmental problems [$t(573) = -4.23, p < .001$], and less public action [$t(573) = -1.97, p = .05$] in 2021. The frequencies of topics on achievement [$t(573) = 0.87, p = .40$] and scientific knowledge [$t(573) = 0.47, p = .64$] remained at the same levels. Figure 2 shows the trends in quotation topics from 2013 to 2021.

Furthermore, we explored the extent to which news media sources have employed a critical perspective in discussing climate change-related policies and domestic environmental problems. We first filtered out quotations that were irrelevant to China. Among the remaining sources ($N = 1907$), only 5.3% expressed critical attitudes either in questioning the policy or expressing concerns about the environmental problem (see Table 1). The attitudes in the source quotations generally framed a favorable and positive opinion of China's environmental situation, depicting a greener country based on effective policymaking and wise leadership. In the study period, we found a remarkable decrease in the proportion of critical attitudes among the quotations (see Figure 3).

In summary, the results for source types, quotation topics, and attitudes showed politicized sourcing patterns in China during the period from 2013 to 2021. By "politicized," we mean that our results implied a growing concentration of official state discourses in climate change reporting, in which the mitigation of climate change was no longer a long-term scientific issue involving debates on pros and cons. Instead, it has been framed as an indicator of political correctness and as a means of the state to demonstrate China's positive image and leading role on the world stage.

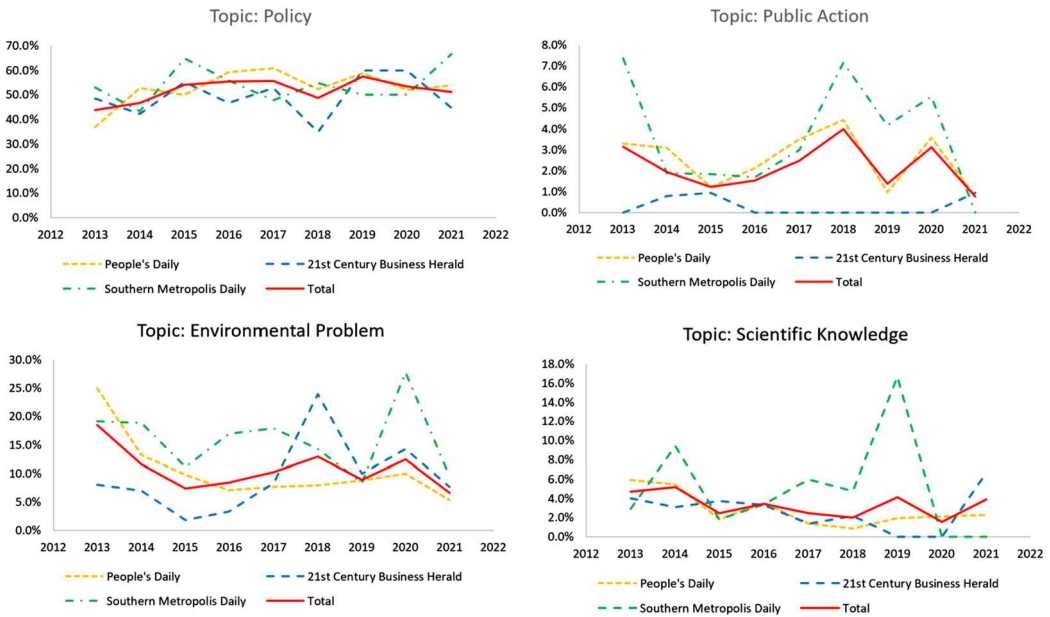


Figure 2. Percentage of Focal Quotation Topics per Newspaper by Year. Note. To make the analysis more focused, we only included quotation topics of policy, public action, environmental problems, and scientific knowledge in this figure.

