

Bureaucratic inertia in dealing with annual forest fires in Indonesia

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Abstract. Indonesia has sustained annual forest fires since the 1990s related to land clearing activities for agriculture. The Indonesian Government has made substantial efforts to resolve annual fires by improving intergovernmental coordination at national and local levels. Overall, 96 government agencies are liable for controlling forest fire. This study explores local to central government's bureaucratic reluctance in addressing forest fires, focusing on Riau Province, the most forest fire-prone region in Indonesia. Data were collected from 2015 to 2019 using participatory observation, engaging in meetings of key players; in-depth interviews with key heads of relevant agencies, officials, and NGOs; and a questionnaire for Social Network Analysis. The results show that there are seven influential institutions for addressing land and forest fires in Riau. However, the power of the decision-making process is concentrated at the level of the President and the Governor as the regional leader, which implies that large institutions involved in fire response have less power and responsibility owing in part to bureaucratic inertia as bureaucracy is overly centralised and less responsive. In the long term, devolution of government authority from the central to the local level is required to furnish front-line institutions with the power to deal with the fires.

Keywords: bureaucratic inertia, collaboration, coordination, forest fire, Indonesia.

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Introduction

Since the 1990s, annual forest fires have been occurring in Indonesia. For example, large-scale forest fires were reported in 1972, 1982–1983, 1987, 1991, 1994, 1997–1998, and again in 2015, when forest fires and haze resulted in health issues and many locations were affected. The forest fires caused environmental, economic and social problems between 2010 and 2018 (Edwards *et al.* 2020). This environmental issue has a strong relationship with land clearing for large-scale and small-scale farming and agroforestry activities, primarily for palm oil as the main crop (Eckerberg and Buizer 2017; Ramdani and Lounela 2020). During the dry season in late 2016 when the El Niño–Southern Oscillation (ENSO) occurred, fire activity and drought increased. Furthermore, over 50% of Indonesia's primary natural forests loss resulted from large-scale plantations, which are related to the fire issue (Dennis *et al.* 2001; Purnomo *et al.* 2019; Liu *et al.* 2020).

The Indonesian government has expended a great deal of effort to deal with this issue, such as by improving intergovernmental coordination at both national and local levels to prevent forest fires. According to the latest regulation, namely

Presidential Instruction No. 11/2015, there are 23 national ministries and agencies responsible for fire protection. At the provincial level, such as in Riau, Gubernatorial Order No. 61/2015 stipulates that there are 48 departments, consisting of both local and central government entities under deconcentration roles – vertical institutions at the local level. Deconcentration here implies that government authority is delegated to regional governors or vertical agencies function as representatives of the central government (Purnomo *et al.* 2020). At the local government level, there are 47 local government entities engaged in addressing this yearly environmental crisis. In total, 96 government agencies are by law responsible for controlling fires. It is now recognised that the greatest proportion of fire prevention activities lies with Indonesia, in comparison with Singapore and Malaysia, which have only established ~54 agencies and institutions.

Although a vast range of organisations has been deemed responsible for fires, results are still a long way off. Forest fires are continuing to happen. For example, by 2019, ~100 000 ha of land had been burned in Indonesia, wherein Riau province, the case study for the current research, had the largest area of fires,

followed by the provinces of East Java, Central Borneo, Jambi and North Sumatra in order of size.

Scholarly work argues that Indonesia's forest protection effort is fractured and of poor quality owing to political disputes, its anarchic existence, and inconsistencies between the legal and illegal foundations of the legislation (Purnomo *et al.* 2018; Wolff *et al.* 2018). Many organisations have difficulty conducting collaborative work. Research by Enrici and Hubacek (2018) highlights the significance of and the approaches to assessment across various scales of governance (e.g. international, national, local) and sectors (e.g. civil society, government, corporate) using the instance of Indonesian peatland fires, although in their study agencies appeared enthusiastic about collaboration (Enrici and Hubacek 2018). Several other issues are also considered contributing factors, such as industry's control over and regulatory limitation of certification, sales of uncertified palm oil to non-brand buyers, and illegality, lax of regulatory compliance and the absence of widely accepted exchange of knowledge among stakeholders (Moeliono *et al.* 2013; Kom *et al.* 2020; Purnomo *et al.* 2021a). Ultimately, local institutions are most relevant for preventing and suppressing forest fires at the local level, but these institutions, typically, have lower capacities (i.e. less funds, expertise, qualified staff and technology) than national institutions (Karim and Thiel 2017; Prabowo *et al.* 2017).

The purpose of the present study, therefore, is to explore the bureaucratic reluctance of local and central governments in resolving annual forest fires and to understand the activities conducted by government organisations regarding the annual rise in number of forest fires. The study of institutional inertia is essential to the analysis, which refers to collective power that creates an opposition to reform and lessens organisational capability and willingness to be more versatile, adaptable and efficient in terms of services or products (Williams 2020; Purnomo *et al.* 2021a). In other aspects, all national and local government institutions can be versatile and adapt to the background and circumstances in which the agency operates to reduce forest fires. The idea is that the selection of effective fire-reduction governance frameworks cannot be achieved in a vacuum or independently of the larger structural setting. The present study focuses on the province of Riau, which is located in a very ecologically and politically sensitive area between Indonesia and the Malaysian–Singaporean border. Riau produces the majority of Indonesia's palm oil and pulp paper. Any concerns related to forest fires may give rise to controversy (Yusran *et al.* 2017; Agustiyara *et al.* 2020; Ramdani and Lounela 2020).

Conceptual framework of bureaucratic inertia

Bureaucratic inertia is often experienced by old and large institutions, which are prone to inertia owing to the 'sunk expense' reflected by their existing laws, practices, processes and internal contact, and authority network (Kumar *et al.* 2007; Williams 2020). Owing to existing rules and procedures, the bureaucracy prevents any deviation from what was initially imposed by legislation and/or it only partly accepts reform at the single-office level, and the bureaucracy may be entirely absorbed by another bureaucracy (Tao 2016).

Theories about organisational stagnation have had an influence on how researchers of modern institutionalism interpret it.

