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Engagement or control? The Impact of the Chinese Environmental Protection Bureaus' Burgeoning Online Presence in Local Environmental Governance.

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Abstract

Since 2011, Chinese environmental authorities have undertaken a project of “occupying” online spaces, with a particular focus on social media like Weibo. These activities have been analysed alternatively as a promising attempt to improve environmental governance by increasing citizen engagement and transparency, or as a new tool of control over online environmental discourses. However, empirical research into the practices of state microblogs is rare, and the implications of their emergence for local environmental governance remain poorly understood. Using a combination of online and offline investigation methods, this paper analyses the use of microblogs by 172 local environmental authorities in Shandong Province, whose multi-level EPB microblogging system is seen as a model for other provinces, testing whether this system improves environmental governance, and whether this objective is impeded by practices aimed at controlling online environmental discourse. We find limited evidence of improved environmental governance that would be attested by enhanced information disclosure and active citizen engagement. Instead, EPB communication appears mostly insular, and obstructed by floods of diversionary content and propaganda. We suggest that while these behaviours are likely driven by misaligned state incentive structures and fears of triggering social unrest, they also support the goal of discursive control by occupation.

Keywords

Government microblogs; online politics; environmental governance; environmental information; China; Weibo; censorship by flooding; social media; big data; network mapping

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1. Introduction

Since 2011, the rise of China's e-government reforms and increased online presence has coincided with an unprecedented politicization of environmental protection by President Xi Jinping. This has led to a rapid expansion of the presence of Environmental Protection Bureaus (EPBs) on social media social media, in particular Weibo, China's largest microblogging platform (Xinhua 2015). EPB microblogs have been promoted as a tool of environmental information disclosure and citizen cooperation to monitor pollution (Zhao and Du 2013; IPE 2015; Zhang, Mol and Yang 2017), which align with broader e-government reforms' objective to bring about more transparent, diligent and participatory government. However, under Xi Jinping control over environmental discourses has also been significantly tightened (Goron 2018) and EPB microblogs have been instructed to 'guide' public opinion and showcase state performance in addressing environmental problems (Liu 2018).

Traditionally, the literature on Chinese politics has focused either on opportunities for non-governmental organizations (NGO) deployment and environmental mobilization afforded by the Internet (e.g. Yang 2009; Cai and Zhou 2016; Deluca, Brunner and Sun 2016), or on the suppression of these opportunities through internet censorship and its use by the state as a tool of social control (e.g. King, Pan and Roberts 2017; Zeng, Pan and Fu 2017). However, this dichotomy overlooks the rapid expansion of the Chinese state on social media platforms and the impact of the everyday practice of Chinese state online presence on social and political life. The number of empirical studies of state microblogs remains extremely limited; how, to what ends, and with what success the Chinese state uses social media remains largely unknown (Noesselt 2014; Schlaeger and Jiang 2014).

This paper contributes to filling this gap by analysing how EPBs use microblogs and whether the political objective of 'guiding public opinion' interferes with their stated purpose of improving local environmental governance. It focuses on the province of Shandong, which was the first to establish a province-wide network of EPB accounts in 2013, has since then topped the charts of the most influential government microblog and is held up as a model for EPBs in other provinces (Yang 2015; You 2016; ROMO 2018).

Using a mixed-method research design, this paper analyses data collected from Weibo, as well as information collected from various sources during fieldwork in Shandong Province. It analyses the context in which EPB microblogs are being rolled-out, the content of EPB posts as well as the way in which EPBs communicate online among each other and with the public.

We find limited evidence of improved environmental governance that would be attested by significant flows of environmental information and meaningful interactions between EPBs and citizens. Instead, communication appears obstructed by floods of superficial diversionary content and propaganda. We suggest that control goals may have taken precedence, driven by misaligned incentives and fears of social unrest.

2. E-government or occupation and control: two academic perspectives on state microblogs

Since its launch in 2009, Weibo has become an online space where the burgeoning of civil society activity is met with increasingly sophisticated state controls (Liu 2013; Bolsover 2017). Weibo holds a particularly important place due to its public nature, ease of publication and dissemination, and nationwide reach. However, academics studies are split between those

analysing Chinese state online expansion as an attempt to improve governance and those analysing it as a new tool of social control.

2.1. Microblogs for better environmental governance

In *Environmental Small Talk: The Online-Offline Story of a Media Spokesperson*, the former spokesperson for Beijing's EPB, better known by his blogger name Bason Wolf King, argued that government microblogs facilitate direct dialogue with the public and increase government transparency (Du 2018, 44). Du's position reflects an agenda, which, in China as well as in the rest of the world, has promoted the use of social media platforms like Weibo as part of broader e-government reforms aimed at making public administrations more efficient, providing better services, responding to the demands of citizens for transparency and accountability, being more inclusive and thereby restore the trust of citizens in their governments (UN 2008, Zheng 2013, Zhu 2014, Lei 2016).

Increasing government uses of social media is seen by several authors as necessary to deliver information and public services efficiently (Zhu 2014; Chen and Li 2015). Many argue that Weibo, like Twitter, is especially well suited to increase citizens' participation in public affairs (Ma 2013; Guo 2015, 116), especially socially disadvantaged and remotely located groups (Liu and Zheng 2012). Weibo's networked communication may also enable citizens to hold local governments accountable (e.g. fighting against corruption, Guo 2015). Authors also underline that different state actors may use social media for different purposes (Schlaeger and Jiang 2014). In the case of EPBs, to catch up with international practice³ and help resolve the problem of lack of local implementation of environmental norms, Weibo has been promoted, in particular, as a way to improve environmental information disclosure both locally and across jurisdictional boundaries (Zhang et al. 2017); to facilitate citizen participation in pollution monitoring, for instance through taking pictures and tagging EPB microblogs to report pollution; and also, crucially, as a way to draw immediate government reaction to environmental complaints that used to end bogged down in opaque administrative procedures. The last two arguments are prominently made by NGOs, who have started tagging EPB microblogs to draw attention to environmental problems (IPE 2015, Deluca, Brunner and Sun 2016, personal communication, March 24, 2018, April 14 and 16, 2018).

However, the literature also notes important shortcomings in the development of China's e-government. Several studies underline deficiencies of government microblogs, including inconsistent identities, low activity, irrelevant or self-centred information, selective and slow responses, rigid and monotonic language styles, and lack of cross-boundary collaboration (Zheng 2013, Lei 2016). In the environmental field, the only empirical study of EPB microblogs, focusing on two Beijing microblogs, found their public engagement very superficial (Chen and Bo 2014). Furthermore, despite a rapid expansion of the number of provincial and municipal EPB microblogs, in 2017 the environmental NGO IPE claimed that 21 of them were inactive (IPE 2017). Zheng suggested, based interviews with Shanghai government officials, that these shortcomings are due to institutional factors, such as insufficient funding, supportive regulation and professional training; and rigid hierarchical

³ For example, the US Environmental Protection Agency and the UK environment agency have both published guidelines explaining how they use social media to diffuse information about their work, inform the public in case of major incidents and reply to citizens' queries (e.g. for the UK environment agency: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/303211/Social_Media_Guidance.pdf and for EPA: <https://www.epa.gov/web-policies-and-procedures/list-social-media-platforms-epa-uses>).

controls on information disclosure rooted in fears of being attacked by online protest groups and causing social unrest (Zheng 2013).

2.2. Microblogs as tool of control of online environmental public opinion

The opening of EPB accounts has also been understood as an effort by the CCP to assert control over public environmental discourses and to fabricate support for the state. Research has shown that, like green politicians and NGOs in western countries (e.g. Hutchins 2016 study of Australia's green party members use of twitter, Merry 2014 and Comfort and Hester 2019 study of American NGOs), Chinese environmental activists have harnessed social media to broadcast their message and build influence (e.g. Sullivan & Xie, 2009; Yang 2009, Ji et al. 2018), mobilise for collective actions both on and offline (e.g. Steinhardt, Christoph and Wu 2016, Xu 2014, Liu 2011), and put public pressure on local governments by exposing their failure to protect the environment (e.g. Deluca, Brunner and Sun 2016, Dai, Zeng and Wang, 2017). Coming on the heels of this increasing use of social media by activists, in 2012 the CCP started cracking down on Weibo's major influencers and intensified censorship to maintain its narrative dominance.

In parallel to increased censorship, the state also vowed to reinforce its capacity to disseminate "correct" ideas and "guide" online opinions (Hilton 2017). Empirical research has shown that the Chinese state fabricates about 500 million social media posts a year diffusing mostly positive propaganda and nationalistic sentiment; a quarter of these posts are made to Weibo (King, Pan and Roberts 2017). This type of activity has been theorized as a form of censorship, called flooding, because it dilutes and distract from sensitive issues and events (Roberts 2018). Roberts argues that censorship by flooding is more effective than more overt, fear-based censorship that can obscure public opinion, create backlash and be difficult to enforce. State microblogs are an important vector to diffuse state discourses. Since 2011, the CCP has encouraged state organs and employees at all levels to open microblogs and actively participate in online discussions via posting and commenting (China Net, November 1, 2011); latest figures count 173,569 registered state microblogs (ROMO 2018). Underlining this effort, the influence of all state microblogs has been measured, ranked and publicized in annual reports and conferences with the support of Sina Weibo and the People's Daily since 2011.

Whereas the e-government literature underlines government microblogs' potential for improved service provision, the literature on Internet control underlines the role of official microblogs in managing social tensions and conflicts. By allowing people to vent grievances on microblogs, bureaucrats can learn about emergent issues, which ideally enables them to adapt policies and respond to public demands, but can also be used to devise strategies to prevent protests (Guo 2015, 115; Hassid 2012; Eaves 2012), as well as identify and act to repress critical voices (Roberts 2018). This move towards service prediction and government surveillance is promoted in official and scholarly discourse (Schlaeger and Jiang 2014, Song 2015, Zhu, 2014).

Evidence that this approach has been taken up in the environmental arena includes scholars and officials promoting the use of microblogs to counter environmental 'rumours' and to 'guide' public reactions to environmental events (Luo 2011; Zhu 2014; Chen and Li 2015; Liu 2018, China Environment News, May 31, 2018) and a few empirical studies showing how the party-state "shrewdly occupied the social media landscape to advance its own environmental narrative" in debates about air pollution on Weibo in 2013 (Kay, Zhao and Sui, 2015) and how

official microblogs were used to counter 'rumours' and 'guide' public reaction to the 2015 Tianjin blasts (Zeng, Chan and Fu 2017).

2.3. EPB Microblogs for both e-government and control

The literature suggests that with the establishment of government microblogs, the Chinese government may be pursuing parallel ambitions of improved public engagement and control, especially on particularly sensitive environmental matters (Hilton 2017). Noesselt (2014) argues that this leads local officials to constantly oscillate between constraining and channelling online debates. However, whether the oscillation impedes governance objectives has not been explored. First, quality empirical research on the day-to-day activities of state microblogs is limited (Zheng 2013, Schlæger and Jiang 2014). Second, the Chinese state's environmental communication on social media has been overlooked by researchers focused on media framings of environmental issues and NGOs' use of social media (Tong, 2017, Comfort and Parks, 2018).

Table 1. Evidence of improved environmental e-governance and of social control

Improved environmental E-Governance	Occupation and control of the green public sphere
<ol style="list-style-type: none"> 1. Better disclosure of environmental information: EPB posts about all environmental issues affecting citizens, local policies supporting open communication 2. Enhanced administration: empowerment of grassroots EPBs' communication with other EPBs and state institutions; policy provisions aimed at encouraging this. 3. Enhanced citizens' engagement: citizens' interaction with EPB posts and responsiveness of EPB accounts to societal inputs. 4. Enhanced citizens oversight of government: EPB responses to citizen oversight initiatives; policy provisions enabling EPBs to respond to this evidence. 	<ol style="list-style-type: none"> 1. Promotion of state environmental discourse and policies: EPB posts promoting state slogans and showcasing efforts and results, local policies encouraging such promotion 2. Censorship by flooding: EPB posts with distracting and homogenous content. 3. Attempts to prevent environmental mobilization: EPB policies and practices taken to reduce potential for unrest offline and online including identification and punishment of critical voices 4. Occupation of online space: dishonest use of platform affordances for self-promotion such as fake accounts, automated dissemination, and EPB officials disguised as common users

Addressing the gap in this literature, this paper analyses whether EPB microblogs are used to improve environmental e-governance by enhancing environmental information disclosure and public participation (Q1); and whether control goals interfere with this objective (Q2). To do so, it analyses different aspects of the activity of EPB microblogs in Shandong Province, whose multi-level microblog system has been held as a nationwide model of environmental e-governance (Guan 2018). First, we investigate the politico-regulatory context in which this system has been established and managed. Second, we analyse the kind of information posted by the EPBs belonging to this system. Thirdly, we analyse the patterns of online communication between them; and finally, we analyse their interactions with citizens commenting of their posts. We test the findings of these enquiries against an operationalisation, derived from the literature, of microblogs as e-governance and as social control (Table 1).

3. Engagement and control goals of the ‘Shandong Model’ of multilevel EPB microblogs

In June 2013, Shandong became the first province to establish a system of EPB microblogs involving all administrative levels (An introduction to Shandong’s administrative structure is provided in [Appendix A.1](#)).⁴ Since then, Shandong EPBs’ microblogs have dominated the annual rankings of state microblogs across China (ROMO 2018, Guan 2018) and drawing national rewards and praise from Beijing (Environment Magazine 14 April 2017) as well as some environmental NGOs (IPE, 2015).

In order to understand whether Shandong EPB microblogs were aimed at improving environmental e-governance or promoting strategies of online occupation and social control, we collected information from local policy documents, newspapers and actors regarding the political motivations for setting up this system, the rules governing its operation, and local environmental activists’ experiences with and views on the system. Corroborating the academic literature, we found a mix of improved e-governance and control goals in the motivations that led the province to set up the EPB microblog system. First, we found that “guiding public opinion” to prevent online environmental scandals was a key objective for establishing these EPB microblogs (Zhou, Li and Wang 2014, Guan 2018). The system was set up in response to a large online environmental movement resulting from a viral Weibo post that accused chemical plants in Weifang prefecture of pumping polluted wastewater deep into the ground. This incident triggered scrutiny from both media celebrities and the central authorities (Wang 2018), putting Shandong authorities under extreme pressure to resolve the crisis. They summoned dozens of inspections that apparently found nothing and gave several press conferences to claim this but failed to convince a distrustful public. According to an insiders’ account, EPB leaders became convinced that it was necessary to counter the rumour directly at its source: Weibo (You 2016). Establishing a multilevel system looked more ambitious and could multiply the government’s communication channels (personal communications, March 24, 2018 and April 16, 2018).

However, Shandong EPB Chief Zhang Bo also advocated using Weibo to regain public trust, by improving environmental information disclosure and by handling petitions from citizens more transparently and rapidly (Yeemedia May 30, 2015). The establishment of EPB microblogs came along a series of measures to disclose air quality information and industrial emissions data online, and to encourage NGOs and citizens to monitor and report pollution (Qilu net 15 July 2013). By the summer of 2013, Shandong EPB microblogs began accepting citizens’ complaints on their microblogs.

The tension between engagement and control goals is also visible in the management rules of Shandong EPB microblogs⁵. On the one hand, several provisions implemented e-government canons for improving citizens’ engagement. For instance, 200 EPB staff across the province were assigned the job of microblog editor and the province began issuing monthly rankings to track the performance of prefecture-level accounts (albeit not county-level and below). These

⁴ The only precedent for this kind of multi-level microblog system was the much smaller experiment in the 38 district-level EPBs of Chongqing Municipality in China’s south-west in 2011. However, there is no evidence that it served as a model for the Shandong system.

⁵ Since neither the Provincial notice of 21 June 2013 regarding the setting up of the EPB Weibo system, nor the “management rules of the Shandong Province EPB microblog” and the “provincial multilevel EPB microblog system” were publicised, this analysis is based on the leaked Provisional rules for the management of the EPB microblog system in Dezhou Prefecture accessed on wenku.baidu.com, corroborated by partial information mentioned in local newspapers articles and in interviews.

staff were also specifically trained to handle citizens' complaints directly on Weibo. There is also evidence that the province aims at using Weibo to engage citizens in supervising local EPBs; a new trial policy issued in 2018 plans for the province EPB to keep a record of all Weibo complaints and organize random checks to ensure that they have been addressed by the competent local EPB (Guan 2018)⁶. The regulations also contain specific guidance on how to communicate well with netizens, such as talking in a factual and polite manner and avoiding jargon.