Use of official sources

To address RQ2a, we zoomed in on the use of official sources. In our sample, state official sources ranked first in all three newspapers (PD: 38.8%; BH: 34.5%; SMD: 29.6%). Among the top 10 quoted sources in the entire sample (see Appendix C), most sources were high-level officials, and only one expert was among them (Dr. Lin Boqiang, director of the China Institute for Studies in Energy Policy).

To examine the patterns in the topics of state- and local-level officials' quotations, we coded the categorical dependent variable (i.e. topic) into six dummy variables (e.g. policy, business,

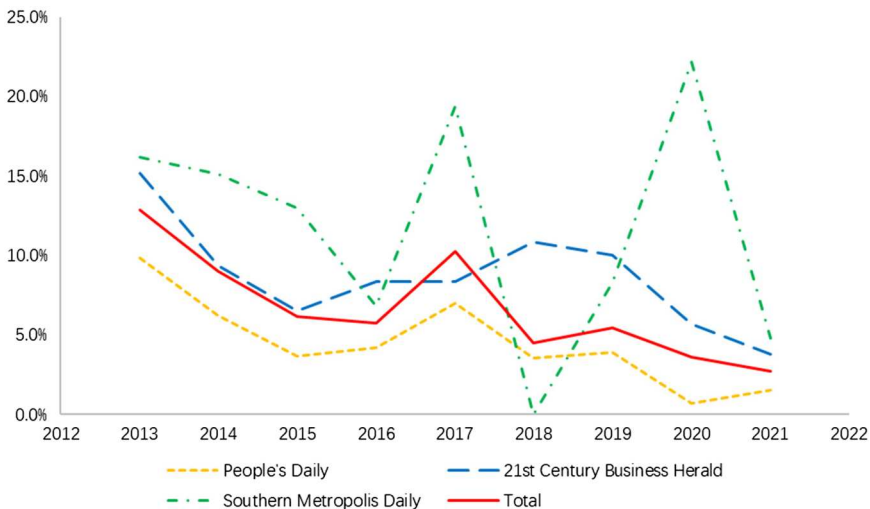


Figure 3. Percentage of Critical Attitudes per Newspaper by Year.

achievement, environmental problem, public action, and scientific knowledge) (1 = yes; 0 = no) and conducted a series of Chi-square tests (Sweet & Grace-Martin, 1999). The results showed that state-level officials were more likely to discuss policy [$\chi^2(2, N = 2293) = 324.60, p < .001$], but less likely to talk about business [$\chi^2(2, N = 2293) = 102.90, p < .001$], achievement [$\chi^2(2, N = 2293) = 16.49, p < .001$], environment problems [$\chi^2(2, N = 2293) = 37.31, p < .001$], public action [$\chi^2(2, N = 2293) = 22.02, p < .001$], and scientific knowledge [$\chi^2(2, N = 2293) = 36.04, p < .001$]. Local-level officials were more likely to discuss achievement [$\chi^2(2, N = 2293) = 16.57, p < .001$] and less likely to tackle business [$\chi^2(2, N = 2293) = 16.59, p < .001$] and scientific knowledge [$\chi^2(2, N = 2293) = 9.89, p < .01$]. No significant difference was found between local official sources in the probability of discussing policy, public action, and environmental problems ($p > .05$). The distribution of quotation topics in each source type is shown in Table D1, Appendix D.

To examine the attitudes of official sources reflected by quotations, we dummy coded source attitudes to reflect whether they were critical or not (1 = critical; 0 = positive or neutral). The results of Chi-square tests showed that state-level officials were less likely to discuss China's climate change issues from a critical perspective [$\chi^2(2, N = 1907) = 18.65, p < .001$]. In contrast, local-level officials were more likely to discuss the topic critically [$\chi^2(2, N = 1907) = 7.89, p < .01$]. However, overall, only 3.89% and 8.96% of the two types, respectively, conveyed a critical tone. The distribution of quotation attitudes in each source type is shown in Table D2, Appendix D.