Campeau (2019) and Williams (2020) concluded that institutional persistence is largely motivated by the dynamic method of playing an economic game under structured and informal rules that allow for creative practices in a specific direction (Wu *et al.* 2020). This argument indicates that members will be effective in utilising and manipulating their tools and expectations with various bureaucracies to maintain political authority for a particular agency (Ostrom 2008). Different environments and cultures will establish various structures since the same law cannot be enforced in multiple social contexts (Agrawal and Ostrom 2001; Campeau 2019). The creation of successful municipal structures should be focused on local circumstances and cultures. A particular organisation with a given meaning is the best way of solving resource and environmental problems (Purnomo *et al.* 2018).

In countries with significant forest capital, such as Indonesia, state power is mostly concentrated in national forestry departments; however, other societal elements may exert influence via informal networks, social movements, or structured organisations such as corporations, religious entities, donors and activist groups; however, in reality, local communities have had little institutional impact (Fernández-Berni *et al.* 2012). Where state involvement and power in forest areas are low, local communities sometimes have their values, traditions, rules and practices in force, and they selectively enforce or disregard the laws administered by the state and function as 'semi-autonomous administrative fields' (Moeliono *et al.* 2013; Kusumaningtyas and Aldrian 2016). Conversely, where state involvement and control are high, local residents have tried to have an impact on regional authorities and fire protection, danger alerts and mitigation management (Hur *et al.* 2019).

In fact, there is a power gap in these organisations. For example, power imbalances among collaborating parties may emerge, leading to distrust and also endangering successful cooperation (Karim and Thiel 2017) or partnership owing to a mix of uncertainties (Sinclair and Diduck 2017; Gayo *et al.* 2021). It has also been recognised in the latest structural literature that the expense of enforcing policies is a major cause of structural resistance. Institutional resistance applies to the 'stickiness' (Hur *et al.* 2019) of structures or how they avoid reform (Pierson 2004; Kenbeek *et al.* 2016; Smith 2016). Campeau (2019) and Williams (2020) defined the following three major structural inertia factors in the latest operational literature: (1) expense, which refers to rules and laws that direct the collaboration of actors; (2) complexity, which refers to how each agent determines his or her task; (3) path dependence, which refers to the hierarchical framework and the rules and procedures that direct the collaboration of actors.

In the present paper, bureaucratic inertia will, therefore, be defined as the combined force generating resistance to change and reducing the ability and capacity of organisations to be more flexible, adaptable and productive in the provision of services or goods (Tao 2016). In other words, in bureaucratic inertia, political and administrative actors cannot work effectively and professionally (Yusran *et al.* 2017; Palumbo and Manna 2018). These actors only work for their needs and tend to adhere to procedural and bureaucratic methods (Campeau 2019). There are several factors in bureaucratic inertia, among them are: the 'sunk cost', the complex process of playing the economic game,

Table 1. Selected institutions and respondents' position

X1 refers to the level of government and X2 refers to the informants that were used for predictors in SPSS models

Count		X2				Total
		Chair of the Institution	Member of Board	Staff	Member of society	
X1	Central	6	7	3	0	16 (16.6%)
	Province	18	12	0	0	30 (31.2%)
	Regional	8	7	2	0	17 (17.7%)
	Villages	0	0	20	2	22 (22.9%)
	NGOs	0	0	0	11	11 (11.4%)
Total		32 (33.3%)	26 (27%)	25 (26%)	13 (13.5%)	96 (100%)

and power imbalance among bureaucratic organisations. It is argued that to avoid bureaucratic inertia, institutional development, coupled with efforts to rely on local context and cultures, is critical in our study of dealing with forest fires issues (Purnomo *et al.* 2019).

These ideas can serve as the main indicators for analysing the forest fire phenomena in Indonesia. Following new literature on institutionalism, we focus on five main mechanisms that generate institutional inertia: costs, uncertainty, path dependence, power and legitimacy (Eckerberg and Buizer 2017). The present research attempts to examine (1) sunk cost preferences in rules and laws that guide the coordination of actors in a forest fire; (2) uncertainty: how each government unit defines its task; (3) path dependence: the organisational structure of forest fire prevention; (4) the government unit's power and authority; and (5) the legitimacy of the forest fire organisation based on existing laws, rules, norms, routines, cognitive scripts and standards of behaviour.

Research method

In this study, we utilised a mixed method in which data were collected not only through observations, in-depth interviews and focus group discussions (FGDs), but also through a questionnaire for stakeholder network mapping. The observations were conducted from 2015 to 2019 and aimed at mapping state and non-state actors responsible for dealing with the issue of forest fires in Indonesia. For example, we participated in various workshops and seminars in Jakarta and Riau province organised by the central and provincial governments and non-government organisations (NGOs). Representing our research institute, we were also invited to a meeting of key players such as local decision-makers to deliver our assessment on how local government played its roles in forest fire prevention. We documented the information acquired in those activities.

Additionally, we conducted in-depth interviews with key informants aimed at extensively exploring the roles of national, provincial, regional, sub-district and village governments in dealing with fires. For example, we interviewed six informants from the Ministry of Environment and Forestry (MoEF), the National Disaster Management Agency and the Presidential Staff Office. Other interviews were conducted in the capital city of Riau province with representatives from departments such as the regional planning agency, the department of forestry, and the local legislative assembly (Dewan Perwakilan Rakyat Daerah; DPRD). Lastly, we arranged interviews with local leaders in regencies, sub-districts and villages, and leaders of

NGOs. The purpose of those interviews was to expand on the position of each stakeholder in the fire prevention and response phase and to provide the study background (Ritchie *et al.* 2013).

To gain a proper description of the stakeholder networks and forest fire governance, questionnaire scenarios were distributed directly several days ahead of focus group meetings so respondents could consider the issues in advance. These research data were better able to map the complexity of the network. We chose Social Network Analysis (SNA) as a tool to study the depth and complexity of the collaborations among the organisations. Data from the questionnaire were used to describe how the Indonesian stakeholders network correlates with the handling of forest fire, and visualisation was carried out using *NodeXL* software. With limited information flows, a network type in the forest governance, indicating that a degree actor, centrality, betweenness and eigenvector can be seen by *NodeXL* software.