However, other provisions suggest more control orientated goals. EPB editors are instructed to create individual accounts and to intervene to “appease” in online discussions. During fieldwork, several individual accounts that appeared to be regular users were identified as disguised government staff or associates. More importantly, the regulations instruct the editors to abide by internal secrecy rules (which are not specified in the document) and to obtain approval from other departments before posting information or replying to citizens’ queries. If a piece of information is “susceptible of triggering major reactions from the public”, it needs prior approval by the EPB director and if, once posted, information triggers “negative reactions from the public”, it must be withdrawn immediately⁷.

4. Investigating the presence of Shandong EPBs on Weibo

Following this contextual analysis, we now turn our attention to the actual online activities of these microblogs. Using custom Python scripts to query the Weibo API, we collected general data, as well as the posts (both originals and forwards) of 172 Shandong EPB accounts, including the province, 17 prefectures and 132 counties between Monday 23 April and Sunday 20 May 2018 (Table 2, Appendix A.2.). This period was chosen to capture routine working behaviours, falling during a time without major political events or ongoing environmental inspections that could disturb the normal operation of local administrations and would therefore not accurately reflect average activity levels or interactions. A Weibo research account followed the selected EPBs and the account’s home timeline was queried at regular intervals, returning information about the most recent (approximately) 100 posts made by the followed EPBs. Since the number of new posts never exceeded 80, we can be confident that all relevant posts were collected⁸.

Over the four-week period, the 172 EPBs made 35,700 posts. We later collected interaction data, including the number of forwards, the number of comments and the text of comments, for each of these 35,700 posts. We analyse these data sequentially using a mixed-method approach, which is appropriate to answer our multifaceted research question (Ivankova, Creswell and Stick 2006.). We first conduct a qualitative content analysis of a random sample of 1,000 posts to analyse whether the information posted by the EPB tends more to serve their e-government function or discourse control. Secondly, we perform a geographic and hierarchical analysis of information flows between EPBs to find out whether the network improve grassroots EPBs’ governance and communication capacity, or mainly serves to amplify higher-levels’ discursive power. Since EPBs work within jurisdictional boundaries, we also visualise these information flows according to their underlying geography, to show the extent of geographic concentration of microblog activity. Finally, we analyse the interactions between citizens and EPBs on

⁶ Shandong “provisional rules regarding the use of randomized spot check of the implementation and rectification of environmental pollution problems discovered and reported by the masses”, of 19 May 2018.

⁷ Shandong Province “Notice on improving government openness” 6 July 2018.

⁸ Relevant posts mean all the EPB posts that appeared on the timeline of the research account and other EPB followers.

microblogs using a combination of quantitative and qualitative techniques. This enables us to further our understanding of EPBs’ online engagement practices, as well as to uncover possible attempts to manipulate and control online environmental discourse through opaque and spam accounts. More detailed methodological steps are described in each of the following sections.

This mix of methods enables us to capture different dimensions of EPB microblogs’ activities, providing a diverse evidence base to evaluate microblog activity under the operationalisation of evidence for e-governance and control presented in Table 1. Combined with the findings from the fieldwork and document analysis, this enables us to draw more nuanced and comprehensive conclusions to the question of whether EPB microblogs improve environmental e-governance and whether control goals are interfering with these e-governance objectives in Shandong.

Table 2: Summary of Followed Accounts

Administrative Level	Number of administrative divisions in Shandong	Number of official EPB accounts located	Number of administrative divisions for which no official EPB account was located
Province	1	1	0
Prefecture	17	17	0
Counties	137	133 ⁹	5 ¹⁰
Sub-County Level	Unknown	21 ¹¹	N/A

5. Inform or occupy: What do Shandong EPBs post about?

To investigate whether EPBs post about contents that serve e-government goals or control goals, we coded a random selection of 1,000 posts from the sample of 35,7000. Since the literature suggests that the main e-government functions of EPB social media use is for environmental information disclosure and enhancing public participation, we coded the posts into two broad categories: government information disclosure and societal engagement. These are reflective of three categories used by Chen and Bo (2014) in their study of Beijing EPBs microblogs (information disclosure, relationship building and societal mobilization) with the last two merged into a broader societal engagement category.

In the societal engagement category, we considered posts that explicitly replied to citizens’ complaints or explicitly @mentioned non-EPB users¹², a practice that social media users adopt to engage with and show connexions with other users (Merry 2014). We also considered posts that forwarded societal information (NGOs or scientific studies and environmental activities). In the government information category, we sub-categorized the contents between those most

⁹ Zhifu County in Yantai Prefecture had two official accounts associated with their EPB.

¹⁰ The counties lacking official EPB accounts were Dingtao and Dan in Heze Prefecture and Dongying, Kenli and Lijin in Dongying Prefecture. The reason why these three counties lack official EPB microblogs is unknown. However, this confirms previous research (You 2016).

¹¹ This includes the EPBs in special economic and ecological zones, and seven township and village-level EPBs in Ju County, Rizhao Prefecture. Ju County was attempting to build the first hyper-local network of “grassroots” EPB microblogs (Ju County News, October 23, 2015).

¹² @mentioning is a functionality within microblogging platforms which enable a user to tag another user in their posts. The text of the @mention will contain a hyperlink to the mentioned user’s profile and the user that is @mentioned will receive notification that they have been mentioned

likely to enhance governance; i.e. those whose disclosure is most frequently asked by environmental actors, like environmental quality data, state regulations and policies, and state actions taken against polluters (personal communication, March 24, 2018), on the one hand, and contents promoting the state's message and image; i.e. environmental propaganda and posts about EPB's affairs). Finally, in respect of evidence for malpractice (Zheng 2013) and potential strategic distraction (King, Pan & Roberts 2017), we included categories for irrelevant government information and irrelevant information (Table 3, Appendix A.3.).

To ensure the reliability of our results, a second coder coded a random sample of 200 of the 1,000 posts. The percentage agreement between the two coders was 80.25%, with a Cohen's Kappa of 0.7672 and a Krippendorff's Alpha of 0.7666, reliability metrics that are within accepted bounds for this type of research (Lombard, Snyder-Duch and Braken 2002). After coding, we also had a qualitative look at the posts in each category to draw more nuanced interpretations.

Table 3: EPB microblog posts by content type

Category	Number of Posts	Percentage of Posts
Government information	571	57.1%
Information most relevant for improving environmental governance	373	37.3%
Environmental laws, policies and regulations	101	10.1%
Concrete enforcement actions against polluters	147	14.7%
Environmental quality information	125	12.5%
Environmental less relevant for improve environmental e-governance	198	19.8%
EPB news (meetings, speeches)	46	4.6%
Environmental protection propaganda	111	11.1%
Government information unrelated to environmental protection	41	4.1%
Societal Engagement	114	11.4%
Interactions with citizens	32	3.2%
Posts forwarding societal environmental information	82	8.2%
Societal environmental protection activities	15	1.5%
Societal environmental information	67	6.7%
Posts unrelated to environmental protection	295	29.5%
Content not visible	20	2%

On the one hand, this analysis provided limited evidence supporting an improvement in environmental governance. First, microblogs appeared used mostly to diffuse state information,

since EPBs posted mostly governmental information (57.1%); made no reference to the many scientific and NGO studies circulating online, and rarely reported on societal environmental activities, (1.5% of posts, none of which were taking place in Shandong). In addition, only 3.2% of posts @mentioned individual users, and a cross-verification with field data revealed that many of them were working for or having close connections with Shandong EPBs. Additionally, although EPBs frequently posted environmental quality information from government sources (12.5%), upon closer examination we found that these posts were overwhelmingly about air quality (excluding equally relevant information about water and soil pollution). Moreover, most reports were generic prefecture-level information, which are used to rank performance, but which are of little use for citizens. Lastly, EPBs frequently reported on enforcement actions (14.7%), which is key for citizens' oversight of how local EPBs handle polluters. However, most of these posts merely state that an inspection took place, while rarely providing concrete evidence of the sanctions adopted. The majority were also posted under prefecture EPB-sponsored hashtags like 'Environmental Protection Work Undertaken' in Jinan, 'Resolutely Win the Battle for Ecology and Environment' in Dezhou, and 'We Are Moving' in Linyi. Considering the province's stated efforts to use Weibo to monitor subordinate EPBs, this suggests that microblogs might be used also to showcase performance to superiors.

On the other hand, we found a significant amount of content providing evidence for malfunctioning e-government, and potentially for the pursuit of a diversion strategy. Firstly, 11.1% of the posts either promoted official environmental protection slogans or praised the state's effort, which is in line with the stated objective of promoting a "positive online public opinion atmosphere" for government policies (Guan 2018). Secondly, a striking one third of posts were unrelated to the environment yet showed little diversity: 17.9% of these concerned public holidays, 15.6% weather forecasts, and 5.7% nationalist propaganda. Others were posted under a hashtag created by Dezhou Prefecture, providing advice about topics such as shampoo choice and nutrition¹³.

In sum, we found evidence of a malfunctioning e-government that misses its objective of delivering relevant environmental information and engaging society. This pattern may be explained by the management of EPB microblogs, which are pressured to be active online but subject to strict constraints over any information that might risk trigger citizen unrest, a situation which likely incentivises EPBs to post the most innocuous content possible. This, in turn, floods the online information environment with diversionary content. However, this pattern may also be interpreted as aiding control goals. The large amount of distracting content and propaganda may serve to promote a positive public opinion environment, while the generic air quality and investigation initiation reports may serve to increase state legitimacy by "performing state performance" in tackling pollution (Wang 2019).

6. Origins and flows of environmental information among Shandong EPBs

In the second stage of our analysis of social media data, we returned to the full dataset of 35,700 posts to investigate the origins and flows of the information posted by Shandong EPBs using quantitative analysis of the hierarchical and geographic source and dissemination of environmental information. Inspired from studies which have used similar techniques to study social media ecosystems around environmental issues (Merry 2014, Kay, Zhao and Sui 2015, Comfort and Hester 2019), this analysis helps address several points. Firstly, information

¹³ The small portion of these posts that could be linked to environmental protection were categorized as societal environmental information.

originating with grassroots EPBs and then disseminated laterally and by higher level EPBs would support an e-governance hypothesis as it is EPBs at the district and county level who are responsible for environmental enforcement and information disclosure within their jurisdiction. Secondly, information originating mostly from higher level EPBs would signal a failure to improve local e-governance and a use of microblogs mostly to disseminate general messages produced by higher-ups. Lastly, geographic analysis of information production and dissemination can help illuminate the nature of online information provision, such as concentration around the provincial capital, in urban areas or in areas with heavy industry or areas of natural beauty.

To begin, we analysed the overall levels of activity of Shandong EPB accounts, considering the number of original posts, overall activity levels (originals and forwards) and the overall size of that EPBs voice within the dataset (the sum of the number of original posts and the number of times forwarded by another Shandong EPB) (Appendix A.6.). This analysis revealed first, that most of the EPBs' activity was forwarding information from verified accounts (73.4%).¹⁴ By contrast, only 0.7% were forwards of posts made by unverified accounts, and 25.9% were original posts¹⁵. This dominance of forwards and verified voices is much higher than for regular Weibo users, for whom 43% of posts are original, 29% are forwards from verified accounts, and 28% forwards from unverified accounts (Bolsover 2018). Second, 57.7% of posts made by a Shandong EPB were forwards of posts originally made by another Shandong EPB. This insularity suggests that the online activities of these EPBs amplifies official environmental narratives through large-scale forwarding of EPB and other verified user voices. Third, it was also found that grassroots EPBs had much lower levels of activity than prefectures and the province. One fifth of grassroots EPBs (county level and below) showed no activity (neither posting original content nor forwarding) during the four-week period and a further fifth did not post any original content.

Moreover, a significant fraction of accounts concentrated their activity on a small number of days. For instance, Lingyang Township, Ju County, Rizhao Prefecture posted 63 statuses (all of which were forwards) across only three days. By contrast, the Shandong Province EPB account posted 1,184 times during the four-week period, of which 976 were original (an average of 35 original posts and 7 forwards per day), and more than half the prefectural accounts posted more than 15 times per day on average. Thus, while the provincial and some prefecture microblogs (who are publicly rated based on their online activities) dominate the Shandong EPB system, many grassroots EPBs seem to approach Weibo activity either as an optional or simply a box-ticking exercise, instead of using it to enhance their capacity to disclose information and interact with citizens (an interpretation also expressed by a local official, personal communication 16 April 2018).

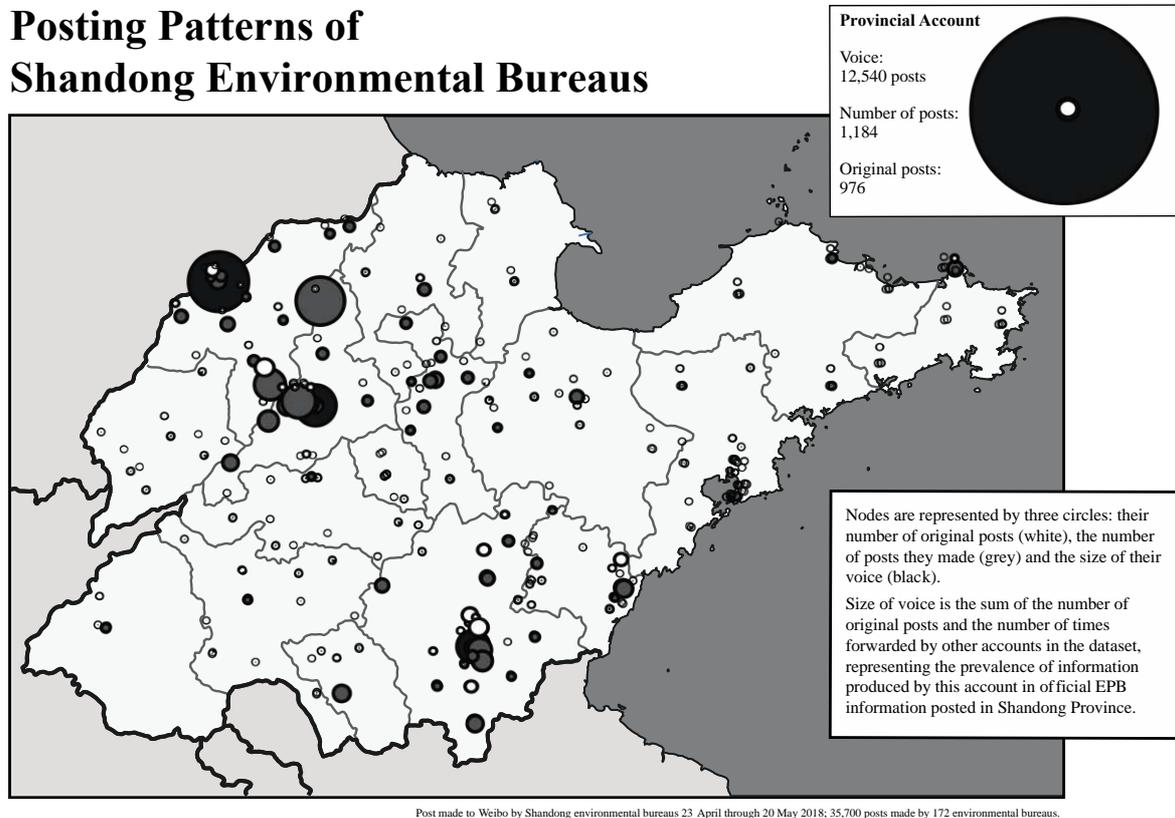
Fourth, the most active grassroots microblogs appeared clustered around the Province's capital, Jinan, as well as the prefecture-level cities of Dezhou and Linyi. The geographic clustering of the most prominent accounts – by original posts, posts and voice - is shown in Figure 1. Each of these three EPBs, as well as the provincial EPB, has a large voice (black circle) relative to their online activity, meaning that original posts by these accounts were frequently forwarded

¹⁴ Verification is a status afforded by Weibo. To apply for verified status, accounts must have at least 100 followers and 30 friends, at least two of which are verified accounts. Companies and organisations must pay fees and submit materials to apply.

¹⁵ Original posts mean those that are not forwards. Being an original post is a necessary but not sufficient condition for being original content, as information could, for instance, have been copied and pasted from other sources.

by other EPBs. The Shandong EPB received 9.7 forwards by other Shandong EPBS for each post it made, Dezhou received 4, Jinan 2.7 and Linyi 1.2.