We also paid particular attention to President Xi Jinping's role as a climate change news source during his two terms of presidency. In our randomized sample, Xi was quoted 203 times (8%), ranking first among all sources. He was seldom directly interviewed but quoted in the press releases of national or international meetings. An interesting finding was that 12.8% of Xi's quotations fell into the type of "being referred to by other sources." For example, in an article about the environmental protection of the Qinghai-Tibet Plateau (People's Daily, 2020a), many local official sources cited Xi's speech to demonstrate their passions and resolutions in protective actions. Because he was frequently cited as a secondhand source, the influence of the country's dominant leader and his political personalization were reinforced.

In addition, we examined yearly trends in the use of Xi's quotations in climate change reporting. As shown in Figure 4, they increased yearly. From 2013 to 2016, Xi's quotations accounted for 1.9%–11.5% of all the sources in our sample. After the 19th National Congress of the Chinese Communist Party in 2017, Xi's quotations accounted for 10.6%–16.1% of all sources during his second term of presidency from 2017 to 2021. Compared with the frequency of Premier Li Keqiang's appearances, the strengthening of Xi's personalization was further identified. From 2018, Li was seldom quoted as a climate change source in our sample, although the issue was closely related to the country's economic development (see Figure 4). The results of Chi-square tests by year also showed significant yearly increase in the use of Xi's quotations as a climate change source [$\chi^2(8, N = 2293) = 38.49, p < .001$] as well as a steadily low frequency of Li's quotations [$\chi^2(8, N = 2293) = 9.76, p = .28$].

The role of expert sources

RQ2b concerns the role of experts ($N = 465$) in climate change reporting. Table 1 shows that 20.3% of the sources were experts. The majority of experts were directly interviewed by reporters (82.8%) and were from the science and technology field (56.3%). Instead of addressing environmental problems (19.1%) and scientific knowledge (13.1%), which were considered the experts' specialty and therefore their responsibility to inform the public, most experts discussed macro policy (34.4%), such as how President Xi' has pointed out the country's revolution of new energy production and provided a clear direction for scientific researchers' future work (People's Daily, 2017).

In addition to descriptive statistics, the findings showed that PD was more likely to quote overseas experts than the other two newspapers, $\chi^2(2, N = 465) = 66.38, p < .001$. Among the foreign expert sources cited in the PD, their quotations concerned the success of climate change campaigns

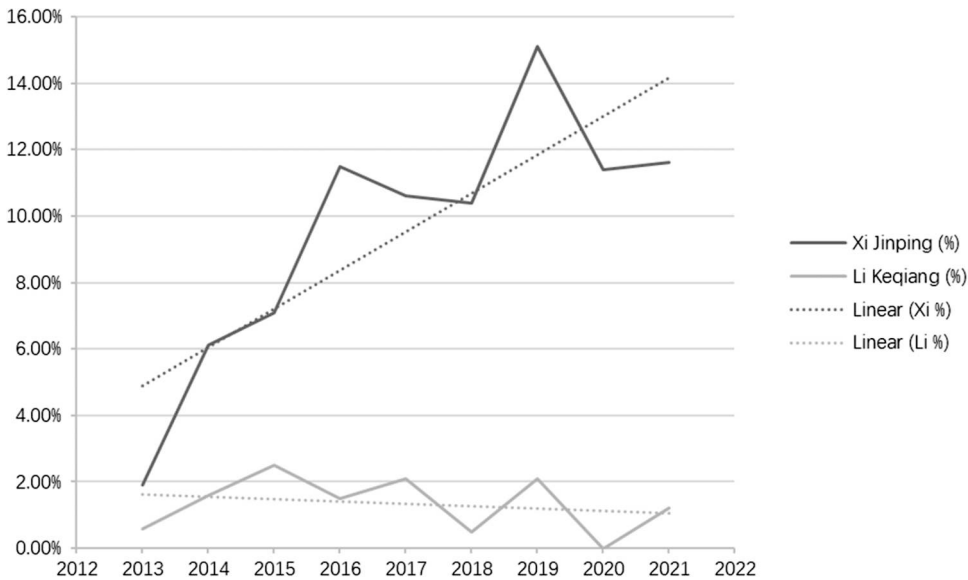


Figure 4. Percentages of Quoting Xi Jinping and Li Keqiang as Sources by Year.