NodeXL tools were used to identify the government network. The study results were obtained from a questionnaire, which had the highest proportion of respondents at the regional level (Table 1), with approximately 47 unique respondents at local governments level (province: 30 or 31.2%, and regional: 17 or 17.7% of the overall respondents). The second highest were village respondents, 22.9% of the overall respondents, then central government 16.6%. In comparison, there were 11 NGO respondents or 11.4% of the total. The survey was carried out from May to August 2016. The characteristics of the respondents were defined based on their level of work and their roles. For comparison, the profiles of respondents were as follows: 33.3% were chairpersons and 27% were team members of the institution; 26% were staff and members of NGOs and 13.5% were ordinary citizens. SNA was used as a data processing methodology. This strategy was chosen to investigate the adhesion of networks among organisations and the collaboration fostered among them for preventing forest fires in the province of Riau. In addition, a relational analysis approach was used in the context of interviews and focus group conversations with all groups concerned.

Data are classified into primary and secondary data. The primary data were collected using questionnaire and in-depth interview results from 68 organisations ranging from the provincial to the village level. At the very least, the content of interviews included: who was involved in promoting forest fire management through collaboration; what they did, when, why, and how; to what extent and what activities encouraged bureaucratic institutions to participate in collaborating to resolve forest

fire issues; what other actions or policies should be implemented in response to forest fire management issues. The collected data were analysed using SNA and smart Partial Least Squares (PLS). SNA was used to analyse networking among stakeholders, and smart PLS was used to describe their collaboration.

A description of the bureaucratic concept of inertia involving forest fires was given and discussed through FGDs supported by a relevant literature review. Our research partner in Riau province coordinated invitations to the FGDs, seeking to extensively draw information from a wide range of stakeholders. During the research, we conducted 90-min focus group interviews. The FGDs were conducted as open dialogues led by a member of our research team.

Descriptive research methodology was used to interpret the data obtained from personal interviews and desk studies. First, the data obtained based on the groups in the themes and sub-themes were assumed to be equivalent. Subsequently, findings from the interviews were coded and summarised, and organised in charts, shapes and keywords to satisfy the analysis goal. This clearly explains the purpose of the study, such as figuring out the viewpoint of each agency based on its positions and functions, and helping it to explain the concept of government activities in the cross-cooperation field.

Second, we defined a core interest framework centred on desk analysis and evaluation, assessed findings, and discussed any variables that might characterise the positions of government agencies, NGOs, civil society organisations (CSOs) and the public that could form the basis of research, such as national and local government networks. Third, we carried out classification and networking based on surveys, desk analysis and evaluation to define and analyse more organisational networks and evaluate the results, to ensure authenticity based on main informant sources, and to recognise discrepancies and correlations from the point of view of government agencies, NGOs, CSOs and academics.

Findings

Identification of hotspot occurrences

Over the last 5 years, Bengkalis and Pelalawan regencies have become the major areas affected by forest fires in Riau province, with ~400 to 900 hotspots each year, followed by Rokan Hilir, Indragiri Hulu and Indragiri Hilir, with ~300–800, 200–600 and 100–400 hotspots, respectively. The largest number of

hotspots in the Riau province in the last 5 years are clearly seen in Fig. 1.

In response to the annual haze, Susilo Bambang Yudhoyono (SBY, Indonesian President from 2004 to 2014) laid down 10 pieces of legislation, varying from laws to ministerial decrees, to avoid forest fire outbreaks. It is noteworthy that a non-ministerial agency, BNPB (Badan Nasional Penanggulangan Bencana – National Disaster Management Agency) was formed as the key actor responsible for managing this problem during SBY's administration. This organisation is responsible for handling forest fires and for carrying out its mission and government control. However, the Directorate of Forest and Land Fire Management of MoEF has expanded the scope of cooperation between central government departments, mainly to increase disaster management capacity at central and regional levels, such as pre-disaster, and during emergency response and post-disaster recovery.

According to Williams (2020), institutional and operational issues are a critical concern in adopting a multi-hazard strategy, including complexity and dispersion and the need for more time to establish an interconnected structure for various early warning systems. A multi-hazard approach is defined: 'where hazardous events may occur simultaneously, cascadingly or cumulatively over time, taking into account potential interrelated effects' (Lassa 2015). Frequently, many products are developed in various organisations, and thus there are difficulties in integrating multiple goods and services. The frequency of hazards and disasters and the absence of leadership and sufficient infrastructure to adopt a multi-hazard system solution in Indonesia have also been a problem. The correlation between government control and hotspot patterns from 2005 to 2018 are provided in Fig. 2.

Typically, the greatest fire frequency coincides with the timing of land-cover transition. Our analysis shows that in Riau, fire is closely linked to change in land use and that most of the fires are associated with the transition from secondary forest to plantation. In this case, weak governance is a primary cause of continued deforestation. Countries with poor governance have great difficulty handling sustainability issues and assuring national and local government forest management efforts (Mulyani and Jepson 2013; Enrici and Hubacek 2018). Further, as in many other forest fire areas, forest fire management presents unique environmental governance challenges. Success

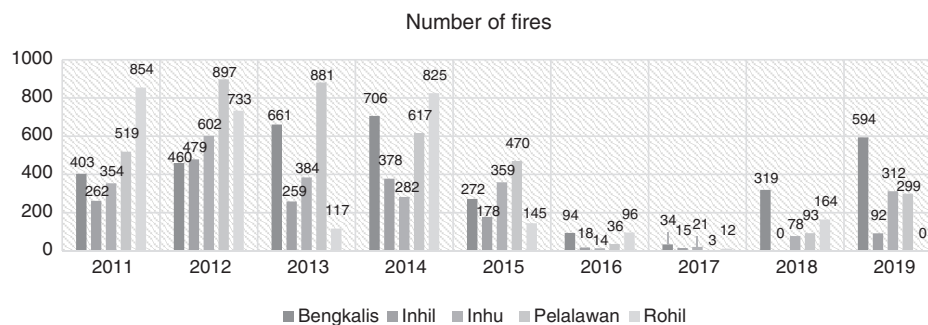


Fig. 1. The number of fire hotspots in the last 5 years in Riau Province. Sources: data modified from Sipongi and the National Disaster Management Agency, 2018.