Figure 1: The representation of Shandong EPBs in information provision on Weibo: originals, posts and voice



Around each of these active prefectural accounts, the grey circles indicate accounts that frequently forwarded information posted by other EPBs. For instance, Qingyun County, Dezhou Prefecture and Pingyin County, Jinan Prefecture both forwarded posts from their superior level EPBs more than 300 times for each original status they posted. These data provide further evidence in support of a box-ticking hypothesis at the grassroots level, with EPBs looking to their direct superiors for information they can post to fulfil their online activity responsibilities.

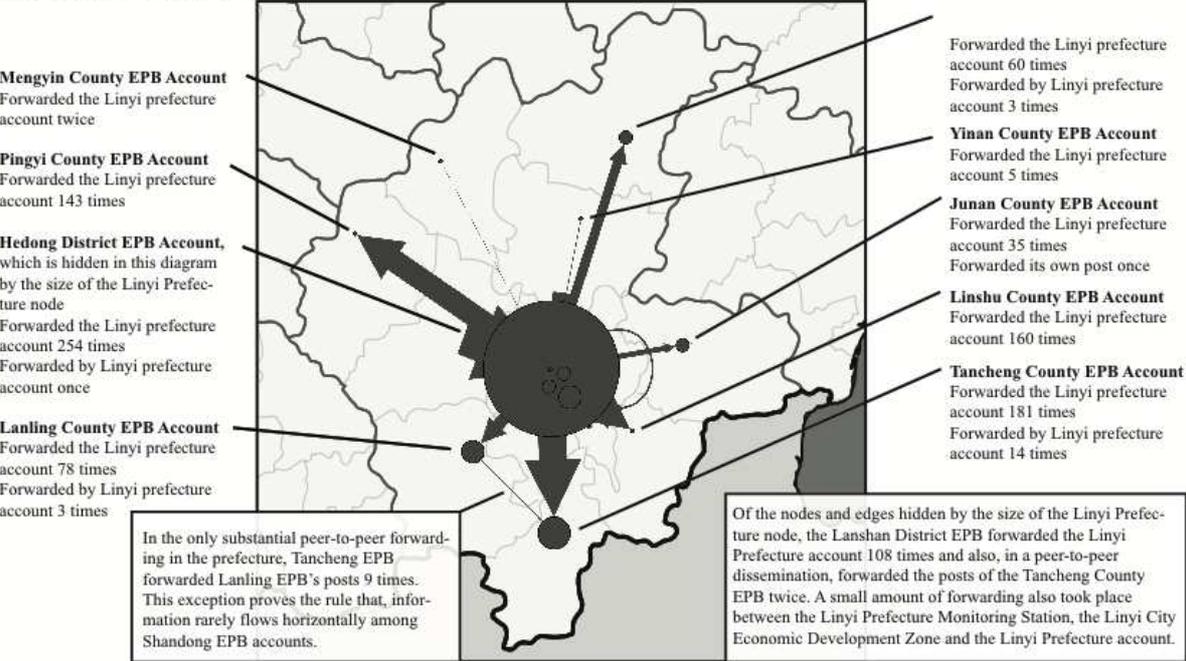
To investigate further, we compared the posting and forwarding practices between EPBs at different levels (Appendix A.4.). This revealed large hierarchical difference. The proportion of original posts declined from 82% at the provincial-level to 38% at the prefecture-level and 17% at the county-level. Accounts at the prefecture and county-level frequently forwarded posts by superior-level accounts, but there was almost no forwarding of posts made by peers or subordinates. More than one third of posts by prefecture-level accounts were forwards of posts by the province but only 2% were of other Shandong prefectures and 5% of Shandong counties. At the county level, 34% of posts were forwards of the Shandong EPB and 25% were of Shandong prefectural EPBs; only 7% were of other counties. This finding is notable considering the cross-jurisdictional nature of environmental pollution problems and the precedent set by local police, who have used microblogs effectively for cross-jurisdictional cooperation (Ma 2013).

To demonstrate this phenomenon, Figure 2 visualizes the forwarding relationships between EPBs located in Linyi Prefecture (the most populous and one of the most active). This demonstrates that state environmental information flows almost invariably followed established administrative hierarchies. Thus, although it was hoped that the microblogging system would increase the online activity of grassroots-level EPBs, bringing the benefits of e-governance to the local level, this does not seem to have occurred.

Figure 2: Forwarding relationships between EPB accounts in Linyi Prefecture

Forwarding Relationships Among EPBs in Linyi Prefecture

In this map, each EPB in Linyi Prefecture is represented by a dot (node). These nodes are sized relative to the number of times their posts were forwarded by other Linyi Prefecture accounts. The Linyi Prefecture EPB was forwarded 1,083 times by the accounts of subordinate EPBs, meaning that the node is so large that it covers those of the Linyi city districts. Forwarding relationships are shown by arrows (edges) from the account who posted the information to the account that forwarded the information. These arrows are sized according to the number of times the second account forwarded the first. This map illustrates a pattern, also present in the other prefectures, in which information is disseminated down the chain of heirarchy via forwarding, but rarely flows upward or horizontally.



To explore the nature of this top-down information flow, we examined 25 randomly selected posts made by a higher level and forwarded by a subordinate level (Appendix A.5.). All of the randomly-selected posts originated from one of the big-four content producers: Shandong, Jinan, Dezhou or Linyi. Only one post contained additions by the subordinate EPB, but even this was simply a quotation cut and pasted from the report by the Shandong EPB to which the original post linked. The topical spread of these posts mirrored the content analysis in the previous section, supporting the idea that this information environment is actively promoted by higher-level EPBs. Within the 25 posts, three were from Dezhou’s Something You Didn’t Know series confirming that the spread of topics in these diversionary posts is set by these big-four EPBs.

However, we noted one interesting practice, which is that these posts frequently @mentioned higher-level EPBs when forwarding, suggesting that this functionality may be used by lower-level EPBs to inform their superiors. To investigate this, we analysed posts containing @mentions (34.7% of the 35,700 posts). Table 4 shows that county-level EPBs most frequently made @mentions and many of the most frequently @mentioned accounts are prefecture-level

EPBs, supporting the idea that @mentions are often used by lower-level EPB to attract the attention of superiors. Moreover, the overwhelming majority (93.1%) of the 16,111 @mentions were of another Shandong EPB, corroborating the content analysis, in which we found very few @mentions of individuals. Only two individuals were frequently @mentioned and both had close connections to the Shandong EPB. This further reinforces the insularity of EPB activity, as well as the blurring of lines between EPBs and the individuals they interact (and are seen to interact with) with online.

Table 4: Top Ten Accounts by Number of @mentions made and received

Number of @mentions made		Number of @mentions received	
Shanghe District of Jinan Prefecture	2,628	Jinan Prefecture	6,347
Qihe District in Dezhou Prefecture	2,111	Zibo Prefecture	2,401
Tianqiao City District in Jinan	926	Shandong Province	2,168
Changqing Suburban City District in Jinan	863	Dezhou Province	2,016
Huaiyin City District in Jinan	778	Qihe District in Dezhou Prefecture	979
Lixia City District in Jinan	699	Weifang Prefecture	403
Pingyin District of Jinan Prefecture	699	Ju County in Rizhou Prefecture	186
Zhangdian District of Zibo Prefecture	590	Personal account of an EPB official, most likely responsible for communication	164
Zichuan District of Zibo Prefecture	460	Jinan Municipality Public Communication microblog	83
City Centre District in Jinan	437	Personal account of an individual with a very close relationship to the Shandong EPB	63

A systematic comparison of the @mentioning relationships between different administrative levels further reinforces the conclusion that @mentions are a bottom-up communication method (Appendix A.7.); 75.2% of @mentions made by county-level EPBs were of prefecture-level EPBs and 12% were of the provincial EPB. To explore the nature of these bottom up @mentions, we analysed qualitatively a random selection of 25 posts in which a subordinate EPB @mentioned a superior EPB (Appendix A.8.). This restriction showed no evidence of information production by grassroots EPBs. All 25 of the posts were forwards of information originally produced by an official outlet, either state or media. Moreover, some @mentioning patterns indicated that they might be being used to increase quantitative statistics. For instance, in one post, Dezhou Prefecture posted a Something You Didn't Know about levels of pesticides

on fruits and vegetables, which was forwarded by Qihe County, Dezhou Prefecture, who added @mentions to Dezhou and itself. Neither of these mentions align with the purpose of @mentions as drawing the attention of another to a piece of information and, thus, seem designed to inflate metrics of engagement.

To try to drill down to find relevant environmental content at the grassroots level, we also looked specifically at the posts made by county-level EPBs using the hashtags that, from the content analysis, seemed to be designed to report investigations in the active areas of Jinan, Dezhou and Linyi. We found that a high proportion of these posts @mentioned their respective prefecture-level EPB (1,335 of 1,344 in Jinan, 42 of 43 in Dezhou, and 198 of 259 in Linyi), confirming that these hashtags and the @mentions within them were part of an organized pattern of reporting to superior levels, rather than simply to disclose this information to the public.

In sum, the analysis of the relationships between EPBs reveals a highly insular information environment within Shandong's EPB system, in which the majority of communication and interaction occurs between different levels of EPBs according to established power structures, rather than with citizens or in ways that would reflect enhanced e-governance at the grassroots level. This adds more evidence in support of ideas of a malfunctioning e-government failing to engage with society. At the same time, the network of local EPBs are also, through their online activities, propagating and amplifying official information created by a small number of higher-level EPBs, who are evaluated on these quantitative metrics. This leads to a flooding of Weibo with homogenous and sometimes irrelevant information, which may also serve a broader occupy and control strategy. Indeed, it could potentially be the case that misaligned e-government incentives of rewards and requirements for online activity and punishments for environmental incidents or citizen unrest are knowingly allowed to continue because they serve goals of control by diversion and flooding.

7. Interacting with or manipulating interactions with netizens?

As a final step in the analysis of Shandong EPB microblog activities, we examined the level and quality of their interactions with citizens. We first looked at the number of followers and found that, while the provincial account had 700 000 followers, and prefecture accounts as well as accounts in the provincial capital had over 100,000 followers, over one third of EPB accounts had fewer than 500 followers, implying a low level of attractiveness of these accounts to citizens. In turn, this small audience would add to the absence of pressure from publicized rankings at the sub-prefectural level meaning that there is likely much less incentive for these EPBs to devote time and energy to engage in meaningful online interactions with citizens.

However, follower numbers only represent the size of the potential direct audience, whereas the forwarding and commenting of information posted by EPBs would be a much more reliable indicator of citizen involvement. It is for this reason that we collected and analysed the 73,914 comments made on the 35,700 EPB posts of our dataset. These data revealed that EPB posts received an average of 4.1 forwards and 2.1 comments per post, which is considered low. By contrast, news stories from top outlets on Weibo were found to receive on average 1,370 forwards and 589 comments per story (Bolsover, 2013). Moreover, 63.5% of EPB posts received no comments at all, and 27% of the comments were made by another Shandong EPB. This reinforces the conclusion that the information posted to the platform is generally not of interest to citizens and that the majority of activity occurs for and between EPBs.

However, we considered that even a small number of posts showcasing improved information disclosure or citizen engagement might be evidence of enhanced environmental e-governance. Thus, we looked more closely at the small number of posts (0.09%) that received above 100 comments. To our surprise we found these comments to be dominated by spam. The three highest commented posts were all made by Lixia District, Jinan Prefecture; 319 (88%) of the 363 comments on these posts were made by a single user who had only 12 followers but had made 8,942 posts, all forwards of Jinan Prefecture EPBs. The content of each of the 319 comments was some number of iterations of the emoji [praise China]. This was clearly a spam account, likely designed to provide the appearance of greater citizen involvement. High levels of spamming were also found in the fifth through 35th most commented posts, all of which were made by Tancheng County, Linyi Prefecture; nearly three quarters of comments on these posts were made by a handful of users and simply said, “forward microblog”.

Interestingly, Jinan and Linyi Prefectures were the two top microblogs in the official monthly ranking calculated by Weibo for Shandong Province EPB published during the data collection period. This correlation suggests even more strongly that some EPBs are employing spammers and mass forwarding to improve the scores under which they are evaluated and that those that do are rewarded with higher scores in the official rankings. This spamming also contributes to flooding of the platform with homogenous but diversionary content, which would align with a strategy of occupation and control.

Thus, in order to identify and analyse genuine EPB-citizens interactions, we selected the 15 posts that received the largest number of unique comments (Appendix A.9.). However, three of the 15 posts with the most unique comments were the Lixia posts mentioned above, due to variations in the number of times [praise China] was posted¹⁶. The possibility of constructing another sample attempting to pinpoint genuine user interactions by excluding the specific forms of spam uncovered so far was considered; however, we decided that this would result in overfitting to the sample and, thus, the more general metric of the 15 posts that received the most unique comments was deemed to be the most appropriate.

Five of the remaining top 15 posts appeared unrelated to the environment. However, some nonetheless triggered environmentally-motivated reactions. For instance, a post about Mother’s Day received a stream of comments accusing the EPB of causing the deaths of Shandong mothers from pollution-induced cancers (Appendix A.9.12.). The EPBs did not engage with these negative comments, but users identified as associated with EPBs followed-up by posting neutral or positive comments, aligning with ideas of flooding, diversion and discourse control.

The remaining seven posts concerned environmental matters, yet very few triggered meaningful user interactions. For instance, a post by Shandong EPB announcing the new natural park supervision plan had only one substantial citizen comment, which laments that “local EPBs are so weak that can’t even manage a village mine!” This critical citizen comment is flooded by numerous praises and encouragements from other EPB accounts within the post comments (Appendix A.9.8.).

The post that triggered the most meaningful user interactions was a pollution case. In the post, Ju County reported on its investigations at a polluting factory and invited comments, especially from an @mentioned environmental activist (likely the one who reported the case) (Appendix A.9.6). The activist reacted critically: “The real situation is that, first, the factory is still

¹⁶ A post with 10 comments, five of which were “forward microblog”, two of which were “[praise China]”, and three of which were “[praise China] [praise China]” would be considered to have three unique comments.

processing, and second, nobody answers the phone,” @mentioning higher-level EPBs and several environmental activists and organizations. Another user followed-up asking: “Isn’t it the case that large polluting companies should be closed immediately?” In response, at 10:36 pm, Ju County EPB posted that there were two responses to this type of case: immediate closure or mandated renovations within a certain time limit but did not specify what renovations might have been mandated, nor the time limit that might have been imposed. The activist was not satisfied and continued to ask for further information, but another user (whose identity is not known) criticized this persistence, stating that one should “petition according to the law and defend rights with reason.” Ju EPB thanked this poster and ignored the activist's demands.

Although far from satisfactory, this exchange illustrates the kind of interactions that were promoted as a goal of establishing EPB microblogs. However, it is not the case that all pollution event related posts receive similar levels of interaction. In this particular case, debate may have been stimulated by the involvement of the local environmental activist. The other two pollution-related posts in this sample of 15 posts did not show similar levels of interaction (post A.9.-9 and A.9.13). Moreover, when, a few days later, another user asked in a separate post whether the same EPB had investigated a close-by cement plant, the EPB told the user to submit an environmental petition, instead of following-up online. In spite of the provincial microblog regulations instructing EPBs to handle complaints on Weibo, these attempts by EPBs to move environmental queries to the traditional petition channels appear to be still common. The Jinan-based NGO Green Qilu reported that they obtained replies to only half of their online queries about over-emitting factories in 2017, and field interviews confirmed not only that many netizens never get replies, but also that EPBs sometimes pressure activists to remove posts about local pollution issues from Weibo thus hiding these posts both from citizens and from the EPB's superiors (personal communications, April 14, 2018, July 30, 2018 and August 21, 2018).

In sum, the sheer weight of non-environmental and propagandistic content, published by a small number of users and disseminated by the network of EPBs, plus the large amount of spam that obscures genuine citizen comments and anecdotal evidence of offline repression, reduces the weight of the evidence provided by the online interaction found in this dataset for the efficient e-government hypothesis.

8. Conclusions

This paper set out to examine whether the activities of Shandong EPB microblogs align with the stated goal of improving environmental governance and fulfil the expectations of e-government reforms, and whether the goals of controlling online environmental discourses and managing social reactions impede these e-governance efforts.

