Reg Environ Change (2017) 17:2433–2441
DOI 10.1007/s10113-017-1179-4

ORIGINAL ARTICLE

Institutional response to disaster risk: the City of Vancouver and District of Maple Ridge, British Columbia, Canada

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Received: 26 August 2016 / Accepted: 23 May 2017 / Published online: 8 June 2017

Abstract Proactively managing disaster risk in the absence of an event is the result of the responsible organization or institution's political will. This paper is a comparative policy and practice study on factors affecting municipal institutional behaviour on flood management in the City of Vancouver and District of Maple Ridge, British Columbia. Using Q methodology, we identify three behavioural groups through a by-person factor analysis on local practitioners (n = 12) in the study area. We compare these findings with data gathered from semi-structure in-depth interviews (n = 7), literature on development pathway theory and a review of local responses in the two cities. We suggest the mechanisms in place for external funding is inherently different for smaller municipalities who lack administrative capacities. In the absence of cross-boundary risk, it becomes more difficult to access the resources necessary to adopt disaster risk reduction strategies requiring large inputs of hard infrastructure. These smaller municipalities are more reliant on the expressed interests of the public than that of larger municipalities who can more freely distribute resources based on risk. Not only does institutional behaviour influence the disaster risk management system in place, but also the external mechanisms in place to provide support for such proactive management forces institutional behaviour of smaller municipalities to be oriented towards more social inclusion as opposed to the risk-sensitive approach that larger municipalities are more easily able to align themselves. This hinders the adoption of disaster risk reduction in local emergency management policy and practice and reinforces a reactive disaster risk management.

Keywords Disaster risk management · Local policy and decision-making · Q methodology

Editor: Jamie Pittock.

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Introduction

According to the Intergovernmental Panel on Climate Change (IPCC), it "is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise" leading to an increase in frequency and intensity of natural disasters (IPCC 2014, 58). The costs of weather-climate events to the Canadian economy are increasing (Report of the Canadian Parliamentary Budget Officer (PBO) (2016). The Disaster Financial Assistance Arrangements (DFAA) transferred $280 million to the provinces in fiscal years 2012–2013, and this increased to Canadian $1.02 billion in 2013–2014 and $305 million in 2014–2015. Using the Insurance Bureau of Canada (IBC) estimate for flood losses, PBO estimates that on average, DFAA is projected to have, in coming years, annual costs of $673 million for floods which will be the largest of the weather-related costs (PBO 2016).

A global perspective of risks of climate change, extreme weather and natural disasters is given in *The Global Risks Report 2017* (World Economic Forum 2017) which ranks extreme weather events as the most likely global risk and the second highest in terms of impacts. The failure of actions on climate change mitigation and adaptation, which was highest risk in the 2016 report, is still high, ranked fifth highest global

risk in terms of impact and one of the most likely ones. The top five global risks in terms of likelihood are ranked to be: (1) extreme weather; (2) large-scale involuntary migration (some of which is due to disasters); (3) major natural disasters; (4) large-scale terrorist attacks; and, (5) massive incident of data fraud/theft.

Despite growing pressure on cities, regions and countries to develop more effective policies and practices in emergency management to natural disasters and climate change, many government disaster risk management systems are only reactive, with minimal proactive strategies in place to reduce disaster risk. Some researchers have argued that this reluctance is the result of a difference in stakeholders' interests, jurisdictional conflict and "citizens as aggressive consumers of policy" (Prater and Lindell 2000). Other researchers maintain the position that government actions are inhibited by competing priorities and potential actions contrary to cultural values (Burby et al. 1985; Burby and French 1981). In both, the resulting actions or inaction reflect the views of governing institutions or organizations responsible for emergency management.

Standards for disaster risk management are, in part, reflected in legislation (Raikes and McBean 2016). These standards are indicative of baseline response capacity—the legal requirements of responsible institutions. In Canada, the absence of emergency management in the Constitution Act (1867, 30 and 31 Vict, c 3, as amended) allows the federal and provincial governments to define their roles and responsibilities. Municipalities and local authorities, on the other hand, are creatures of statute. In Section 92 of the Constitution Act, provinces are given jurisdiction to make laws governing municipal institutions. As such, most provinces and territories have statutes devolving responsibility for emergency management, including disaster risk management, to local authorities, in most cases municipalities.