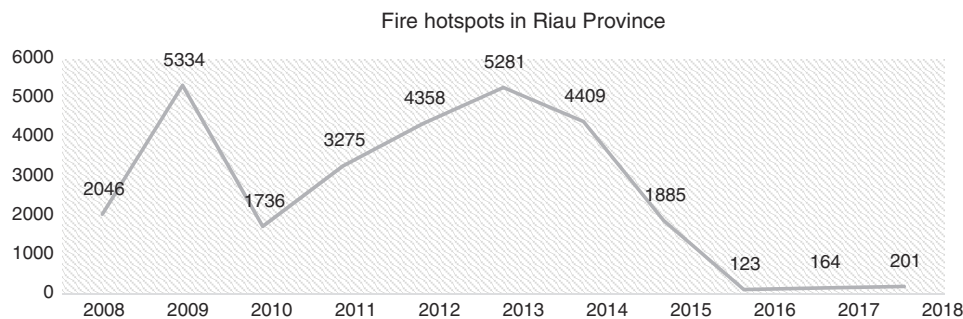


Fig. 2. Trends in fire hotspots 2005–2018. Sources: data modified from Sipongi and the National Disaster Management Agency, 2018.

in forest governance not only involves technically sound stakeholder interventions, but also, most importantly, the willingness and commitment of stakeholders within the network.

Structure and networking

The mean of the network structure of stakeholders can be estimated to have as many as 96 actors (vertices) involved, and as many as 2372 (unique edges) interactions of each actor demonstrate how the network, which can be interpreted in its metric diameter, is likely to be a decentralised network or a centralised network with a single actor. Some researchers clarified that networks with broad diameters could be more flexible than tiny ones (Everton 2012; Zandian and Keyvanpour 2019). The broad diameter of the network operated by the respective owners is set to 2. This suggests that the average gap between the interacting participants is up to 2, the gap the organisation currently has implying it requires each entity for them to operate together. No major player has been able to develop coordinated leadership to resolve the fires.

This paper also explains the nature of the network among stakeholders with an overview of the intensity of the network and its topology of stakeholders over selected times. To evaluate how clustered the network is among the stakeholders and help understand the bureaucracy, the SNA study applied the following six parameters: width, centrality, centrality of proximity, centrality of the own vector, diameter, and average size. The agency or entity that has the greatest role in the control of land and forest fires in the province of Riau was subsequently determined. Thus, the findings indicate that from three levels of governance, which are central, provincial and regional, the Governor is the highest-level entity at the provincial level; he serves as supervisor in delivering guidance to the respective institutions. However, there are a range of agencies with broader responsibilities in the management of land and forest fires, as shown in Fig. 3.

Forest and land fire-related SNA identified the actors concerned and evaluated their relations with the other actors. Using the SNA tool, 96 stakeholders from provincial, district, sub-district, village level governments and NGOs involved in the management of fires were examined. The engagement of various actors – small and large – in preventing, overcoming, or seeking benefits from the fires has led to the creation of a high number of Indonesian forest governance structures. Through

their networks, these actors exert influence on forest governance procedures in order to further their own interests. The actors may have power, support, protection and access to forest resources. Fig. 3 indicates that environmental agents – the Provincial Disaster Management Agency (Badan Penanggulangan Bencana Daerah –BPBD); the police; the military; the Indonesian Meteorological, Climatological and Geophysical Service (Badan Meteorologi, Klimatologi, and Geofisika – BMKG) and the Governor are key players in fire control operations in the province of Riau. Nonetheless, all stakeholders have a role to play in addressing environmental issues. The success and failure of all partners require the collaboration of a diverse network of organisations. For interconnected functioning for stakeholders to resolve environmental concerns and for the government to play a part within the framework, these policymakers have the political and financial resources required for deep and successful network coordination and alignment.

This result integrates different players when operating within their structure but not under coordinated guidance. For stakeholders, unformed collaborations have different effects on unresolved issues, particularly in relation to forest fires. This finding has shown that such measures and rules have mainly emerged through one or more institutions failing to cooperate. In addition, there is a need for national, provincial and district government authorities to put effort into establishing collaboration networks. Network analysis demonstrates the metric density or graph structure, as seen in Fig. 3. A graph is used in this study to compare the height of the layers or the density of the network, which can be summarised in several metrics (Lieberman 2014). Graphic density is defined as the total number of relationships in the network divided by the total number of possible bond networks, which means that the network density ranges from 0.0 to 1.0.

For comparison, networks with a density of 0.0 imply that there is no network relation among actors; if the density is 1.0, it indicates that there is a potential interaction among actors and interaction among all actors in the network is more accurate (Everton 2012; Zandian and Keyvanpour 2019). Data analysis reveals that the graph density value is 0.54, which implies that there are very few networks among actors. This finding means that the pattern shows a very minimal relationship among the institutions to develop fire-fighting cooperation in the province of Riau. It can, therefore, be interpreted that the collaboration