This study found only very limited evidence that EPB microblogs enhance e-governance either through information disclosure or citizen interaction. The microblogs did create new channels of public communication, but it was rarely used effectively, especially at the local level. EPBs posted almost exclusively official sources, giving little publicity to societal voices. Most interactions occurred between EPBs, and the remainder generally involved individuals with obvious but often undisclosed relationships to EPBs. These practices resemble those of political actors and large environmental NGOs in the west, who have been found to use social media to broadcast their message unilaterally and to reinforce their internal connections, rather than to interact with the public, out of fear of losing control of their message (Hutchins 2016; Merry 2014; Comfort and Hester 2019). Such an interpretation can plausibly explain the behaviour of

EPBs, to the extent that their administrators may be also worried about losing control (Zheng 2013).

However, the EPB posts were also overwhelmed by a flood of distraction and spam, which are inconsistent with the pursuit of message diffusion. These behaviours could be explained by institutional factors listed by Zheng (2013): first, the fact that the Province evaluates the prefectures on the basis of quantitative criteria may have encouraged ‘box-ticking’ attitudes, as well as, in some cases, the use of artificial means to improve scores. This use of artificial means to boost quantitative metrics of audience engagement corroborates the growing body of research concerning the increasing manipulation of the online information environment (Bolsover and Howard, 2018) and supports ideas that quantitative performance assessment in government service provision produce distorted incentives and maladaptive behaviours that have a negative impact on information disclosure (Zhang and Chen 2015). Second, EPB’s online behaviours may be explained as a reaction to the attempt by the province EPB to use Weibo to supervise them. Since grassroots EPBs cannot delete the comments of other users, the most effective strategies to deal with potentially exposing information would be to pressure the poster to remove the information (offline strategy) or to obscure it with a flood of positive posts and comments (online strategy).

Is this apparently malfunctioning of e-governance on Shandong EPB microblogs caused by behaviours aimed at controlling online environmental discourse, rather than just by institutional deficiencies discussed in the literature? Although academic perspectives tend to analyse e-government and control as distinct issues, we showed that official language presents these goals as going hand in hand. The empirical analysis in this paper indicates such a presentation may subsume and distort the parameters of information disclosure and citizen interaction in a way that is not incompatible with, and perhaps is even supportive of, control goals. Hence, although local in nature and potentially contrary to central government goals to fight pollution, the practices uncovered in this research align with broader state control goals of combatting ‘rumours,’ ‘guiding’ public opinion and “performing performance” in tackling pollution. These practices were found to be quite effective during major environmental events like the 2015 Tianjin Blast and the 2013 ‘airpocalypse’ (Zeng, Chan and Fu 2017; Kay, Zhao and Sui 2015); our findings suggests that it may also shapes the mundane and day to day activities of EPB microblogs.

Furthermore, these practices can also be linked to a wider blurring of the state and society in the newly envisaged efficient Chinese technology-powered state. Evidence for this blurring was found in requirements that officials use individual microblogs and in the co-option of citizens to report on local pollution. Despite blatant evidence of attempts to manipulate quantitative measures of engagement, there was no evidence of attempts to punish these maladaptive e-government practices. To the extent that the state can turn a blind eye on them, it will be able to continue to maintain that state microblogs enhance both e-governance and social governance.

However, it is important to note the limitations of this study. First, it focused on the activities of EPBs in a single province. It cannot be seen as representative of other provinces but is rather a deep investigation of the nature of the activity held up as an example to other provinces. Second, although we specifically picked a time-period of relative normalcy, we can also not claim that it can be extrapolated beyond the four-week period we examined, particularly given the fast-changing nature of Chinese environmental governance. Third, we chose to wait at least a week before collecting comments to ensure that commenting on every collected post had finished. (the API restrictions on data collection also make impossible rapid comment

collection on such a large number of posts). This means that our data would exclude comments that have been deleted by censorship, as well as comments that were automatically hidden based on target keywords and (potentially government-induced) practices of self-censorship.

Fourth, this paper focused on providing a deep analysis a single social media platform. As such, its conclusions cannot be extended to other platforms such as WeChat or individual EPB websites. Lastly, this study focused on EPB posts and the associated commentary, but interactions over environmental events often occur in multiple venues both online and off over an extended period of time, or problems, even when they do not escalate into broader movements. This research cannot speak to interactions and events that move across the wider ecosystem. The limitations of the present study indicate valuable avenues for future research.

To conclude, despite a multitude of efforts at uncovering evidence of enhanced e-governance on model Shandong EPB microblogs, we found limited evidence of information disclosure and citizen interaction; instead we discovered an information environment flooded by diversionary content and providing evidence for malfunctioning e-governance that may play into wider control goals. It is hoped that by turning the lens on the mundane and everyday work of EPB microblogs within the context of its complex and multilevel social governance, further research can investigate empirically Chinese state initiatives and actions, in service of illuminating not only the goals and priorities of the state, but also what it is able to achieve in practice pursuing these goals.

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11. Appendices

Appendix A.1. Map of the Administrative Divisions of Shandong Province

Administrative Divisions of Shandong Province



Shandong Province (山东省) is located on China's eastern sea board, between Beijing and Shanghai. It is the third richest province in China (after Guangdong and Jiangsu) and the second most populous (after Guangdong).

Shandong is a large agricultural and a major industrial province with a high proportion of power, cement, coal, steel, petrochemicals and textile industries. As a result it has been a key contributor to Beijing's air pollution and has been singled out for its 'cancer villages'.

Shandong is sometimes called Qilu (齐鲁) after the name of two ancient kingdoms that ruled the area. In 551 BC, the scholar Confucius was born in what is now Shandong and his home town, Qufu, is now a centre of Confucianism. The province has the reputation of being culturally conservative and politically loyal to the centre.

Shandong Province is divided into 17 prefectures, each named for the prefectural capital. The city of Jinan is the both the capital of Jinan Prefecture and of Shandong Province.

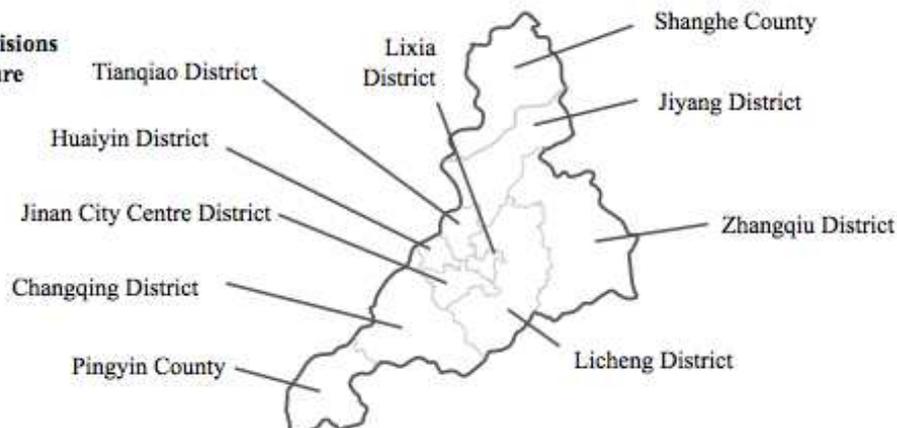
The city of Qingdao is the capital of Shandong's richest prefecture and is afforded a special administrative status. Linyi is the largest city in Shandong, by both area and population.

The province has large development gap. Per capita GDP in Qingdao, which has been rated as China's most liveable city every year since 2016, is five times higher than in rural Heze.



Each prefecture is divided into some number of county-level units. For instance, Jinan Prefecture is divided into 12 counties, county-level districts and county-level cities. Districts are strictly within the jurisdiction of the prefectural city. County-level cities are more highly ranked and more urbanised than counties. Counties and districts are further composed of townships and street-level offices (urban) or villages (rural).

County-level Divisions of Jinan Prefecture



All prefecture and province EPBs across China were mandated to open Weibo accounts in 2013. However, Shandong is a national experiment in their decision to expand this to the county-level (and below).

Table A.2. Descriptive statistics of Shandong EPB Weibo accounts

Jurisdiction Name (Chinese)	Jurisdiction Name (English)	Weibo Account Name	Account Creation Date	Number of Friends	Number of Followers	Statuses Posted Since Creation	Statuses Posted Per Day Since Creation	Size of Voice in Dataset	Number of Posts in Dataset	Number of Original Posts in Dataset	Number of Forwarded Posts in Dataset	Number of Forwarded Posts from Verified Users in Dataset	Number of Days Posted on in Dataset
山东省	Shandong Province	山东环境	15-05-13	967	728694	57824	31	12540	1184	976	208	207	28
济南市	Jinan Prefecture City	济南环保	01-07-13	2057	72820	39251	22	2486	676	199	477	477	28
市中区	City Centre District	市中环保	19-07-13	337	2883	38739	21	237	578	47	531	531	24
长清区	Changqing District	长清环境	01-09-14	206	785	45761	33	254	1053	27	1026	1026	28
历下区	Lixia District	历下环保	10-10-14	409	3891	38135	28	240	851	38	813	813	28
历城区	Licheng District	历城环境	30-09-14	222	853	26377	19	164	336	33	303	303	26
槐荫区	Huaiyin District	槐荫环保	23-07-13	211	1879	45459	25	526	1018	186	832	832	26
天桥区	Tianqiao District	天桥环保	08-10-14	313	1213	67219	50	287	2008	70	1938	1938	28
章丘区	Zhangqiu District	章丘环保	29-07-13	191	4318	30134	17	56	316	8	308	308	20
济阳县	Jiyang County	济阳环保	02-08-13	254	1612	30773	17	69	400	8	392	391	20
平阴县	Pingyin County	平阴环保	25-07-13	304	694	27689	15	12	735	2	733	733	15
商河县	Shanghe County	商河环保	25-03-14	428	833	89029	58	159	3048	24	3024	3022	26
德州市	Dezhou Prefecture City	德州环境	03-07-13	935	698032	41834	23	3801	758	607	151	151	28
夏津县	Xiajing County	夏津环保	02-03-15	#	#	#	0	0	0	0	0	0	0

陵城区	Lingcheng District	陵城环境	29-07-11	576	1168	23197	9	40	191	21	170	167	20
德城区	Decheng District	德州城区环境	08-08-13	184	205	3633	2	1	146	1	145	145	14
乐陵市	Leling City (county level)	乐陵环境	09-08-13	3193	15935	37947	21	23	265	14	251	251	19
禹城市	Yucheng City (county level)	禹城环境	25-04-14	1273	2341	26718	17	73	383	57	326	326	25
平原县	Pinyuan County	德州平原环保	29-09-13	311	1497	12044	7	28	568	22	546	545	26
齐河县	Qihe County	齐河环境	12-08-13	2196	44063	103172	59	1056	1820	1016	804	803	28
宁津县	Ningjin County	宁津环境	12-08-13	193	719	5039	2	10	343	10	333	333	16
庆云县	Qingyun County	庆云环保	09-07-13	244	515	20238	11	8	377	1	376	376	22
临邑县	Linyi County	临邑环境	01-09-11	1467	19733	42038	17	94	213	78	135	135	18
武城县	Wucheng County	武城环境	13-08-13	730	18582	21693	12	122	510	118	392	392	28
德州市环境保护局经济技术开发区	Dezhou Ecological Economic Development Zone	德州经开区环境	19-09-17	22	54	4251	17	13	412	5	407	407	23
聊城市	Liaocheng Prefecture City	聊城环境	01-07-13	185	180366	3120	1	26	51	22	29	29	17
东昌府区	Dongchangfu District	聊城东昌府环境	11-04-14	#	#	#	0	0	0	0	0	0	0
临清市	Lingqing City (county level)	临清环境	29-09-13	#	#	#	0	0	0	0	0	0	0
莘县	Shen County	聊城莘县环境	29-09-13	46	273	217	0	1	1	1	0	0	1
冠县	Guan County	冠县环境	30-09-13	156	157	350	0	0	6	0	6	5	3

茌平县	Chiping County	茌平环境	30-09-13	#	#	#	0	0	0	0	0	0	0
阳谷县	Yanggu County	阳谷环境	30-09-13	165	159	698	0	2	16	2	14	14	8
东阿县	Dong'a County	东阿环境	15-08-13	112	139	208	0	3	14	3	11	11	10
高唐县	Gaotang County	高唐县环境保护局	29-09-13	99	182	392	0	3	8	3	5	5	6
菏泽市	Heze Prefecture City	菏泽环境	25-06-13	304	3694	5850	3	40	261	38	223	221	22
牡丹区	Mudan District	牡丹环保	01-04-15	15	46	58	0	0	1	0	1	1	1
定陶区*	Dingtao District	NA											
东明县	Dongming County	东明环境	#	#	#	#	0	0	0	0	0	0	0
巨野县	Juye County	巨野县环境保护局	#	#	#	#	0	0	0	0	0	0	0
郓城县	Yuncheng County	郓城环保	#	#	#	#	0	0	0	0	0	0	0
鄄城县	Luancheng County	鄄城县环境保护局	#	#	#	#	0	0	0	0	0	0	0
曹县	Cao County	曹县环境保护局	#	#	#	#	0	0	0	0	0	0	0
成武县	Chengwu County	成武环境	#	#	#	#	0	0	0	0	0	0	0
单县	Dan County	NA											
济宁市	Jining Prefecture City	济宁环境	27-06-13	482	237818	23211	12	75	165	57	108	108	25
任城区	Rencheng District	济宁市任城区环境保护局	02-07-14	139	239	118	0	7	8	7	1	1	6

兖州区	Yanzhou District	兖州环境	19-04-12	198	3074	289	0	0	3	0	3	3	2
邹城市	Zoucheng City (county level)	邹城环境	13-01-14	37	174	1238	0	0	1	0	1	1	1
曲阜市	Qufu City (county level)	曲阜环保	07-11-12	86	7647	1053	0	5	17	4	13	13	9
梁山县	Liangshan County	梁山环保	22-07-14	108	135	91	0	0	2	0	2	2	2
泗水县	Yishui County	泗水环境	30-12-13	358	282	217	0	2	7	2	5	5	5
汶上县	Wenshang County	汶上环保	25-03-15	120	120	795	0	0	8	0	8	8	5
鱼台县	Yutai County	鱼台环境	26-11-13	216	248	599	0	0	6	0	6	6	3
金乡县	Jinxiang County	金乡环境	02-07-14	57	141	144	0	3	3	3	0	0	3
微山县	Weishan County	微山环境	22-11-13	271	449	2652	1	5	17	4	13	13	9
嘉祥县	Jiashang County	嘉祥环保	09-06-13	#	#	#	0	0	0	0	0	0	0
枣庄市	Zaozhuang Prefecture City	枣庄环保	05-07-13	79	810495	40957	23	89	819	82	737	737	28
市中区	City Centre District	枣庄市中 环保	06-08-13	#	#	#	0	0	0	0	0	0	0
台儿庄区	Taierzhuang District	台儿庄环 保	16-02-16	#	#	#	0	0	0	0	0	0	0
薛城区	Xuecheng District	薛城环保 政务	06-08-13	#	#	#	0	0	0	0	0	0	0
山亭区	Shanting District	山亭环保 政务微博	08-08-13	166	1320	1958	1	4	9	4	5	5	6
峄城区	Yicheng District	峄城环保 政务	06-08-13	#	#	#	0	0	0	0	0	0	0
泰安市	Tai'an Prefecture City	泰安环境	24-06-13	484	144923	14333	8	112	162	99	63	56	28