(40.5%). In addition, among all overseas expert sources who discussed Chinese matters ($N = 89$), 97.8% expressed positive attitudes. Compared with Chinese sources, overseas sources were even more likely to be used as propaganda tools to show positive attitudes toward China: $\chi^2(1, N = 1907) = 17.15, p < .001$. The findings reflected how the Chinese news media used the celebrative tone of foreign experts to propagandize the country's achievements in the climate change campaign (Fang, 2022). For example, an article in PD cited 13 foreign experts, all of whom spoke highly about China's environmental campaign progress (People's Daily, 2020b).

Cross-media comparison

To address RQ3, source types and quotation topics were compared across news media types. Among the three newspapers, each source type of our focal interests (i.e. national official, local official, experts, businesspeople, and ordinary citizens) was dummy coded before a series of Chi-square tests were conducted (Sweet & Grace-Martin, 1999). The results showed that PD was more likely to use state-level officials as sources [$\chi^2(2, N = 2293) = 12.13, p < .01$], BH was more likely to quote businesspeople [$\chi^2(2, N = 2293) = 83.87, p < .001$], while SMD was more likely to use local officials [$\chi^2(2, N = 2293) = 75.23, p < .001$]. In addition, PD was less likely to use expert sources compared with the other two outlets [$\chi^2(2, N = 2293) = 8.25, p < .05$], while BH was less likely to use ordinary citizens as sources compared with the other two outlets [$\chi^2(2, N = 2293) = 29.26, p < .001$].

Regarding quotation topics, the results of Chi-square tests demonstrated that the metropolitan newspaper SMD showed a pattern that differed from those in the other two outlets [$\chi^2(10, N = 2293) = 214.67, p < .001$], as it was more likely to quote sources to highlight the topics of environmental problems, public actions, and scientific knowledge. The results showed that the pattern reflected the newspaper's tradition of investigative reporting, though these topics gradually decreased in SMD in recent years.

In terms of source attitudes, the results of a Chi-square test showed PD was less likely to adopt a critical perspective in reporting climate change issues relevant to China compared with the other two outlets [$\chi^2(2, N = 1907) = 29.93, p < .001$]. Regarding this trend, the findings showed a decrease

in critical attitudes over the study period, even in the metropolitan newspaper SMD (see Figure 3). The results of the Chi-square tests by year also showed significant yearly changes in critical attitude ratios [$\chi^2(8, N = 1907) = 38.11, p < .001$].

Discussion and conclusion

Climate change is a politicized issue. In the US, although the vast majority of climate scientists have agreed that human activities cause global warming (Oreskes, 2004), some politicians have continued to view it as a contentious matter of public debate. One major factor that holds back governments' ambition to combat climate change in democratic countries is politics. For example, in Australia, "a toxic coalition of the Murdoch press, the right wing of the Liberal and National parties, and vested interests in the fossil fuel sector" work against the commitment to net zero emissions (Rudd & Turnbull, 2021). In contrast, the politicization of climate change has manifested differently in China, where policymakers use the issue to legitimize authoritarian rule and assume global leadership in environmental protection. Having enshrined "ecological civilization" in the country's constitution, the CCP has adopted an authoritarian environmentalism model by using coercive methods to achieve its explicit political goal of the short-term success of its environmental campaigns. Our study investigated this model by focusing on China's climate change reporting to determine how news media under tight state control cover climate change issues to reflect the state authority's orientations, measures, and blueprints. In general, the results of the study showed that the suppression of alternative sources and the dominance of state voices have increased during recent decade.