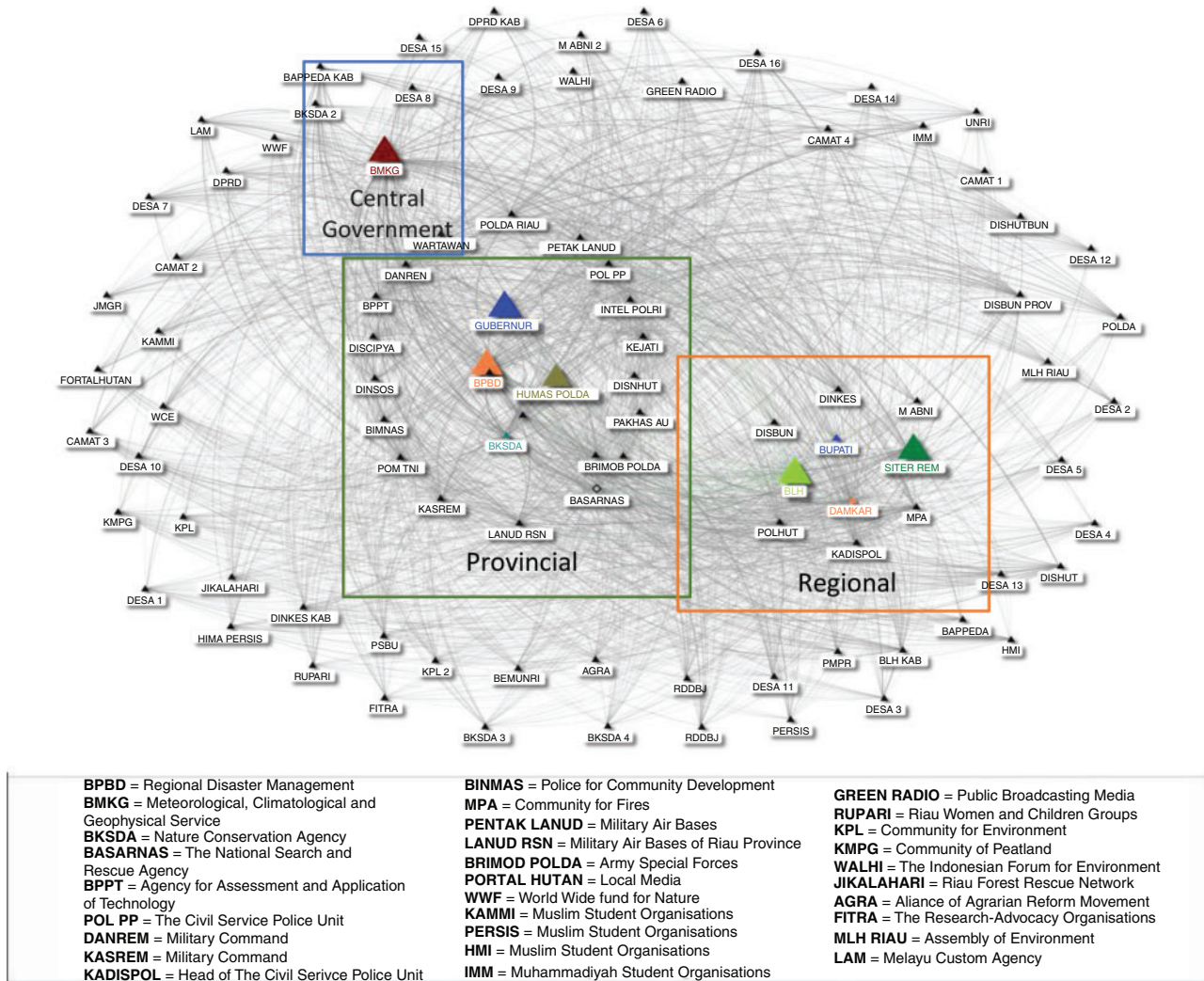


Fig. 3. Network and structure of stakeholders in Riau's forest fire management. Data analysis as visualised by Social Network Analysis (SNA) with *NodeXL* software, 2018.

established is not working well. In addition, the findings of an interview with one of the government bodies in the province of Riau, the Regional Development Planning Board, show proof of an established network of institutions.

As far as the handling of fires is concerned, there is a team that coordinates the task force, namely the Regional Development Planning Board – BAPPEDA, but the Regional Environmental Management Agency is also a partner in the management of land and forest fires (Anonymous, interview, 2019)

Regarding the handling of fires, there is a team that coordinates the task force, the Regional Development Planning Board – BAPPEDA; right, there are other preoccupations, but the Regional Environmental Management Agency is also a partner in handling land and forest fires. (Anonymous, interview, 2016)

However, there may have been a loss of cooperation as the number of players participating in land conservation and dealing with forest fires has grown. This situation may have led to

bureaucratic inertia due to the large number of departments involved in the organisations' activities. The situation, therefore, hinders a quick response to the problem.

The interventions undertaken by the current government are not only for the sake of advancing Indonesia's interests and developing human resource or bureaucratic capacities, but also for developing new coalitions with relevant parties or strengthening established ones, and seeking new sources of funding or investments (Sahide *et al.* 2015; Matangaran *et al.* 2019). Accordingly, forest-related institutions have made those decisions and even influenced what regulatory systems could be feasible (Berti Suman 2019). Transboundary haze is a classic social action or free-rider issue; what may be fair at the government level is less reasonable at the personal level, and this provides disincentives for individuals to comply with improvements in power processes that will favour the majority (Urbinnati *et al.* 2020). Metric density is an indicator of the assessment of a social network to identify the system of collaboration among stakeholders. Those stakeholders that have an impact on forest

fires are all related to one another in diverse positions and the relationships may be independent or interlinked.

The network diameter refers to the ‘longest line’ and may represent the network size (Table 2). Everton explains that large-diameter networks may be more decentralised than small-diameter networks (Everton 2012). In the current study, each stakeholder’s network has a diameter of 2 at the whole level, as opposed to local governments, which have a diameter of 3. This value implies that centrality in the network structure is the longest distance between individuals collaborating and network features. The network structure as a whole has a graph density value of 0.54, and 0.28 at the local government, indicating that there is little collaboration and communication among institutions at both the regional and overall levels.

Therefore, governments are urged to develop cooperation to resolve current land and forest fires. However, cooperation attempts have not yet taken place and there are no interagency partnerships. This finding has led some agencies to work on their own to address forest fires, as described in the previous SNA results. The results of the data analysis indicate that, especially in the sense of building cooperation, no organisation has the authority to set the same priorities and to engage in interorganisational collaboration in the sector. Furthermore, the establishment of organisational processes at the regional, district and village levels, such as communications and knowledge sharing to enhance overall cooperation in the control of fires, has yet to be developed. The creation of teamwork and cooperation processes is, therefore, crucial and most pressing. This assertion is also aligned with the findings of government department interviews with the Regional Development Planning Agency (Badan Perencanaan Pembangunan Daerah – BAPPEDA) of the province of Riau.