岱岳区	Daiyue District	岱岳环境	22-07-13	395	1082	1284	0	3	9	1	8	8	6
泰山区	Taishan District	泰山环境	04-07-13	119	927	1817	1	5	32	3	29	29	12
滕州市	Tengzhou City (county level)	滕州环保	04-09-13	167	692	4819	2	0	28	0	28	28	17
肥城市	Feicheng City (county level)	肥城环境	04-07-13	154	468	412	0	0	1	0	1	1	1
新泰市	Xintai City (county level)	新泰环保	08-07-13	75	294	489	0	3	4	2	2	2	3
东平县	Dongping County	东平环境	04-07-13	198	687	670	0	11	5	4	1	1	4
宁阳县	Ningyang County	宁阳环境	09-07-13	85	296	308	0	7	5	4	1	1	4
滨州市	Binzhou Prefecture City	滨州环保	20-12-12	300	795777	22177	11	110	475	102	373	372	28
沾化区	Zhanhua District	沾化环保	15-10-13	62	190	847	0	0	4	0	4	4	4
滨城区	Bincheng District	滨城区环 保分局	26-04-13	#	#	#	0	0	0	0	0	0	0
无棣县	Wuyi County	滨州无棣 环保	07-11-13	153	237	135	0	0	2	0	2	2	2
惠民县	Huimin County	惠民环境	09-10-13	187	309	3065	1	0	89	0	89	89	18
博兴县	Boxing County	博兴环保	29-09-13	372	542	988	0	0	2	0	2	2	2
阳信县	Yangxin County	滨州阳信 环保	02-09-13	#	#	#	0	0	0	0	0	0	0
邹平县	Zouping County	邹平环保	26-12-11	796	2048	5134	2	0	1	0	1	1	1
东营市	Dongying Prefecture City	环保东营	25-10-11	453	4472	3193	1	10	89	8	81	80	18
河口区	Hekou District	河口环保	12-06-12	158	235	145	0	6	20	3	17	17	10
东营区	Dongying District	NA											

垦利区	Kenli District	NA											
广饶县	Guangrao County	广饶环保	08-07-14	238	418	661	0	0	5	0	5	5	3
利津县	Lijin County	NA											
黄河口生态旅游区	Huanghe Delta Ecological Tourism Zone	黄河口生态旅游区	#	#	#	#	0	0	0	0	0	0	0
淄博市	Zibo Prefecture City	淄博环保	15-11-12	359	26197	17055	8	91	697	16	681	677	28
淄川区	Zichuan District	淄川环境	15-10-14	161	381	1800	1	85	462	34	428	423	25
张店区	Zhangdian District	张店环境保护	17-09-14	24	244	1583	1	39	537	19	518	515	27
临淄区	Linzi District	临淄环保	17-04-12	212	761	2209	0	13	393	7	386	385	25
博山区	Boshan District	博山环保	15-09-14	78	323	1075	0	1	195	1	194	194	14
周村区	Zhoucun District	周村环保	05-11-13	270	375	2070	1	12	179	8	171	171	12
高青县	Gaoqing County	高青环保	18-09-14	32	43	121	0	5	369	3	366	366	13
桓台县	Huaitai County	桓台环保	18-10-13	99	243	2333	1	92	382	42	340	340	23
沂源县	Yiyuan County	沂源环保	19-09-14	103	248	1248	0	36	91	20	71	71	18
临沂市	Linyi Prefecture City	临沂环境	08-07-13	1243	333484	41103	23	1903	851	772	79	75	28
罗庄区	Luozhuang District	罗庄环境	15-04-14	4335	5331	17764	11	93	94	93	1	0	24
河东区	Hedong District	河东环境	26-01-14	308	74339	32654	20	123	1324	122	1202	1083	17
兰山区	Lanshan District	兰山环境	27-01-14	447	32728	22682	14	129	401	128	273	269	27
沂水县	Yishui County	山东沂水环境	18-09-13	1593	9461	25652	15	189	362	179	183	182	19
郯城县	Luancheng County	郯城环境	17-09-13	3541	14496	35595	20	556	777	530	247	247	28

沂南县	Yinan County	沂南环境	05-06-13	580	50390	18985	11	532	541	530	11	11	25
兰陵县	Lanling County	兰陵环境	16-05-14	1068	17927	23359	15	150	216	138	78	78	19
平邑县	Pingyi County	平邑环境	05-09-13	2059	15829	23152	13	19	572	19	553	524	21
临沭县	Linshu County	临沭环保	14-05-14	142	1149	23172	15	1	170	1	169	169	9
莒南县	Junan County	莒南环保	16-05-14	739	1366	37539	25	80	252	79	173	173	22
费县	Fei County	费县环保	#	#	#	#	0	0	0	0	0	0	0
蒙阴县	Mengyin County	蒙阴环境	17-09-13	216	1388	7291	4	19	28	19	9	9	11
临沂经济区	Linyi Economic Zone	临沂经济区环境	29-09-13	1146	52348	19868	11	1037	1025	1019	6	6	28
开发区	Linyi High-Tech Zone	临沂高新环保	15-04-14	1238	100236	29882	19	120	220	105	115	114	21
临沂市环境保护局经济技术开发区	Lingyi Economic Development Zone	临沂经济区环境	29-09-13	1146	52348	19868	11	1037	1025	1019	6	6	28
潍坊市	Weifang Prefecture City	潍坊环保	28-06-13	258	522553	19175	10	17	565	14	551	551	21
奎文区	Kuiwen District	奎文环境	04-07-13	#	#	#	0	0	0	0	0	0	0
坊子区	Fangzi District	坊子环保	05-07-13	52	78	503	0	0	25	0	25	25	3
寒亭区	Hanting District	寒亭环保	21-05-11	#	#	#	0	0	0	0	0	0	0
潍城区	Weicheng District	潍城环保	04-07-13	57	158	218	0	0	8	0	8	8	6
高密市	Gaomi City (county level)	高密环保	02-07-13	11	367	249	0	4	2	2	0	0	1
安丘市	Anqiu City (county level)	安丘环保	08-07-13	345	945	815	0	1	5	1	4	4	5
青州市	Qingzhou City (county level)	青州环境	13-10-11	75	348	1185	0	1	21	1	20	20	11

寿光市	Shouguang City (county level)	寿光环境	02-06-13	213	1442	5650	3	1	167	1	166	166	12
昌邑市	Changyi City (county level)	昌邑环境	01-07-13	27	160	246	0	0	6	0	6	6	6
诸城市	Zhucheng City (county level)	诸城环境	05-07-2013	#	#	#	0	0	0	0	0	0	0
临朐县	Linqu County	临朐环保	04-07-13	630	548	5974	3	3	181	3	178	165	6
昌乐县	Changle County	昌乐环境	01-07-13	150	190	4057		0	110	0	110	110	14
潍坊高新区	Weifang High-Tech zone	潍坊高新区环保分局	02-07-13	23	114	34	0	0	7	0	7	7	4
潍坊经济开发区	Weifang Economic Development District	潍坊经济开发区环保	05-07-13	68	124	138	0	0	1	0	1	1	1
滨海经济开发区	Binhai Economic Development District	潍坊滨海环境	03-07-13	100	273	57	0	0	5	0	5	5	5
峡山生态经济开发区	Xiashan Ecological Development District	峡山环境	#	#	#	#	0	0	0	0	0	0	0
日照市	Rizhao Prefecture City	日照环境	10-06-13	446	190008	44627	24	739	854	616	238	237	28
东港区	Donggang District	东港环境	03-07-13	517	7920	7922	4	132	102	85	17	17	21
岚山区	Lanshan District	岚山环境	03-07-13	#	#	#	0	0	0	0	0	0	0
莒县	Ju County	莒县环保	05-07-13	2220	4298	25948	14	71	357	32	325	320	28
五莲县	Wulian County	五莲环境	02-07-13	336	1300	9136	5	0	1	0	1	1	1

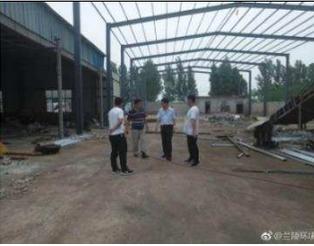
日照开发区	Rizhao Development Zone	日照开发区环保	04-06-13	309	1539	1492	0	1	1	1	0	0	1
山海天区	Shanhaitian Tourism Zone	山海天环境		154	485	320	0	2	1	1	0	0	1
莒县果庄镇	Ju County Guozhuang Township	果庄环保办	02-07-15	148	87	385	0	0	1	0	1	1	1
莒县小店	Ju County Xiaodian Township	小店环保	16-06-15	114	238	320	0	2	1	1	0	0	1
莒县安庄镇	Ju County Anzhuang Township	安庄环保	16-01-14	2040	734	2750	1	0	1	0	1	1	1
莒县东莞镇	Ju County Dongguan Township	东莞环保办	11-06-15	71	115	1501	1	2	115	1	114	108	5
莒县刘官庄镇	Ju County Liuguangzhuang Township	刘官庄环保	22-02-14	77	139	1456	0	0	74	0	74	73	9
莒县陵阳镇	Ju County Lingyang township	陵阳环保办	27-02-14	241	144	796	0	0	63	0	63	63	3
莒县夏庄镇	Ju County Xiazhuang Township	夏庄环保办	11-06-15	50	95	1160	1	0	78	0	78	77	7
莒县库山乡	Ju County Kushan Village	库山环保办	#	#	#	#	0	0	0	0	0	0	0
青岛市	Qingdao Prefecture City	青岛环保	25-04-13	2145	320819	35902	19	79	89	61	28	27	25
即墨区	Jimo District	即墨环保	19-06-13	283	1372	2074	1	0	17	0	17	17	11
市南区	Shinan District	市南环保	09-07-13	1490	3244	9405	5	38	225	37	188	186	18
李沧区	Licang District	李沧环保	25-04-13	3642	2745	4736	2	45	63	45	18	17	13

崂山区	Laoshan District	崂山环保	14-06-13	188	2466	6616	3	2	3	2	1	1	3
城阳区	Chengyang District	城阳环保	05-06-13	383	3668	18138	10	46	128	46	82	80	20
市北区	Shibei District	市北环保	15-10-13	618	2059	6295	3	12	8	5	3	2	6
黄岛区	Huangdao District	黄岛环保	#	#	#	#	0	0	0	0	0	0	0
莱西市	Laixi City (county level)	莱西环保	18-06-13	346	1511	4601	2	0	54	0	54	54	8
胶州市	Jiaozhou City (county level)	胶州环保	19-06-13	822	2138	2347	1	6	20	6	14	14	13
平度市	Pingdu City (county level)	平度环保	07-06-13	465	1899	5897	3	47	89	47	42	42	9
青岛高新区	Qingdao High-tech Zone	青岛高新区环保	20-03-13	552	1661	6228	3	28	41	27	14	14	7
青岛西海岸新区	Qingdao West Beach New District (Huangdao)	青岛西海岸新区环保	15-08-12	300	2377	1972	0	4	6	4	2	2	3
烟台市	Yantai Prefecture City	烟台环境	26-06-13	458	271829	13645	7	22	261	17	244	243	27
芝罘区	Zhifu District	芝罘环境	26-03-13	42	103	331	0	0	5	0	5	5	3
牟平区	Mouping District	牟平环境	26-11-13	1335	710	3577	2	1	74	1	73	73	9
莱山区	Laishan District	莱山环境	25-11-13	117	220	855	0	0	2	0	2	2	2
福山区	Fushan District	福山环境	15-02-12	#	#	#	0	0	0	0	0	0	0
招远市	Zhaoyuan City (county level)	招远环境	22-01-14	524	2146	1823	1	36	59	28	31	31	19
龙口市	Longkou City (county level)	龙口环境	16-05-13	#	#	#	0	0	0	0	0	0	0
海阳市	Haiyang City (county level)	海阳环境	03-12-13	533	1896	10095	6	52	121	51	70	70	19
蓬莱市	Penglai City (county level)	蓬莱环境	28-12-10	#	#	#	0	0	0	0	0	0	0

莱州市	Laizhou City (county level)	莱州环境	27-11-12	#	#	#	0	0	0	0	0	0	0
栖霞市	Qixia City (county level)	栖霞环境	03-04-15	#	#	#	0	0	0	0	0	0	0
莱阳市	Laiyang City (county level)	莱阳环境	14-03-11	157	198	1833	0	0	6	0	6	6	4
长岛县	Changdao County	长岛环境	20-12-13	#	#	#	0	0	0	0	0	0	0
威海市	Weihai Prefecture City	威海环境	19-03-13	385	142783	19314	10	148	683	131	552	548	27
环翠区	Huancui District	环翠环境	15-11-12	1810	1651	14920	9	15	30	15	15	15	15
乳山市	Rushan City (county level)	乳山环保	22-08-13	93	3039	4285	2	34	44	19	25	25	7
文登市	Wendeng City (county level)	文登环境	12-07-13	397	2012	5785	3	5	12	3	9	9	8
荣成市	Roncheng City (county level)	荣成环境	15-08-13	247	1669	5669	3	27	88	26	62	62	12
高技术产业 开发区	High-Tech Development Zone	威海高区 环保	05-09-13	179	411	3534	2	4	41	4	37	37	15
莱芜市	Laiwu Prefecture City	莱芜环境	04-07-13	395	71661	1383	0	21	43	13	30	30	18
钢城区	Gangcheng District	钢城环境	20-08-13	66	86	1068	0	0	43	0	43	43	11
莱城区	Laicheng District	莱城环境	07-08-13	33	62	64	0	2	11	2	9	9	7

*Blackened lines are counties with no EPB microblogs

Table A.3. Further description of the coding frame

Category (English)	Description	Example Post
Government information		
Information most relevant for improving environmental governance		
Environmental laws, policies and regulations Environmental laws, policies and regulations	Posts announcing the adoption of various environmental norms and rules, as well as explanations of these norms and rules.	<p>Jinan City Centre EPB: [A representant from the MEE replies to the press on the “guidance for the assessment and check of clean production audits”] today, the MEE and the NDRC published the “guidance for the assessment and check of clean production audits” triggering large societal interest. The representative from MEE answered questions from the press and regarding the “guidance’s background, goal and meaning, as well as the drafters’ intention etc.</p> <p>http://t.cn/R39vMJq4240317647626263</p> 
Concrete enforcement actions against polluters	Posts informing about the conduct of concrete enforcement actions and eventually their outcome, including investigations of polluting sources (检查) the admonition and warning of industry leaders and officials (约谈) as well as their politico-administrative (问责) and legal(处罚) punishment.	<p>Lanling EPB: #We are moving# Lanling County EPB and the Changcheng Town Government inspected the Longcheng Town Lanling County Tianyu Vegetable Co., Ltd., which is undergoing renovation according to the requirements of the EIA approval. @Lingyi Environment @Tancheng Environment</p> 

Environmental quality information	Posts about the quality of the environment, including air, water and soil produced by government authorities, including original measurements such as the “level of visibility”.	Gangcheng EPB: forward #Everyday Air Quality Map# [17 cities AQI] on 16 May 2018 at 8 am	
Environmental less relevant for improve environmental e-governance			
EPB news (meetings, speeches)	Posts informing about the activities of environmental authorities, which are not directly concerned with the implementation of environmental norms, including work conferences and press conferences, speeches and leadership change.	Dezhou EPB: # Resolutely win the battle for ecological environment# This afternoon, the Municipal Environmental Protection Bureau held a meeting on the management of hazardous wastes in enterprises and discussed the main contents and main points of the work of the new indicator system for hazardous waste management.	
Environmental protection propaganda	Posts forwarded from public authorities or official newspapers like the People’s daily that promote the environmental policies and discourse of the government and encourage citizens to support them.	Haiyang EPB: [Talk about civilization, new wind] Save electricity, beautify the environment, save energy, and create a beautiful environment]	
Government information unrelated to environmental protection	Posts about other domains of government actions, such as public security, tourism, and economic or rural development, as well as important political events such as Party conferences and major political orientations by political leaders	Rizhao EPB: Rizhao CPPCC Economic Committee Work Conference held to accelerate comprehensive deepening reform http://t.cn/RuME16F	
Societal Engagement			

<p>Interactions with netizens</p>	<p>Posts that contain @mentions of individuals, indicating a will to interact with them and potentially reply to issues they raised</p>	<p>Changqing EPB: //@Jinan Environment #Environmental Work in Progress# Jinan Prefecture EPB organizes monitoring centre and city detachment to conduct special work inspection on online monitoring of key pollutants in Lixia District. @Shandong Environment forwarding #Environmental Work in Progress# The Jinan Municipal Environmental Protection Bureau organized the monitoring centre and the municipal detachment to conduct special work inspections on the online monitoring of key pollutants in the Lixia District. @Shandong Environment @Jinan Environment @Lixia Environment @Green Bud @Leading Tiger Leap @Blue sky and white clouds @South West Station North East Square</p> 
<p>Posts forwarding societal environmental information</p>		
<p>Societal environmental protection activities</p>	<p>Posts about environmental activities organized by civil society organizations, such as environmental education activities, environmental knowledge dissemination activities, NGO fund raising campaigns and NGO activities. This includes both local and national activities.</p>	<p>Lingyi EPB: # Running towards nature [TNC (the nature conservation) global Photography contest] Since the beginning of the competition, we have received tens of thousands of applications from more than 100 countries and regions around the world! Several entries from China have been validated! Participants use the lens to record the nature of their eyes, telling their stories about nature and them! Come and join us! @Forest and Humans Magazine website: http://t.cn/RnkVHwU ... full text: http://m.weibo.cn/3628218102/4232043536213309</p> 