In British Columbia, Section 6(2) of the *Emergency Program Act* (RSBC 1996 c 111, as amended) states, "a local authority must prepare or cause to be prepared local emergency management plans respecting preparation for, response to and recovery from emergencies and disasters." The legislation, however, fails to include defined standards for "preparation for, response to and recovery." This allows local governments to loosely interpret their responsibilities for disaster risk management and disaster governance. For example, preparations for an emergency or disaster have not been defined as proactive steps that mitigate risk and potential impacts. Raikes and McBean (2016) note that this vagueness in defining standards exposes private landowners to greater vulnerability to disasters and the attached liability.

Raikes and McBean (2016) argued that the minimum use of disaster risk reduction strategies in emergency management is in large part reflected in this legislation, jurisprudence and financial institutional arrangements that, in some respects, have facilitated reactive governance as opposed to proactive/precautionary management. While many local authorities have taken action, to some degree, that include proactive strategies in their emergency management plans, taking this approach is a function of resource management and the organization or institution's political will (Burch 2009; Hadfield and Seaton 1999).

The shift from the traditional reactive emergency management to more proactive management and adaptation practices that require a more holistic approach in the response capacity of institutions responsible for disaster risk management needs to be studied. Contextualizing public agenda setting in emergency management has, in part, been absent in current literature. Agenda setting theory and social movement theory have offered some insights into local emergency management policy and practice, but these research areas often examine the response of particular groups post-event, and little emphasis has been placed on the factors driving the public agendas of municipalities and their resulting disaster risk management approaches prior to or in planning for these events.

Kingdon (1995) noted that there are two categories of factors that affect agenda setting: active participants and the processes that dictate the relevance or necessity to address an item. The former could include media, interest groups, political parties and the general public. Birkland (1998), Baumgartner and Jones (1993) and others show that sudden unexpected disaster events (known as focusing events) cause increased attention and advocacy for better management from the public, media, interest groups and political parties. Without these events, these groups do not often recognize their community's risk and vulnerabilities to disasters (Birkland 1998; Baumgartner and Jones 1993). It is when a perceived threat becomes a reality, such that direct societal impacts are visible to these groups, that there may be greater attention, advocacy and investment in proactive disaster risk management.

This paper examines the latter: the processes and mechanisms defining governing bodies' political will to proactively manage disaster risk, emphasizing behavioural traits of local institutions and the resulting disaster risk management. We explore factors affecting municipal agendas in the context of disaster risk management through a study on response capacity to floods and flood actions in two cities in the Metro Vancouver region—the City of Vancouver and District of Maple Ridge. The findings of this study show that larger municipalities, like the City of Vancouver, have greater administrative capacities to access external resources, reasoning a risk-sensitive approach that can be undertaken to disaster risk management. Smaller municipalities, like the District of Maple Ridge, on the other hand, rely more heavily on joint agreements with adjoining municipalities that share risk. The result is that municipalities with smaller administrative capacity behave more reactively based on public desires in the absence of cross-boundary risk. For these municipalities to

invest in disaster risk reduction and to move towards more proactive preparedness requires a cultural change in both the public domain and the policy arenas that promote joint local agreements and mechanisms that allow greater access to external resources.

Methods

With municipalities being largely responsible for emergency management, municipal decision-making is the major factor in disaster risk management. Their decisions are reflections of both the individual(s) and the group(s) of policy-makers involved, as well as those who are consulted or influence those decisions, both internal and external to the responsible institutions. As such, the methodology for this study needed to be centred on subjectivity and self-reference by focusing on those influences on decision-making that ascertain the outlook(s) on political behaviour and institutional accountability.

This study follows a Q methodology framework, outlined by Watts and Stenner (2012). Q methodology, as developed by Stephenson (1953) and later refined by Block (1978), is designed to identify and explore individual and group behaviours by performing a by-person factor analysis of participants' responses to a predesigned rank-order questionnaire. It is an alternative measurement technique to psychology tests and scales (Stephenson 1953). Where normal factor analysis compares two or more variables using participants as the sample, the by-person factor analysis treats participants as the variables and the measured statements as its sample. The result is an analysis characterizing the person(s) as opposed to the material/statements. The output of the analysis is the collective view(s) of grouped individuals based on commonality in their responses. Scores are produced for each statement of the original questionnaire that can be used to characterize a group's behaviour on the subject matter in question.