In the field of planning related to infrastructure and the environment, BPBD should also be involved in ecosystem planning in my field, as in the Regional Environmental Agency (Badan Lingkungan Hidup – BLH) activities, there are people who care about fire and coordinate meetings for field activities. We also involve disaster management agencies that are part of the planning discussion at BAPPEDA. (Anonymous, interview, 2016)

In the area of engineering and environmental preparation, BPBD can also be interested in the preparation of habitats in the region, as in the operations of the Regional Environmental Agency (BLH), there are people who take charge of fire and organise field operations. Emergency response organisations that are part of the contingency process at BAPPEDA are also included (Anonymous, interview, 2019).

The agencies working together to address the fires are unclear as to how they are coordinated (between central, provincial and district governments, e.g. where is the foreign aid coming from, who coordinates: ministries or local government) because the funds issued are unclear and the coordination is underdeveloped. Therefore, the recommendation must be a special regulation for governing the fires. (Anonymous, interview, 2016)

The average gap is evaluated from the estimation of the contact route among the actors. The average distance refers to the average length of the shortest communication path among all

Table 2. Metric density of the network

Sources: data analysis visualised with Social Network Analysis (SNA) using NodeXL software, 2018

	All network density	Network density in local governments
Metric	Value	Value
Vertices	96	47
Unique edges	2372	296
Diameter	2	3
Average distance	1.43	1.68
Graph density	0.54	0.28

actors in the network. It is claimed by the authors from the data that knowledge can circulate more rapidly throughout a network if the average distance is low; however, contact can take a long time if the average distance is high. Since the data show 1.43 as the average metric distance, the average distance in the stakeholders’ network relationships is relatively high. This finding also shows that there is a long communication process for establishing collaboration and that existing communication among institutions is very weak. Therefore, the jurisdiction is often found to be comparatively broad and overseen by just one institution. The following solution is proposed by one of Bengkalis Regency’s sub-districts:

The organisations operating together to cope with fires are unsure if they are organised (between central, regional and district governments, e.g. where international assistance comes from, who oversees: departments or local councils) so the funds distributed are not transparent and the organisation is not established. The advice would also be a specific rule on fires. (Anonymous, interview, 2019)

Bureaucratic inertia

While anti-haze legislation has been dramatically strengthened in post-Suharto Indonesia, firefighting capability has remained limited (Yusran *et al.* 2017). The (partial) transition of authority from the national to the regional and district levels multiplied the number of players participating in the policy process and generated conflicting, at times inconsistent, jurisdictions, which culminated in a fragmented and sometimes disputed decision-making mechanism and expanded prospects for corruption and complicity (Berti Suman 2019). A solution must yet be found. Next, both firefighting and reaction have to be decentralised (Purnomo *et al.* 2021a). The lack of an Incident Command Structure (ICS) can contribute to opposing views between local officials from fire brigades, forest services and district emergency management agencies as well as military, local police and local volunteers (Lassa 2015). In the case of annual forest fires in Sumatera and Kalimantan (Sukrismanto *et al.* 2011; Purnomo *et al.* 2021b; Matangaran *et al.* 2019), it was noticed that there was poor cooperation between forest and land fire protection organisations; thus, forest and land fire management is inefficient. The cooperation among relevant multi-level organisations is shown in Fig. 4.

Efforts to minimise the likelihood of forest fires or to alleviate the effects of deforestation through initiatives carried

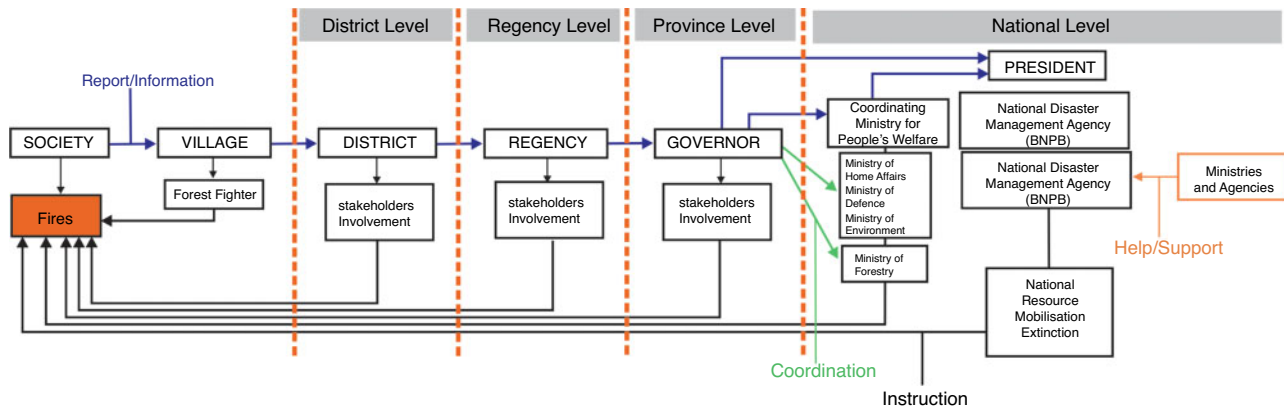


Fig. 4. Forest fire prevention schemes in Indonesia. Source: modified database (<https://peraturan.go.id/>) on analyses of Ministerial Regulations, 2018.

out by different government departments are intended to improve cooperation, as shown in Fig. 4. As referred in Ministerial Regulation No. 32/2016, which acknowledges the introduction of the Rapid Response Framework of the Firefighter Task Force (Satuan Tugas – SATGAS), connections can be separate or mutually reinforcing. The Presidential order establishes a legal framework for stopping forest fire activities and for disseminating reports or details. The President directed the National Disaster Management Agency (BNPB) to contain fires and to adopt different protective steps as its key priorities as an organisation. The system of different protective steps against forest fire was formed by regional forestry offices, companies, provinces, districts, and villages.