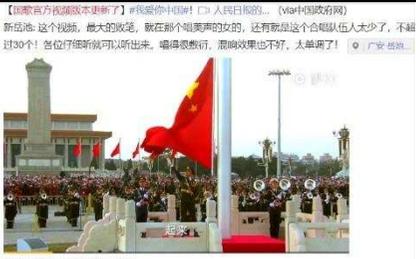
<p>Societal environmental information</p>	<p>Posts about environmental information and tips produced by researchers, NGOs, diverse media including the press, the foreign press and bloggers.</p>	<p>Shouguang EPB: //@Weifang Environment: forward</p> <p>[Menghua! Check out the world's first rare black langur dragon!] On the 13th, the world's first rare black leaf monkey dragon and phoenix, which was successfully bred in the Guangzhou Changlong Wildlife World, officially met with the tourists. The black langur is a national first-class protected animal, even less of them than Giant Pandas remain in the wild. Therefore, it is known as “the monkey’s giant panda”. According to reports, the new-born black langur is golden in colour and only turns black like its mother after two or three months...full text: http://m.weibo.cn/1642512402/4239660911392470</p> 
<p>Posts unrelated to environmental protection</p>	<p>Posts which are neither related to environmental protection nor government activities. A brief description of the topic of the post was annotated during the coding process to have an idea of the types of information they contain.</p>	<p>Changhe EPB: [The official video version of the national anthem has been updated] forwarding [Forward this video! The official video version of the national anthem has been updated] #I love China#! Http:t.cn/RuoZVc4 (via Chinese government network)</p> 
<p>Content not visible</p>	<p>Posts of which the content could not be seen nor guessed by the coders</p>	<p>Changhe EPB: [Map #Our values#]</p>

Table A.4. Posting and forwarding relationships between different administrative levels

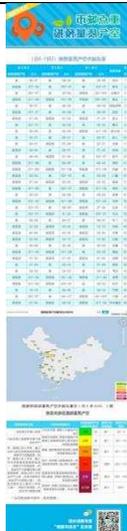
	Number of accounts followed	Number of accounts that posted at least one status (either original or forward) in the dataset	Average number of statuses posted	Average number of original posts	Average number of forwards	Average number of forwards of:			
						Shandong provincial accounts	Shandong prefecture accounts	Shandong county-level accounts	Shandong sub-county level
Province	1	1	1184	976	208	108	44	42	0
Prefecture	17	17	441	168	273	159	8	20	1
County-level	133	103	242	41	201	82	61	16	0
Sub-county level	21	17	123	69	54	15	25	2	1
Note: Accounts that did not post during the collection period are excluded from these calculations of averages.									
	Number of accounts that posted at least once/number of accounts followed	Percentage of followed accounts that posted at least one status (either original or forward) in the dataset	Average number of statuses posted	Percentage of statuses that are original	Percentage of statuses that are forwards	Percentage of total statuses posted that are forwards of:			
						Shandong provincial accounts	Shandong prefecture accounts	Shandong county-level accounts	Shandong sub-county level
Province	1/1	100%	1184	82%	18%	9%	4%	4%	0%
Prefecture	17/17	100%	441	38%	62%	36%	2%	5%	0%
County-level	103/133	77%	242	17%	83%	34%	25%	7%	0%
Sub-county level	17/21	81%	123	56%	44%	12%	20%	2%	1%
Note: Accounts that did not post during the collection period are excluded from these calculations of averages and percentages.									

Table A.5. Twenty-five randomly selected top-down information flow forwards

Posting User	User Posted Text	Original Poster	Original Post Text
Dongying Prefecture	Dongying 20km	Shandong Province	 <p>#Everyday Visibility Map# [Shandong's 17th City Visibility Ranking] At 8:08 am on 24 April, 2018: Yantai 32.9km, Weihai 24.2km, Qingdao 21.6km, Dongying 20km, sunshine 19.3km, Linyi 18.1km, Zaozhuang 16.6km, Laiwu 16.1km, Weifang 15.9km, Tai'an 14.5km, Jining 11.5km, Heze 10.8km, Liaocheng 10.5km, Binzhou 10.2km, Jinan 10.2km, Zibo 8.3km, Dezhou 5.5km</p>
Jinan Prefecture	[The basic family "emergency package." Is your home ready?] 12 May is #National Fire Disaster Prevention Day# What should we do if there is a fire at home or school? In the event of an earthquake, how should children evacuate safely? If trapped, how can you to save yourself? At this point, a tiny "family emergency kit" may be essential to keep you from harm. See below ↓↓ I hope it will never have to be used, but we must be prepared!	Shandong Province	 <p>[The basic family "emergency package." Is your home ready?] 12 May is #National Fire Disaster Prevention Day# What should we do if there is a fire at home or school? In the event of an earthquake, how should children evacuate safely? If trapped, how can you to save yourself? At this point, a tiny "family emergency kit" may be essential to keep you from harm. See below ↓↓ I hope it will never have to be used, but we must be prepared!</p>

Shanghe County	Forward Weibo	Jinan Prefecture	#National air quality forecast # In the coming three days (12-14 May) the conditions in most parts of the country will be average. Overall, there will mainly be between good and light pollution. In the North East, the central part of the Mid-North, and the Northern part of the Centre there may be medium-level pollution coinciding with high temperatures and high humidity. The North West will suffer from sand storms and heavy pollution may occur.
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Weifang Prefecture	Forward Weibo	Shandong Province		[Talking about civilisation, new directions: Health is a responsibility, exercising is a task]
Shouguang County	//@Weifang Prefecture EPB://@Wuchang EPB (in Heilongjiang Province): Forward Weibo	Linyi Prefecture	#Environmental Bingo Sauce#	[The CO2 emissions of the tourism industry] New research indicates that global tourism already makes up 8% of annual greenhouse gas emissions. Additionally, transportation, shopping and food are important contributors, especially in high-income countries. http://t.cn/R3abyHp
Changqing County	Forward Weibo	Jinan Prefecture		Whenever I sit in a taxi in the city, the hazy blue sky and the messy garbage always spoil the view. In life, there's nothing more important than protecting the environment! Watch this video of the "Thousands of teachers' environmental messengers – sowing green futures project." Everyone must protect the environment and teachers raise their hands and make environmental protection an easy thing http://t.cn/R3N1ReL
Shanghe County	Forward Weibo	Jinan Prefecture		# Key city air quality forecast # The air quality forecast for 36 key cities from 1 to 3 May

			
Weihai Prefecture	[emoji for powerful]	Shandong Province	[Speaking to the world The 2017 Annual Environmental Status Report shows that the concentration of major pollutants in surface water keeps falling] http://t.cn/Rux4RqZ
Zibo Prefecture	Forward Weibo	Shandong Province	[The Propaganda film "The Big Country Takes Off" has a surprise at the end] On the 8th, China Aviation Industry Corporation Co., Ltd., the largest aviation manufacturing company in China, released a three-dimensional promotional film " The Big Country Takes Off " to celebrate the 60th anniversary of its founding. At the end of the propaganda film, there is a nine second surprise: a flying wing scene of a mysterious aircraft covered with thick cloth creates a suspense. http://t.cn/R3hbtIY
Weifang Prefecture	Forward Weibo	Shandong Province	 #Environmental Quality Bulletin for the First Quarter of 2018 # The province's 17 cities ranked by number of days of heavy pollution in March and the first quarter of the year.
Dongying Prefecture	Dongying 38km	Shandong Province	#Everyday Visibility Map# [Shandong's 17th City Visibility Ranking] At 8:00am on 8 May, 2018: Weihai 40.2km, Dongying 38km, Binzhou

			 <p>30.6km, Tai'an 27.8km, Yantai 27.7km, sunshine 23.8km, Qingdao 23.5km, Weifang 22.1km, Dezhou 18.7km, Laiwu 17.6km, Linyi 13.5 Km, Liaocheng 13.3km, Zibo 12.6km, Jining 11.7km, Zaozhuang 9.5km, Jinan 7.4km, Heze 3.8km</p>
Jinan Prefecture	[Environmental Monitor: eliminate black and smelly waters to make the city more beautiful] The first meeting of the Central Committee of Finance and Economics held recently pointed out that there are several important battles to be noted. As one of the seven major pollution prevention and control battles, the elimination of urban black and smelly waters holds an important position in this battle.	Shandong Province	<p>环境观察:消灭黑臭水体 让城市更靓丽</p> <p>2018年05月18日 作者:赵娜 来源:中国环境报</p> <p>赵娜</p> <p>生态环境部会同住房和城乡建设部近日联合开展了2018年黑臭水体整治环境保护专项行动,第一批督查组正在各地对黑臭水体整治进展和成效进行专项督查。这一行动再次体现出我们坚决打好污染防治攻坚战决心。</p> <p>前不久召开的中央财经委员会第一次会议指出,要打几场标志性的重大战役。作为七大污染防治攻坚战之一,城市黑臭水体整治摆在涉水攻坚战的重要位置。2018年全国环境保护工作会议指出,今年要联合住建部门推动36个重点城市和长江经济带黑臭水体整治。</p> <p>开展黑臭水体整治专项行动,有利于问病求医,对症下药。城市黑臭水体的实质是污水、垃圾直排环境的问题,根子在于城市环境基础设施不合格。此次专项行动以整治黑臭水体为抓手,倒逼各省市加快补齐短板;促使更多城市以问题为导向,加强研究对策,少走弯路,早日还清水于民。</p> <p>开展黑臭水体整治专项行动,有利于考核问责。此次专项行动既是为了考核《水污染防治行动计划》规定的2017年需完成的任务,也是为了督促地方落实2020年的工作目标。通过督查,可以检验出地方治理黑臭水体的真实水平,找出“优等生”和“差等生”。对于在黑臭水体治理方面履职尽责、弄虚作假,只注重表面文章、不解决根本问题的,要依法依规严肃问责。</p> <p>生态环境部会同住房和城乡建设部近日联合开展了2018年黑臭水体整治环境保护专项行动,第一批督查组正在各地对黑臭水体整治进展和成效进行专项督查。这一行动再次体现出我们坚决打好污染防治攻坚战决心。</p> <p>of Ecology and Environment in conjunction with the Housing and Urban-Rural Development Department have jointly launched a 2018 black and smelly water environmental remediation special action. The first batch of inspection teams have been sent everywhere...full text: http://m.weibo.cn/3354394424/4241075273298665</p>
City District, Dezhou	Forward Weibo	Dezhou Prefecture	#Something You Didn't Know# Put your air conditioning filter into a bucket, two hours later you can salvage one litre of water. The water saved can be used to water the flowers or wash your hands.

			
Binzhou Prefecture	#The second national survey of pollution sources##//@Shandong EPB: In accordance with national security requirements, all levels and relevant departments should further enhance their sense of responsibility and urgency, in line with the priority of faster progress, clearer base, accurate data, and practical application, accurately grasp the objectives and tasks of the survey, resolutely ensure that the organization and leadership are in place, that the coordination is in place, that the supervision and evaluation are in place, and that the publicity and training are in place to ensure the successful completion of the province. The second national census of various sources of pollution.	Shandong Province	[Shandong: accelerating the second national survey of pollution sources] On 16 May, the provincial government held a video conference on the second national pollution source survey in the province, summarizing the development of the pollution source survey since last year, and arranging the deployment of the next phase. Vice Governor Yu Guo'an attended the meeting and delivered a speech. http://t.cn/R3CKoBr
Weifang Prefecture	//@Shanghe EPB://@Jinan EPB: #The first environmental quality report 2018# The water quality report for Shandong Province for 2018.	Shandong Province	 <p>全省水环境质量状况</p> <p>地表水方面。 回顾地表水水质新进展中，2018年第一季度水质优良（Ⅰ-Ⅲ类）比例为50.0%，较去年同期下降4.4个百分点；劣Ⅴ类水体断面比例为2%。较去年同期下降1.2个百分点。12个市、枣庄、潍坊、济宁、泰安4个水质优良比例未达到省核定的年度目标。滨州、菏泽、淄博（受上游影响）3个劣Ⅴ类水体断面比例未达到省核定的年度目标。年20个国控地表水考核断面水质达到年度目标要求，其中济宁7个，枣庄、潍坊各3个，泰安、菏泽各2个，淄博、莱芜、日照各1个。国控入海及重要河段中，有32个断面水质未达到年度目标要求。其中烟台、滨州2个断面断面水质5个；济南、青岛、淄博、莱芜、东营、潍坊、济宁、泰安、威海等9个断面1个。</p> <p>饮用水方面。 2018年第一季度，全省52个城市及以上城市集中式饮用水源地中，53个水质达到或优于国家标准，达标率为98.1%，达到年度目标要求。</p> <p>固体废物方面。 2018年第一季度，全省17个地级市共处理185.9万吨垃圾中，153个垃圾站完成，总处理率达92.7%，完成了年度任务。17个地级市中尚未达到100%的年度目标要求。</p>

				<p>treatment plan of the university to inspect and give directions for the construction of the mud river water purification plant.</p>
Qihe County	<p>#Something You Didn't Know# [Regularly change your shampoo to care for your hair!] At home, you can stock up on a few brands of shampoo and use them in turn. You can also use one shampoo and change to another shampoo after three months. When shampooing, pay attention to shampoo on your hands and apply it to your hair. Then gently massage your scalp with your fingers. Don't scratch with your nails. It is best to dry naturally without using a hair dryer. @Dezhou EPB @Jihe EPB</p>	Dezhou Prefecture		<p># Something You Didn't Know # [Regularly change your shampoo to care for your hair!] At home, you can stock up on a few brands of shampoo and use them in turn. You can also use one shampoo and change to another shampoo after three months. When shampooing, pay attention to shampoo on your hands and apply it to your hair. Then gently massage your scalp with your fingers. Don't scratch with your nails. It is best to dry naturally without using a hair dryer.</p>
Tancheng County	Forward Weibo	Linyi Prefecture		<p>[Cannot be missed! These are the touristic locations for which you can just say "let's go" and go] In this new year graduation season, how can young people who are about to leave the ivory tower not go on a graduation trip? Today is China Tourism Day, @young friends, let's go on a trip together! PS: you're welcome to recommend other places~</p>

Tianqiao District	Forward Weibo	Jinan Prefecture	 <p>#Everyday visibility map# [Shandong's 17th City Visibility Ranking] At 8:00am on 7 May, 2018: Yantai 27.7km, Weihai 26.3km, Tai'an 17.4km, Dongying 16.9km, Qingdao 16.5km, Laiwu 13.4km, Heze 9km, Jinan 8.3km, Zibo 8km, Rizhao 7.6km, Liaocheng 7km, Jining 6.8km, Zaozhuang 6.2km, Dezhou 5.9km, Weifang 4.5km, Binzhou 3.7km, Linyi 3.3km</p>
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Table A.6. Top Ten Accounts in Dataset by Original Posts, Posts and Voice

Original Posts		Posts		Size of Voice	
Linyi Prefecture Economic Development Zone	1,019	Shanghe District of Jinan Prefecture	3,048	Shandong Province	12,540
Qihe District in Dezhou Prefecture	1,016	Tianqiao City District in Jinan	2,008	Dezhou Prefecture	3,801
Shandong Province	976	Qihe District in Dezhou Prefecture	1,820	Jinan Prefecture	2,486
Linyi Prefecture	772	Hedong District in Linyi Prefecture	1,324	Linyi Prefecture	1,903
Rizhao Prefecture	166	Shandong Province	1,184	Qihe District in Dezhou Prefecture	1,056
Dezhou Prefecture	607	Changqing Suburban City District in Jinan	1,053	Linyi Prefecture Economic Development Zone	1,037
Luancheng County in Linyi Prefecture	530	Linyi Prefecture Economic Development Zone	1,025	Rizhao Prefecture	739
Yinan County in Linyi Prefecture	530	Huaiyin City District in Jinan	1,018	Luancheng County in Linyi Prefecture	556
Jinan Prefecture	199	Rizhao Prefecture	854	Yinan County in Linyi Prefecture	532
Huaiyin City District in Jinan	186	Linyi Prefecture	851	Huaiyin City District in Jinan	526