Regarding the distribution of sourcing types, the findings of this study revealed that state-level official sources increased over the study period from 2013 to 2021. The change was particularly evident in the regional newspaper SMD, which was originally popular because of its investigative reporting. As state-level officials have begun to usurp local officials' and experts' places in discussing environmental issues, alternative opinions about the country's policies have been muted by sourcing selection. Opinions from the general public, citizen groups, and business sectors are silenced, and the perspectives of scientific enlightenment and public awareness are undermined.

An interesting finding was that President Xi Jinping was the most frequent source of climate change news, and his appearance increased during the study period, whereas Premier Li Keqiang's presence was almost insignificant. The personalization and centralization of political authority in China's news reporting have been found in previous studies (Jaros & Pan, 2018). This study provided empirical evidence by showing that the president, who had already been directly quoted by various news media platforms, was also quoted in secondhand sources in news stories, which further magnified the voices of high-level state officials and exacerbated political personalization. Our findings echo other journalistic sourcing studies in democratic contexts that reveal the dominance of elite voices (e.g. Bennett, 1990; Jones, 2019; Wheatley, 2020). However, it is important to note that elite orientation in democracies includes those of different parties and different political perspectives (Bennett, 1990; Wheatley, 2020), whereas in China, elites are expressing overwhelmingly homogenous opinions. Although some scholars (e.g. Geall, 2018) argue that due to media commercialization in China, climate change issue is used as an "edgeball" to challenge official narratives, our longitudinal study demonstrates growing official orientation and heavy reliance on government sources. The authoritarian version of politicized climate change is dangerous as the unanimous source opinion could further strengthen existing power hierarchy and undermine alternative voices (Atton & Wickenden, 2005). While climate change permeates individual lives as well as shared economic, political, and cultural domains, Chinese newspapers have failed to echo the ramifications of this issue, instead using it to enhance the political performance of the leadership.

In addition to sourcing types, we examined various topics discussed by the sources and identified the policy orientations reflected in their quotations. The findings showed that the sources mainly

conveyed, interpreted, or complimented the government's policies and achievements. Only a small percentage mentioned environmental problems, public actions, and scientific knowledge. Moreover, experts were not quoted to convey science-based information about environmental issues but were used to promote what the country had done and what the government ambitiously planned to do in the climate change campaign.

We also examined if the sources adopted a positive tone toward state policy or environmental progress. A worrisome finding was that there was a significant decrease in critical voices during the study period, even in the metropolitan newspaper SMD. Because the sources' expressions in news stories have been manipulated, climate change in China has no longer been considered a crisis with a scientific foundation. Instead, fighting climate change was regarded as a political goal to achieve for the good of the government's image. Thus, the state cannot remain open to criticism and dissent, continuing to ignore the long-term negative consequences of its policies.

Based on our findings, the climate change sourcing pattern in China incorporates three elements that are closely intertwined to serve propaganda purposes: emphasizing state policy, suppressing alternative voices, and amplifying achievement (Figure 5). From an environmental governance perspective, our findings help explain how China's authoritarian environmentalism has been promoted by news media. The findings could also be extended and generalized to understand how Chinese news media have been utilized to report other social issues for political purposes, such as the promotion of the three-child policy, the legitimacy of the zero-Covid policy, and the glorification of China's battle against poverty. On the surface, the top-down authoritarian approach seems hopeful and effective because campaigns are supposed to be supported by an extensive network of government think tanks, experts at universities, and people in industries, based on ideological consensus. However, our findings indicate that this approach is not desirable because the campaign deviated from scientific knowledge or problem-based long-term environmental protection toward