In addition, SATGAS is committed to being responsible for haze emergency operations under the President's instructions. The team consists of the National Emergency Response Service and MoEF, comprising partners such as businesses, NGOs, volunteers, and the firefighters' organisation. In addition, the province operates based on the current legislation to function in accordance with the relevant stakeholders' priorities and to satisfy the need for intergovernmental cooperation, at the regional and district levels. Additionally, the aim of the strategy is to provide a clear mandate for all relevant government agencies to improve collaboration with other agencies in the area of disaster prevention, containment and response. Sanders *et al.* (2020) argued that teamwork is necessary. Furthermore, 'a mixture of institutional teamwork, political commitment, and regulatory change' is required to ensure successful fire control (Sanders *et al.* 2020).

The central government's appraisal is focused on the central authority and policy framework. For example, Susilo Bambang Yudhoyono (SBY) enacted Presidential Decree No. 16/2011, and President Jokowi issued Presidential Decree No. 11/2015. These decrees granted the central government institutions the authority to respond to forest fires and to encourage local initiatives. MoEF is a major participant in forest fire response. Consequently, the Ministry implemented Decree No. 10/2010 on the Process for the Reduction of Emissions or Environmental Degradation associated with forest fires. In 2016, MoEF released Regulation No. 32 on the management of land and forest fires. In 2011, at the provincial level, the Riau Governor established Regulation No. 11 concerning the Center for Forest

and Land Fire Protection (Pusat Pengendalian Kebakaran Hutan and Lahan – Pusdarkarhutla) in response to Presidential Decree No. 16/2011. However, there is no statute for creating an entity at the municipal or regional level, although the problem arises in the regency's area of concern.

Centrality in collaboration

Metric centrality measures a network to identify and determine the level of centrality in the development of collaborative networks. Betweenness centrality involves calculating how often an institution specifically impacts other organisations or entities inside the network system (Lieberman 2014; Zhang *et al.* 2018). In other words, the centrality between the two is the degree of centrality in a model based on the shortest path. This centrality is also explained by Everton (2012) and Zandian and Keyvanpour (2019); the interplay of centrality is a variation in the value of the centrality of actors within the network. The larger the centralised index of the network, the more likely it is an actor in the network has a higher intermediate value than other actors. Betweenness centrality measures the extent to which the actor is located between the other actors in the network (Everton 2012; Zandian and Keyvanpour 2019). The results of the present analysis show that the minimum link between the centrality of the network in the collaboration process is less centralised in one institution and is slow in building communication between land and forest fire management institutions. Based on the metric, the network is very centralised in building a network of collaboration between stakeholders.

In addition, it was found that the minimum value of the intermediate centrality held by the participant is 2.2. This result implies that the number of individuals participating in the principles of collaboration and cooperation has little impact on other entities. At this point, the actors are usually located at the village and sub-district level and receive information only from other institutions that deal directly with fires in the field (Table 3). The maximum value of the analysis results is 57.9, a relatively large number, which implies the need for key actors to develop interagency coordination. In addition, the figure is the highest number for those involved. The number is not always held by a single actor; nevertheless, certain actors have a high rating, which implies they are more successful actors. In addition, the larger the role of actors, the more difficult it is to build

Table 3. Metric centrality in collaboration

Sources: data analysis visualised with Social Network Analysis (SNA) using NodeXL software, 2018

Metric	Value
Minimum Betweenness Centrality	2.221
Maximum Betweenness Centrality	57.923
Average Betweenness Centrality	21.490
Median Betweenness Centrality	2.221
Minimum Closeness Centrality	0.006
Maximum Closeness Centrality	0.011
Average Closeness Centrality	0.008
Median Closeness Centrality	0.006

Note: Value ranges from 0.0 to -1.0 (<1.0 small; >1.0 high)

collaboration within the government. This finding is also shown by the metric outcome of the proximity centrality, which has a limit of 0.011 and a minimum of 0.006, suggesting that, to date, there is no coordination for how each agent manages the handling of fires in the province of Riau.

The data in Table 3 show that, of the 96 actors involved, the high Maximum Betweenness Centrality score of 57.923 may have considerable influence within a network by virtue of their control over information passing between others, and the Maximum Closeness Centrality of 0.011 measures the mean distance from a vertex to other vertices. According to Zandian and Keyvanpour (2019), the centrality of a proprietary actor means that the relationship with the most central actor is more important than the relationship with a peripheral actor. As a consequence, the weight of an actor's interaction with other actors is integrated on a ranking basis varying from the lowest to the highest (Everton 2012; Zandian and Keyvanpour 2019). Conversely, this finding may be translated as the most powerful participant in the social networking system. Data analysis shows that there are seven exceedingly influential institutions addressing land and forest fires in the province of Riau, although essentially, the seven actors do not have the power to coordinate but are dominant in handling the fires. The BPBD, which deals with the management of regional disasters and maintains functions that apply to the government, features among these players. It is also abundantly evident that the BPBD holds a very substantial role in managing fires; this impact represented nearly 41 billion rupiahs (USD 2.8 million) of budget allocation in 2016. The significance of eigenvector centrality and proximity centrality shows that BPBD is one of the influential institutions in terms of forest fires.

Discussion

Various stakeholders are currently involved in efforts to put out forest and land fires. However, forest fire disasters illustrate the effects of bureaucratic inertia, such as a lack of coordination and inaccurate information. This research aims to explore local to central government bureaucratic reluctance in addressing forest fires. Concurrently, we argue that institutional innovations are required to meet the requirements of adaptability and deal with differing institutional norms across organisational levels.

The bureaucratic friction effect (Williams 2020) was the first aspect recognised regarding the question of the lack of

interorganisational interconnectedness. In other words, the results reflect the statement that these conditions are induced by bureaucratic inertia (Congleton 1982; de Castro 2000; Kumar *et al.* 2007; Munck af Rosenschöld *et al.* 2014). The bureaucracy is overly centralised in the present study. Especially when issues exist at the district or lower level, political policy-making occurs at the level of the President and the Governor as regional head, while in fact, the problem of forest fires exists at lower administrative levels (regency or districts). In other words, the President holds a central role in relation to policy-making authority on fire prevention. In terms of bureaucratic inertia and networking, the involved actors only work for their needs and tend to adhere to procedural and bureaucratic methods; thus, a mediator between local and central governments is required. There are several factors that need to be dealt with: synchronised decentralisation of authority by both local and central governments, standard operating procedures (SOPs) and the complex process of playing the economic game, and power imbalance among bureaucratic organisations. It is argued that to avoid bureaucratic inertia, institutional development is critical. In our context of dealing with forest fires issues, relying on local contexts and cultures is essential.