Table A.7. Mentioning relationships between different administrative levels

	Number of accounts followed	Number of accounts that made at least one mention in the dataset	Average number of mentions made	Number of accounts that mentioned another Shandong environmental bureau at least once	Average number of mentions made to other Shandong environmental bureaus	Average number of mentions of:			
						Shandong provincial accounts	Shandong prefecture accounts	Shandong district, county-level accounts	Shandong sub-county level
Province	1	1	81	1	75	18	48	9	0
Prefecture	17	16	46.1	14	27.5	22.1	4.3	2.7	0
County-level	133	76	195.8	75	186.2	23.4	147.2	15.3	0
Sub-county level	21	10	41.3	10	31.1	1.7	9.2	18.4	1.4

Note: Only environmental bureaus that mentioned another environmental bureau in at least one original post are included in this analysis

	Number of accounts followed	Number of accounts that made at least one mention in the dataset	Percentage of followed accounts that made at least one mention	Number of accounts that mentioned another Shandong environmental bureau at least once	Percentage of total mentions made to other Shandong environmental bureaus	Percentage of mentions made of:			
						Shandong provincial accounts	Shandong prefecture accounts	Shandong district, county-level accounts	Shandong sub-county level
Province	1	1	100.0%	1	92.6%	22.2%	59.3%	11.1%	0.0%
Prefecture	17	16	94.1%	14	59.7%	47.9%	9.3%	5.9%	0.0%
County-level	133	76	57.1%	75	95.1%	12.0%	75.2%	7.8%	0.0%
Sub-county level	21	10	47.6%	10	75.3%	4.1%	22.3%	44.6%	3.4%

Note: Only environmental bureaus that mentioned another environmental bureau in at least one original post are included in this analysis

Table A.8. Twenty-five randomly selected bottom-up @mentions

Posting User	User Posted Text	Original Poster	Original Post Text
Pingyin County EPB	//@ Jinan EPB: [Strongly crack down on environmental violations to ensure green hills and green waters forever]	Shandong Province EPB	[Strongly crack down on environmental violations to ensure green hills and green waters forever] # Environmental review# Recently, the Ministry of Ecology and Environment has carried out an intensive "striking, increased force and intensive exposure" of areas, regions and enterprises with serious environmental pollution. This is rare in recent years. This reflects China's "zero" tolerance for environmental violations and its firm determination to tolerate and safeguard the environmental interests of the people, while at the same time "building the beauty of blue sky, the green land and the clear water" ...full text: http://m.weibo.cn/3354394424/4234451628532917
Yiyuan County EPB	[emoji for love you]//@ Zibo EPB: Forward Weibo	Shandong Province EPB	
Changqing County EPB	//@Jinan EPB://@Shandong EPB: On the 14th (Monday) the weather in the province will be cloudy. The southern wind will be of force 5-6, potentially reaching 7, in the peninsula and force 4-6 in other areas. The minimum night temperature: around 24 °C in the inland area, around 19 °C in the coastal area. The highest temperature: about 34 °C in the inland area, about 27 °C in the coastal area.	Shandong Province EPB	 <p>According to the Shandong Meteorological Observatory, the weather in the northern part of the peninsula will be cloudy with thunderstorms or showers; the weather in other areas will be cloudy and sunny. The southerly wind in the peninsula will increase in strength from the 3rd to the 4th grades, then to 5th and 6th, and in the other areas from 2nd to 3rd grades to the 4th to 6th grade. In the rainy areas, the wind force will be 7-8 grade. Please pay attention to safe travel and take care. [Emoji for microphone] Minimum night temperature: about 21 °C in the inland area, coastal...full text: http://m.weibo.cn/3354394424/4239112338455321</p>
Pingyin County EPB	//@Jinan EPB: [The propaganda film "The Big Country Takes Off" has a surprise at the end]	Shandong Province EPB	[The propaganda film "The Big Country Takes Off" has a surprise at the end] On the 8th, China Aviation Industry Corporation Co., Ltd., the largest aviation

			<p>manufacturing company in China, released a three-dimensional promotional film " The Big Country Takes Off " to celebrate the 60th anniversary of its founding. At the end of the propaganda film, there is a nine second surprise: a flying wing scene of a mysterious aircraft covered with thick cloth creates a suspense. http://t.cn/R3hbtIY</p>
Linbo County EPB	//@Zibo EPB: #Everyday Air Quality Map#	Shandong Province EPB	 <p>#Everyday Air quality map# [The air quality AQI index for 17 cities] 8 o'clock on April 25th, 2018</p>
Lixia County EPB	//@Jinan EPB: [People's Daily: Economic development in natural settings]	Shandong Province EPB	 <p>[People's Daily: Economic development in natural settings] Relying on mountains for food, and on rivers for water is a fact and a way of thinking that is difficult to overcome in many places. However, the ability to prosper from the fruits of the earth is limited. The rise of the two mountains theory has prompted people to re-examine the relationship between ecological protection and economic development. Environmental protection and economic construction are not "zero-sum game, the obsession with the old development model, gaining economic development at the expense of the environment, cannot go on...full text:</p> <p>http://m.weibo.cn/3354394424/4231914913125780...full text: http://m.weibo.cn/3354394424/4231914913125780</p>
Shanghe County EPB	//@Green Bud://Jinan EPB: [Jinan: 325 mountains have been added to the list of major environmental protection sites]	Shandong Province EPB	<p>[Jinan: 325 mountains have been added to the list of major environmental protection sites] http://t.cn/RujSv5N</p>
Pingyan County EPB	//@Jinan EPB: [Promote the happy village, create a Shandong model Bingzhou: [Promoting rural revitalization and building a Shandong model [Promote the revitalization of rural Shandong and	Shandong Province EPB	<p>[Promote the happy village, create a Shandong model Bingzhou: [Promoting rural revitalization and building a Shandong model [Promote the revitalization of rural Shandong and create a model Binzhou: a network strung on an ecological industrial chain] One side farm animals, the other wheat, in a</p>

	create a model Binzhou: a network strung on an ecological industrial chain] One side farms animal, the other wheat, in a modern agriculture and animal husbandry industrial park in Binzhou City. An underground ecological pipe network is laid between the two, so that agriculture and animal husbandry form an ecological cycle industrial chain. http://t.cn/RuCucex		modern agriculture and animal husbandry industrial park in Binzhou City. An underground ecological pipe network is laid between the two, so that agriculture and animal husbandry form an ecological cycle industrial chain. http://t.cn/RuCucex
Lixia County EPB	//@Jinan EPB: [Foster entrepreneurial cohesion] #High quality development# Li Jianya: Environmental protection is the life of an enterprise.	Shandong Province EPB	[Foster entrepreneurial cohesion] #High quality development# Li Jianya: Environmental protection is the life of an enterprise.] As the leader and benchmark of China's paper industry, which has grown from a small township paper mill to become the world's largest high-end newsprint production base with an annual output value of more than 70 billion, Huatai Group has written a vivid history of the development of China's paper industry for 42 years. In the face of gradually tightening environmental standards, how can the green development of the paper industry be achieved? Get together to know Huatai Group...full text: http://m.weibo.cn/3354394424/4237344439701279...full text: http://m.weibo.cn/3354394424/4237344439701279
Zhangdian County EPB	//@Zibo EPB: Forward Weibo	Shandong Province EPB	[Speak to the world Starting in May, these new rules will affect your life] http://t.cn/RuOPuwU
Zhangqiu County EPB	//@ Jinan EPB [Mother's Day, a touching short film: the languages of different countries vary widely, but the words are the same [emoji for heart]]	Jinan Times Newspaper	[Mother's Day, a touching short film: the languages of different countries vary widely, but the words are the same [emoji for heart]] Have you noticed that despite the differences between the languages of the world, Mom's pronunciation is strikingly similar? This Sunday is Mother's Day. May all mothers under the sun be healthy and safe. (Time difference video) http://t.cn/R3wDVMQ

<p>Jiyang County EPB</p>	<p>//@Jinan EPB: Forward and share! 31 valuable books. Read, to discover a better version of yourself, #let's read together#!</p>	<p>Shandong Province EPB</p>		<p>Forward and share! 31 valuable books. Read, to discover a better version of yourself, #let's read together#!</p>
<p>Heze Prefecture EPB</p>	<p>//@Shandong EPB: On the 4th, it is expected that the peninsula will be dominated by "good air", and other areas will be dominated by light pollution. The primary pollutants are O3 and PM10.</p>	<p>Shandong Province EPB</p>	<p>[Shandong: Announcement of air quality forecast] On the 3rd, the air pressure was controlled by the northwest airflow at 500hPa, and the ground was in the pressure equalization field. The forecast is that the northern part of the peninsula and the north western part of Shandong Province will have mainly excellent conditions, and the other areas will be mainly good. The primary pollutants are O3 and PM10. http://t.cn/RuHe4UO</p>	
<p>Linzi County EPB</p>	<p>//@Zibo EPB: #Everyday Visibility Level#</p>	<p>Shandong Province EPB</p>	 <p>#Everyday visibility map# [Shandong's 17th City Visibility Ranking] At 8:00 am on 18 May, 2018: Yantai 43.7km, Weihai 40.5km, Tai'an 27.9km, Zaozhuang 27.2km, Dongying 23.6km, sunshine 22.4km, Qingdao 20.8km, Laiwu 17.8km, Binzhou 13.7km, Jining 13.4km, Weifang 13.1km, Linyi 12.2km, Dezhou 11.4km, Liaocheng 8.9km, Zibo 6.2km, Jinan 5km, Heze 4.3km</p>	
<p>Pingyan County EPB</p>	<p>//@Jinan EPB: [Marching into a new era, portraying a new life] @Shandong EPB</p>	<p>Tianqiao County EPB</p>	<p># Marching into a new era, portraying a new life # [Marching into a new era, portraying a new life] Source: Dazhong Wang http://t.cn/R3wG1cb</p>	

Dongguan Township EPB	//@Ju County EPB: [One picture to understand: The 2018 black and smelly waters system remediation environmental protection special action started]	Shandong Province EPB		[One picture to understand: The 2018 black and smelly waters system remediation environmental protection special action started]
Shanghe County EPB	//@Jinan EPB: [News Room Live The National Energy Administration will strictly control the scale of PV development in the coming year]	Shandong Province EPB	[News Room Live The National Energy Administration will strictly control the scale of PV development in the coming year] http://t.cn/RuVOHyI	
Xiazhuang Township EPB	//@Ju County EPB: //@Lonely Seeking: Effectively pursuing the environmental responsibility of polluting enterprises gradually becomes the norm, form an all-round high-pressure situation [good]	Shandong Province EPB	<p>环保问责，仅仅是处理几个人吗？ 对环境污染企业合力追责渐成趋势，形成全方位高压态势</p> <p>2018年5月23日 作者：马朝平 来源：中国环境报</p> <p>•中国环境报记者马朝平</p> <p>近期一系列性质恶劣的污染事件曝光后，追责问责随之而来。舆论纷纷地质问，变化正在发生：环保问责，绝不止处理几个人那么简单。</p> <p>针对污染事件，个人问责问责的，不仅有国家部委，也有地方党委政府，不仅有环保、公安部门，也有纪检、证监、银监等部门。</p> <p>对于污染企业，受到的损失，不仅有罚款，还有停产、限批，不仅有形象损失，还有股市投资市场上的巨大损失。</p> <p>合力追责形成高压态势</p> <p>在生态环境部联合山西福建两省对山西三维集团环境污染问题进行挂牌督办之后，证监会山西证监局也对三维（股票代码：000755）涉嫌信息披露违法违规事项立案调查，并下发监管关注函，要求该公司做好信息披露工作。</p> <p>同时，中国上市公司协会对三维作为上市公司在生产经营过程中，给当地环境造成严重影响表示谴责。</p>	[Environmental accountability; is it just dealing with a few people?] After a series of adverse pollution incidents were exposed, time has come to pursue those accountable. Public opinion is keenly aware that change is happening: environmental accountability and accountability are more than just dealing with a few responsible people. In response to a pollution incidents, not only the national ministries but also the local party committees and government governments have been involved in the investigations, and not only the environmental protection, but also the public security departments, the discipline inspection commissions, the securities supervision, the state-owned assets regulatory authorities and other departments.... full text: http://m.weibo.cn/3354394424/4232277305631425
Changqing County EPB	//@Jinan EPB: [Notice! It is time for quantitative accountability (both for ecology and for the rural environment)]	Ministry of Ecology and Environment	[Notice! It is time for quantitative accountability (both for ecology and for the rural environment)] #Environmental review # The Ministry of Ecology and Environment recently announced the completion of the air quality improvement targets for the autumn and winter of 2017-2018 in Beijing-Tianjin-Hebei and surrounding areas. The average concentration of PM2.5 and the number of heavy pollution days in the 2+26 cities was better than the scheduled targets. At the same time, the local government that failed to complete the task came under the relevant accountability mechanism and	

			letters have been sent to Shanxi, Shandong and Henan....full text (link to a long form Weibo post that provides more information about this announcement, http://m.weibo.cn/6059162597/4236334007199639)
Huaiyin County	//@Jinan EPB: [Jinan: the replacement of a kinetic energy conversion pioneer area will create a new transportation network. A Bicycle highway is expected to launch in the first area]	Jinan Official Public Announcements	#focus on the replacement of kinetic energy conversion# [Jinan: the replacement of a kinetic energy conversion pioneer area will create a new transportation network. A Bicycle highway is expected to launch in the first area] As the main battlefield of Hebei's crossing over, Jinan's replacement of a kinetic energy conversion pioneer area is drawing a blueprint on a white sheet. On this blueprint, the highlight is the new transportation network. Here, there is not only a comprehensive three-dimensional hub built around the intercity station, but also a green TOD development model based on rail transit planning...full text: http://m.weibo.cn/3221854141/4237345500756681 ..
Tianqiao County EPB	//@Jinan EPB: [The province's science and technology awards conference begin] The province's science and technology awards conference was held in Jinan a few days ago. At the meeting, Wang Qingxian read the "Decision of the Shandong Provincial People's Government on the 2017 Shandong Science and Technology Awards."	Shandong Province EPB	[The province's science and technology awards conference begin] The province's science and technology awards conference was held in Jinan a few days ago. At the meeting, Wang Qingxian read the "Decision of the Shandong Provincial People's Government on the 2017 Shandong Science and Technology Awards." Academic He You and Professor Shi Weiyun won the highest awards for science and technology in Shandong Province. Liu Jiayi, secretary of the provincial party committee, attended and presented the award to the winner of the 2017 Provincial Science and Technology Award. The full text of Provincial Party Committee Deputy Secretary and Governor Gong Zheng's speeches, here ...: full text: http://m.weibo.cn/3354394424/4240935602363692
Shanghe EPB	//@Jinan EPB: #The environmental protection work situation# [The Changqing District Environmental Protection Bureau conducts inspections into the dangerous waste of Taifeng Biological Manufacturing Co., Ltd.] @Shandong EPB	Changqing EPB	 //@Jinan EPB: #The environmental protection work situation# [The Changqing District Environmental Protection Bureau conducts inspections into the dangerous waste of Taifeng Biological Manufacturing Co., Ltd.]
Linqu County EPB	* Adhere to ecological priority and green development; adhere to the people-centred idea; pay attention to guaranteeing and improving people's livelihood; adhere to the protection and promotion of China's excellent traditional culture and continue the historical-cultural chain. * Use advanced technology	Ministry of Ecology and Environment	[The central government approved it! Xiong'an New District should be built like this (Xinhua News Agency)] Strengthen the prevention and control of atmospheric, water and soil pollution, strengthen the ecological environment management and protection of Baiyangdian, simultaneously increase the comprehensive environmental remediation efforts in the upstream areas, and

	to construct sewage and garbage disposal systems, increase the proportion of green transportation and public transportation, promote ultra-low energy buildings, and optimize energy consumption structure // @Shouguang EPB: // @Weifang EPB: Forward Weibo		gradually restore Baiyangdian's function as the "kidney" of Northern China. Check out the detailed essay ↓ ↓ http://t.cn/RuhUf5I
Qihe County EPB	# Something You Didn't Know # [Tips: the 12 most dirty fruits and vegetables!] The US Environmental Working Group (EWG) has released the 12 big dirty fruits and vegetables blacklist for nine consecutive years. This year, Apple still tops the list, with a high total pesticide residue: 1. Apple. 2. Strawberry. 3. Grapes. 4. Celery. 5. Peaches. 6. Spinach. 7. Sweet peppers. 8. Nectarines. 9. Cucumbers. 10. Potatoes. 11. Cherry tomatoes 12. hot peppers. @Dezhou EPB @Qihe EPB	Dezhou Prefecture EPB	 <p># Something You Didn't Know # [Tips: the 12 most dirty fruits and vegetables!] The US Environmental Working Group (EWG) has released the 12 big dirty fruits and vegetables blacklist for nine consecutive years. This year, Apple still tops the list, with a high total pesticide residue: 1. Apple. 2. Strawberry. 3. Grapes. 4. Celery. 5. Peaches. 6. Spinach. 7. Sweet peppers. 8. Nectarines. 9. Cucumbers. 10. Potatoes. 11. Cherry tomatoes 12. hot peppers One must wash these fruits and vegetables prior to eating! Full article... http://m.weibo.cn/3577025333/4235319848873557</p>
Huaiyin County EPB	// @ Jinan EPB: [One season of Shandong Industry #upgrading# gradually promote the greening of traditional industry] Today it was announced by the Provincial Bureau of Statistics that since the beginning of this year, the transformation of new and old kinetic energy in the industrial sector of the province has progressed smoothly and with remarkable results. Notably, the rapid expansion of high-pollution and high-energy-consuming industries has been curbed, and the pace of greening in traditional industries has accelerated. Low-end, backward production capacity gradually withdrew from the market, freeing up space for the development of new and old kinetic energy.	Shandong Province EPB	 <p>[One season of Shandong Industry #upgrading# gradually promote the greening of traditional industry] Today it was announced by the Provincial Bureau of Statistics that since the beginning of this year, the transformation of new and old kinetic energy in the industrial sector of the province has progressed smoothly and with remarkable results. Notably, the rapid expansion of high-pollution and high-energy-consuming industries has been curbed, and the pace of greening in traditional industries has accelerated. Low-end, backward production capacity gradually withdrew from the market, freeing up space for the development of new and old kinetic energy. High pollution-high energy consumption industries will soon...full text: http://m.weibo.cn/3354394424/4232433329044249</p>