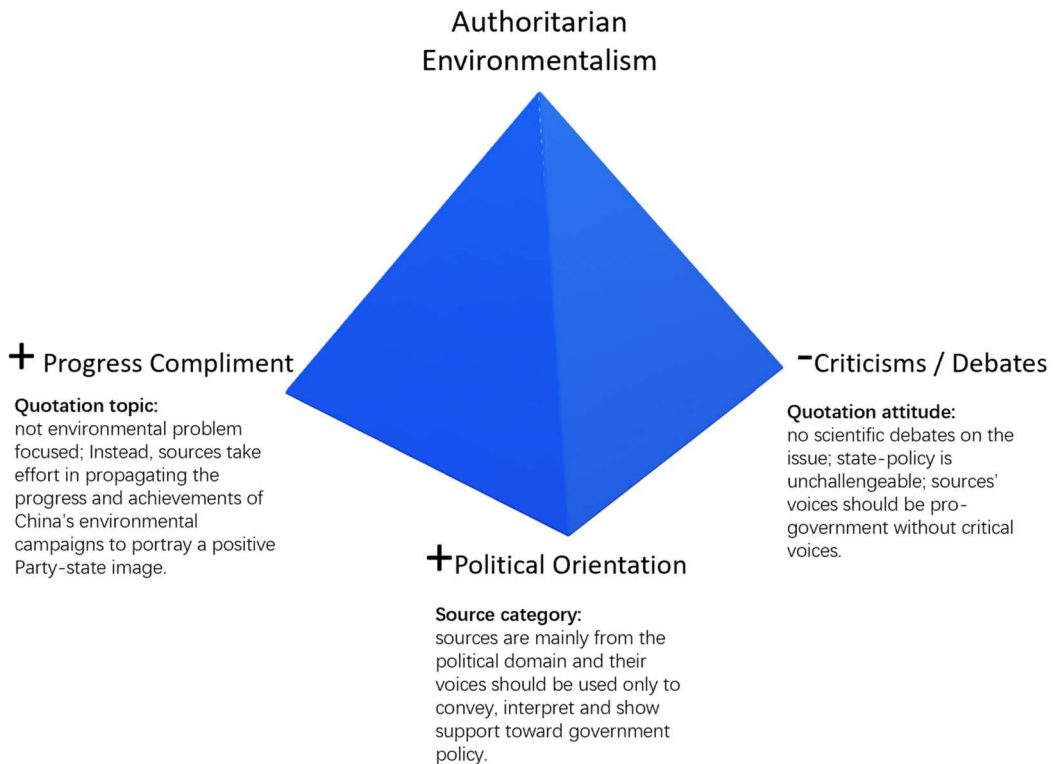


Figure 5. Features of Journalistic Sourcing under Authoritarian Environmentalism.

establishing a stage for state-level political leaders to display their ambitions and achievements during their terms of office. The intended or unintended problems of China's authoritarian approach are covered up, which may eventually emerge and cause other issues or crises in the future.

Moreover, this study helps us understand how different types of news media in China have become collective propaganda tools during the past decade. Our comparison of the three different media types revealed the increasing homogeneity of China's media landscape.

The present study has several limitations. First, the sample of newspapers was imbalanced. Although we used frequency (%) to compare sourcing distributions to overcome such limitations, further studies should apply a more balanced design to increase the comparability of the sample. Second, we chose only one newspaper to represent each news media type, which may limit the generalizability of our results. Finally, we believe that the findings of this study are not unique in China. However, the extent to which political sourcing and politicized framing have been adopted in climate change reporting could differ in various political and social contexts, which points to directions for future cross-country and cross-time comparative research.

Despite these limitations, this study has mapped a longitudinal trend and current problems in climate change reporting in China. We are not optimistic about China's top-down mobilized environmental campaigns in facing climate change challenges. When all news media outlets, politicians, and experts begin to present one-sided pro-governmental arguments in climate change reporting, the news media fails to construct climate change as an important scientific and social issue that is highly relevant to society's collective efforts and well-being.

Note

1. The automated method used in this study only identifies sources with human names—they can be either full names or only surnames (e.g., Mr. Li, Chairman Wang). However, the method cannot identify unnamed sources like “representative of an organization” or “a professor in social science.” We acknowledge this limitation, but as unnamed sources are rarely used in political news reporting in China, we expect that the method only fails in identifying a tiny percentage of sources.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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