The second aspect is administrative synchronisation; the MoEF legislation stipulates that none of the district-level laws apply for managing forest and land fires. This focuses cooperation in just one organisation, and it is impossible to establish partnership among the relevant parties. Moreover, the nature of policy is generally uniform as there is no difference among the regions. This problem is exacerbated by a top-down approach to the procurement phase. If a Gubernatorial Order is released at the regional level, it is the only technical-strategic and organising authority, but this is not practical for organisation.

The third factor is that an excessive number of organisations are involved in fire-haze response. At the ministerial level, 23 departments or organisations have been directed by the President to be active in responding to fires. At the provincial level, the proportion is much larger, with the participation of 48 government organisations and institutional offices vertically under central government coordination. The percentage is not that different from the number of organisations participating at the district level, with a total of 32 entities. Overall, therefore, there are 96 government organisations involved in the issue of dealing with fire in Riau.

These circumstances can lead to bureaucratic inertia because an excessive number of departments or institutions are involved. Private and public companies may react negatively as a result. Problems concerning the speed of change will not be resolved by the slow movement of government organisations in response to these reactions. Consequently, the Centre for Land and Forest Fire Management must be restructured. Furthermore, the Centre for Land and Forest Fire Management was established under particular conditions at the regional and municipal level in reference to Presidential Instruction No. 11/2015, which may seem an extremely reactionary measure. Ideally, the government's first objective should have been to listen to the inputs obtained at the provincial and regional levels. This conclusion is confirmed by findings of research carried out by Edwards *et al.* (2020), which suggests a solution for improved forest governance in Indonesia by discovering governance improvements

that do not require drastic systemic adjustments to the bureaucratic structure. The result of the present study also reinforces the need for improvement, noting that a shift in institutional systems is one of the factors that leads to the effectiveness of fire safety and pollution control programs in Indonesia. The fourth factor is the lack of community participation. Community engagement in the network is only represented by the Community Fire Hazard Care institution (Masyarakat Peduli Api – MPA). Other social forces, which are institutionalised within culturally established structures, are not being accommodated. However, the potential is enormous for those who are associated with religion, culture and ethnicity, as well as farmers and young people. The army, which stands prepared on the front line to respond to the fire, is also involved. Local populations in the villages, however, perceive such intervention as threatening; thus, when fire incidents occur, citizens remain highly cautious and try to avoid any military-related elements. However, throughout the past, given their established organisations and existing knowledge, communities have always had their own method of coordination to cope with forest fires.

The fifth aspect that may be considered from the viewpoint of liability is the exceptionally strict laws controlling firefighting procedures. The responsibilities of the Centre for Land and Forest Fire Management at national, regional and local levels are specified in detail in Ministerial Regulation No. 32/2016. The existing decree defines the coordination functions and the tasks of each institution, from the central to the lower levels, directly involved in firefighting. In addition, the legislation provides the human resources and infrastructure necessary. The rigid rules will have a direct impact on bureaucratic inertia (Eckerberg *et al.* 2015; Williams 2020). These rigid rules create bureaucratic elements that make it very difficult to innovate in the technical counteraction to a fire. As a result, the essence of the hierarchical system of both preparation and success should be scientifically driven by specific guidelines and procedures. There is an urgent need for independence from the hierarchical system in the context of emergency scenarios.

The sixth factor is the budgetary aspect, wherein the budget is allocated in the centralised firefighting unit of the BPBDs. The other institutions are therefore unresponsive to this factor. In any case of fire, BPBDs are still the base for solving problems. Conversely, spending at the regional and district levels has been shrinking over the last 5 years. Offices responsible for land and forest fires do not have a specific budget. Activities related to the prevention of land and forest fires are charged to the annual budget of the respective institutions.

Conclusion

Forest fire is not just a natural occurrence, it is often the product of human activity or mismanagement of forest resources, especially those associated with bureaucracy. In the case of Indonesia, several actors and bureaucratic organisations are involved in managing this issue. However, it is unnecessary for security or judicial institutions to adequately handle the cases. It is therefore important, on the basis of these considerations and their implications, to address this bureaucratic inertia dilemma by making policy decisions in the short, medium and long term. In the short term, it is imperative to fairly and proportionately provide budget allocation to the relevant bureaucratic units

(Satuan Kerja Perangkat Daerah – SKPD) at the regional level, which must deal with immediate fire issues. Currently, during forest fire events, these funds are only allocated directly to BPBDs. Although the occurrence of fire is increasing every year, expenditure may be evenly distributed by making adjustments in the budget plan for the following year.

In the medium term, there is immediate need for the government to rebuild the structure of the Centre for Land and Forest Fire Management at both the district and regional levels for stability and leanness. The reform covers two classes of problems. The first category involves fire safety; the second category is concerned with reaction to the flames. Moreover, the need for government transparency by including the public in the second issue is no less important. In-depth discussions are needed around the existence of the Centre for Land and Forest Fire Management as an entity. Local participation should not be focused on funds disbursed by the Centre for Land and Forest Fire Management; it should be centred on local information. In support of this argument, in the respective areas, each community has their own local expertise to respond to fires.

In the long term, what is required is a devolution from the central to the regional and district levels. Provincial and local government autonomy can provide them with the authority to impose measures and take actions against all forms of violations and abuse of plantation licenses. Local governments should also be authorised to issue fire-related regulations. Therefore, the responsibility for fire prevention rules would be in accordance with the needs of each region. The decision-making process within the rules and regulations should be made through a bottom-up mechanism and considering the aspirations and needs of the bureaucratic structures that directly deal with the fire. Ultimately, the key research issue identified and that should be addressed is the policy-making process. This process is naturally very top-down through instruction from the highest bureaucratic structure with no involvement of the bureaucracy at the lower level.

Conflicts of interest

The authors declare no conflicts of interest.

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