Table A.9. 15 posts with most individual comments classified from largest to smallest number of unique comments by non-EPB users

Rank – Posting user	User Posted Text	Number of comments (according to API)	Number of comments collected	Number of comments by other EPBs	Total number of unique comments	Total number of unique comments by non-EPB users	Description of the post	Descriptions of the comments
1 – Lixia District EPB	<p>#Environmental Protection Work in process# Lixia District Environmental Protection Bureau inspected the warehouse of Baguabao East Road. @Shandong Environment @Jinan Environment @Lixia Environment @Lüziya @Leading Tiger @Blue sky White CloudsLTBY2014 @Jinan West Railway Station East North Square</p> 	129	129	0	14	14	Post under the hashtag #environmental Protection work in action#, usually used by EPBs in Jinan prefecture to report local investigations of polluting sources.	Spam by the user “red-braided cell phone” with multiple iterations of the [praise China] emoji.
2 – Lixia District EPB	 <p>#Environmental Protection Work in process# Lixia District Environmental Protection Bureau handled the noise report of Minghu Community. @Shandong</p>	118	118	3	17	15	Post under the hashtag #environmental Protection work in action#, usually used by EPBs in Jinan prefecture to report local investigations of polluting sources.	Spam by the user “red-braided cell phone” with multiple iterations of the [praise China] emoji.

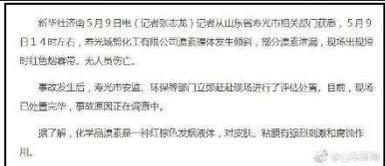
	Huanjing @Jinan Huanbao @Lixia Huanbao @Lüziya @Leading Tiger @Blue sky White CloudsLTBY2014 @Jinan West Railway Station East North Square							
3 - Lixia District EPB	 <p>#Environmental Protection Work in process# Lixia District Environmental Protection Bureau inspected the Atour Hotel @Shandong Huanjing @Jinan Huanbao @Lixia Huanbao @Lüziya @Leading Tiger @Blue sky White CloudsLTBY2014 @Jinan West Railway Station East North Square</p>	116	116	0	14	14	Post under the hashtag #environmental Protection work in action#, usually used by EPBs in Jinan prefecture to report local investigations of polluting sources.	Spam by the user “red-braided cell phone” with multiple iterations of the [praise China] emoji.
4 - Lingyi Prefecture EPB	 <p>#Good Night Linyi# [Good night] Hu Ge reads "Hamlet": Dedicated to the friends who are marching in the fog "Survival or destruction, this is a question worth considering. This is the question that Hamlet thinks: "The real greatness is not a rash move." But when the honour is in danger, even if it is for a rice straw, it must be generous. Http:t.cn/R3QVUGp</p>	35	31	0	30	30	A video of famous TV series actor Hu Ge reading Hamlets under the Hashtag «#Good Night Lingyi#	The 31 comments are a series of individual approving reactions either for the story (for instance “Perfect reading, interpretation of the true meaning of life!” or for Hu Ge.

<p>5 - Lingyi Prefecture re EPB</p>	 <p>#Environmental Protection News# [National Geography joins Jackie Chan to promote environmental protection concept. Gao Weiguang is the image ambassador. Documentary is broadcasted around the world] As a 130-year-old brand, National Geographic has regarded environmental protection as one of its core missions at the beginning of its establishment. National Geographic's 27% of global revenue is also used to support environmental protection. This time we also hope to find more pioneers and peers in the field of environmental protection through this series of documentaries... Full text: http://m.weibo.cn/3600956903/4238438398234374</p>	<p>35</p>	<p>35</p>	<p>2</p>	<p>29</p>	<p>27</p>	<p>Campaign for the promotion of environmental protection by the Chinese magazine "National Geographic" with the actors Jackie Chan and Gao Weiguang as ambassadors</p>	<p>12 out of 35 comments are series of hearts by a fan of Gao Weiguang. However, the rest of the posts praise Gao Weiguang's environmental engagement and claim to support environmental protection together with the slogan "#Gao Weiguang# Support environmental protection"</p>
<p>6 - Ju County EPB</p>	 <p>#Environmental Petition Investigations# On the issue of the public's reactions to the environmental pollution of a furniture factory in Kushan Township, Juxian County, the county environmental protection bureau has investigated and dealt</p>	<p>32</p>	<p>31</p>	<p>5</p>	<p>29</p>	<p>24</p>	<p>The post is a reaction to the public raising problems coming from a furniture factory in Kushan township. It states that the situation has been dealt with, without further</p>	<p>The 31 comments show interesting conversations between netizens and the Juxian County EPB. A netizen, self-described environmental activist, demands explanations for the apparent continuation of activities at the said factory, to which the EPB replies, but is unable to satisfy the user who claims evidence of actions being taken. This exchange is followed by another, between the activist a user defending enterprises and denouncing the manipulation</p>

	with it. Welcome netizens to supervise and comment. @Shandong EPB @Rizhao Environmental Monitoring @Donggang EPB @Lanshan EPB @Wulian EPB https://weibo.com/3548442991/Ggt3Z256s?refer_flag=1001030103_&type=comment#_rnd1537261198906						detail, but invites comments from netizens.	of environmental investigations for private gains.
7 - Weihai Prefecture EPB	 [really like] [really like] [really like] [really like] I have never seen such a gradient flower [laugh haha] [laugh haha] [laugh haha] [laugh haha] beautiful! The Ice Flowers of Wang Jialu Likou Mountain are blooming (via Weihai time story)	27	26	3	26	23	The post contains mostly pictures from the blooming flowers from the touristic village of Weihai's Likou Mountain	Most of the 27 comments show interest in seeing the flowers. However, one netizen complains that the pictures are fake and feels disgusted (with the emoji [vomit]) to have driven such a long way to see them. Weihai EPB interacts with some netizens with personal tone, reacting to one invitation to see other flowers by saying "let's go together soon" as if they knew each other personally.
8 - Shandong Province EPB	 [Shandong: The "Green Shield 2018 Special Action] on the 14th. The provincial government executive meeting reviewed and approved the "Work Plan for the Special Action of Supervision and Inspection of the Green Shield 2018 Nature Reserve in Shandong Province". From now until the end of December, the eight departments of Shandong Province jointly organized and implemented the special action of	25	24	5	21	17	The post is about the adoption of a new provincial plan for the protection and supervision of natural reserves.	The 24 comments feature some explanations by the posting Shandong province EPB, several forwards by other EPBs, and 3 comments by Shandong EPB officials praising the government's effort. However, two netizens also take this occasion to complain about government inaction. One comments "How come local EPBs are so weak? They can't even manage a village mine! The inspection found that they did not respect the standards, and we were told that it was ordered to close and renovate, but then it continues to process! Is law enforcement strength so poor?"

	<p>supervision and inspection of the Green Shield 2018 Nature Reserve in Shandong Province, set off an important political responsibility for strengthening the supervision and management of nature reserves, and solved the outstanding problems in the management of nature reserves. ...full text...</p> <p>URL: https://weibo.com/ttarticle/p/show?id=2309404239704236149605#_0</p>							
9 - Shandong Province EPB	 <p>[Shandong: A report on the investigation of the netizen's report on the sewage in the wheat field] The user @Ecology Dreamer reported about the problem with the sewage produced by the Chenming Industrial Park and the 30-kilometer-long urban sewage treatment pipe network in the north of Shouguang City. Many villagers have unintentionally extracted industrial sewage water and urban sewage treatment water on both sides of the pipe network to water the surrounding wheat fields. The provincial EPB has noticed the gravity of the situation and immediately instructed @Weifang EPB ...</p> <p>URL: https://weibo.com/3354394424/GdHwoeEc?refer_flag=1001030103_&type=comment#_0</p>	24	24	1	20	19	<p>Report in reply to the pollution of wheat fields resulting from problems in the industrial and urban sewage water network in Shouguang City addressed to them by the user Ecological Dreamer, the retired Shandong EPB official who has been extremely active in promoting the online reporting of environmental problems to his former colleagues</p>	<p>One user complains that “suddenly the private use of water from the sewage system becomes an environmental issue” and asserts that there is no problem with the water, no problem with the pipes and that “only the EPB takes care of too many things”. The user “Ecology Dreamer” tries but fails to create a debate about this remark by @mentioning a long list of individuals and EPB accounts. His post is reproduced twice by other users but does not trigger further discussions.</p>

<p>10 - Shandong g Provinc e EPB</p>	<p>[People's Daily: Do not let the environmental protection people suffer losses] Recently, the results of the ecological compensation assessment of 17 cities in Shandong Province in the first quarter were released. Among them, Liaocheng received an ecological compensation of 19.8 million yuan. The ecological protection compensation mechanism is of great significance in the process of ecological civilization construction in China. It can balance the interests of protectors and beneficiaries more rationally, so that those who protect the environment will not suffer, benefit, and have more enthusiasm and initiative. Green Mountain Green Mountain is Jinshan Silver... Full text: http://m.weibo.cn/3354394424/4235157529311415</p> 	<p>24</p>	<p>24</p>	<p>10</p>	<p>17</p>	<p>14</p>	<p>The post is an article of the People's Daily reporting the results of the provincial evaluation of which of the 17 prefectures did best on environmental protection, singling out Liaocheng Prefecture, which was granted 19,8 Million Yuan</p>	<p>Virtually all the comments are made by other EPBs and individuals working with them. 6 comments are by other EPBs, at least 4 by EPB officials and 6 by the user Small Chubby Peanut alone, whose Weibo profile indicates a great proximity with Shandong EPB (it almost exclusively forwards posts from Shandong EPB). These comments either just forward or repeat the post in part or whole.</p>
<p>11 - Lingyi Prefectu re EPB</p>	<p>#Lingyi's affairs # [Look at what Yimeng Road blocked?] 97 seconds video tells you how important low-carbon travel is, Yimeng Road is blocked like this, do you still choose to</p> 	<p>23</p>	<p>22</p>	<p>2</p>	<p>22</p>	<p>20</p>	<p>The post is a shock video of 9:36 minutes showing interminable traffic jams to promote public and low-carbon transportation in Lingyi City.</p>	<p>The 22 comments by netizens express tiredness at the situation, some react negatively to the praise of the public bus company and public transport. Some demand the construction of the subway</p>

	drive? Green travel turn it up! #环保 Bingo 酱# http://t.cn/Rus9w5J							
12 - Shandong Province EPB	 <p>[Night reading: The person who misses the most at the moment is my mother.] The first memory left by my life is the mother's use of a stick to beat wild vegetables. What I cannot forget is that she could sing even when she was sad or exhausted from work! What kind of power did she possess which that made her sing when she was hungry and sick? Live, no matter how hard it is, you have to live! Http://t.cn/R3MZsnw URL: https://weibo.com/3354394424/GgvIm00jX?refer_flag=1001030103_&type=comment</p>	23	18	1	16	16	The post is an emotional message for Mothers' Day encouraging them to sing in adversity.	The 18 comments start with two supporting reactions by EPB officials, but then a user captures the stream with a series of 7 angry comments, starting with "How dare you talk about mother, how many Shandong mothers have been poisoned to death by you clique of cannibals?", which is followed by a series of criticisms regarding the pollution in the province, as well as the numerous cancers they have provoked in the population.
13 - Shandong Province EPB	 <p>[Shandong Shouguang reports no casualties from the bromine leak] Xinhua News Agency reports that the relevant authorities of Shouguang City, Shandong Province, announced that around 14:00 on May 9th, Shouguang Domain Chemical Co., Ltd. sulphide tank tilted, resulting in a leak of bromine, which appeared in bands of red</p>	21	20	1	18	17	The post is an official media report of a chemical plant incident in Shouguang city, Weifang prefecture and of the efficient way in which public authorities have reacted, avoiding any casualties.	The 20 posts show Shandong EPB official repeating that the situation is completely under control, while individual netizens express mostly anger and criticism, which meet the silence of public authorities. For instance, one user exclaims "The air has all been polluted, it's impossible to live here anymore"; another "I am worried for my family"; yet another "finally a report! The smell is already so strong, it gives you headaches!".

	<p>smoke, but that the incident made no casualties. The report further states that Shouguang City Safety Supervision and Environmental Protection Department immediately rushed to the scene to evaluate the situation and take appropriate measures. At present, the site is under control and the cause of the incident is being remediated</p> <p>Full text: http://m.weibo.cn/3354394424/4237859471031402</p>							
14 - Shandong Province EPB	 <p>[Hometown of Confucius Shandong, China - Shandong launched the latest image promotion! One-minute stunning world] http://t.cn/R3yNLhw</p>	21	19	2	17	15	<p>The post is a video making the promotion of Confucian culture</p> <p>4 of the 19 posts are “locally proud” comments by the user Small Chubby Peanut, such as “My Province is so great” or “Confucius Home, Shandong”. At least 6 other comments are from individuals working for the EPB and 5 by other EPBs all positive and prideful, typically “#Big and Beautiful Shandong# [Praise China]”. The almost only one comment by a banal user is negative “I see the river in front of my family home has turned black and is covered with weed. When I was a child it was clear and with lots of fishes. Now when I talk about river fishes to my grandson he looks stunned and doubtful. Please pay attention to the countryside environment”. This comment remains ignored.</p>	
15 - Shandong Province EPB	<p>[Xinhua News Agency commentator: The most glorious work, the happiest struggle] One point of cultivation, one point of harvest, accumulated over the years,</p> 	17	17	2	15	14	<p>The post is a propaganda message published by the official Xinhua News agency on the occasion of International Labour Day, which is also a</p> <p>7 out of the 17 posts are nationalist propaganda made by the user Small Chubby Peanut, such as “realizing the great rejuvenation of the Chinese nation, becoming rich and strong, and creating a new era of vigorous development of socialism with Chinese characteristics.” At least four other comments are made by users who work in the Shandong EPB and simply forward or like the post, and two other</p>	

<p>from less to more, miracles can be created. In the new era, China is changing with each passing day, and all undertakings are flourishing. This is the diligence of the vast number of workers. The times are changing, but the background of struggle is unchanged. From the old generation of labour model Wang Jinxi, Shi Chuanxiang, to the new generation of dedicated dedication model Luoyang, the era of the model Huang Dainian, as well as the recent selection... full text: http://m.weibo.cn/3354394424/4234878189347826</p>						<p>national holiday in China.</p>	<p>comments come from other EPBs and government departments.</p>
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