Q method (Shinebourne 2009), involves four steps: (1) the collection/review of ideas, beliefs and opinions; (2) the formulation of a set of meaningful statements, based on the analysis of step 1, for each participant to rank-order; (3) the completion of this rank-order questionnaire by participants linked in different ways to the issue being examined; and, (4) a by-person factor analysis comparing respondents by virtue of their completed questionnaires.

In applying the methodology, we addressed the first step by conducting a review of the existing literature of development pathway theory and of current local responses in the City of Vancouver and the District of Maple Ridge. The results of this review generated the structure for seven in-depth interviews which were undertaken with local practitioners in the study sites. The participants ranged in terms of their fields of expertise and roles within the development, decision-making and implementation of flood responses in various organizations and institutions in the two cities. Major focal points in these interviews were on: public behaviour as it relates to concern/advocacy and engagement; the role that competing priorities and values have on affecting local responses; the influence of uncertainty in resource management; and communication and collaboration, both internal and external to the main institution(s) responsible for disaster risk management. The interviews were recorded, transcribed verbatim and coded into themes through an inductive interpretive analysis. The results of this analysis categorically addressed six flood management themes: drivers for; controls on; approaches to; limitations of; dependencies for success; and, the direction of future flood management.

The second step in the Q methodology was the formulation of a set of meaningful statements; based on these themes from step 1, for each participant to rank-order. Twenty-three meaningful statements were developed for the rank-order questionnaire [1], and 12 participants were involved in rank-ordering these statements. Similar to the interviewed participants, the participants' expertise was diverse and included individuals representing multiple organizations and institutions that have an impact on the development, decision-making and implementation of disaster risk management within the two cities.[2] The format of the rank-order questionnaire was consistent with a free-distribution format, allowing participants to rank-order each statement with no restrictions on how many statements could be given a particular score. The participants rank-ordered each statement based on their level of agreement, ranging from a score of −4 (strongly disagree) to +4 (strongly agree).

Step 3 was the examination of the rank-order questionnaires by participants, followed by Step 4; a by-person factor analysis comparing respondents by virtue of their completed questionnaires. The purpose of a by-person factor analysis is

[1] Only 10 of the 23 statements used in the questionnaire are shown in Table 1. The other 13 statements were left out for the following reasons: (1) the statements were designed to focus on identifying other components of response capacity to floods such as technological pathways and collective action; (2) statements were designed to explore the link between competing priorities and investment in and attention to emergency management which ultimately showed consistency with Burby et al. (1985) and Burby and French's (1981) results; and, (3) some of the statements used yielded no definitive results or indications on group behaviour. The values of these statements were −1 to +1 with the majority of the 3 groups' output values equal to a score of 0. Therefore, these statements provide no explicit insight that can be drawn on institutional behaviour as it relates to disaster risk management.

[2] According to Brown (1980), "Q methodology requires enough subjects to establish the existence of a [collective view] for purposes of comparing one [view] with another. What proportion of the population belongs in one collective view rather than another is a wholly different matter and one about which Q technique…is not concerned" (192). The methodology is less concerned with sample size as it can be applied to one or more individuals and yield the existence of particular viewpoints (Watts and Stenner 2012; Brown 1980; Stephenson 1953). Twelve participants acting as representatives of different organizations and departments within the responsible institutions, in conjunction with the 7 interviewed participants to compare and contrast, provide results on shared viewpoints with accuracy.

to identify patterns of behaviour among participants (Watts and Stenner 2012). When patterns are identified based on commonality of participants' responses, the by-person factor analysis groups participants that correlate with each pattern. The analysis produces a final product that represents each group's collective view on each statement (known as a factor array). Essentially, it produces another Q-sort (completed rank-order questionnaire) that represents shared behaviour among those participants who are grouped together, based on the commonality of their responses. The resulting behavioural groups were compared to the interviews to: match behavioural groups to municipalities; measure accuracy; and provide a more holistic view on municipal response capacity.

Q methodology results

As noted above, standards for disaster risk management are reflected in legislation, jurisprudence and financial institutional arrangements, that, in some respects, neglect the inclusion of proactive disaster risk management and support reactive management (Raikes and McBean 2016). Taking proactive emergency management actions are a function of the responsible organization or institution's political will. Evidence from the data analysis described above shows that competing priorities act as a control mechanism for action in terms of timing, resource management and response capacity. How institutions manage competing priorities reflects their institutional behaviour and provides insight into urban policy and the management of risk.

The participants in this study demonstrated that the following are primary influences to public administration of disaster risk management: physical risk, vulnerability and uncertainty; public behaviour; and, the political cycle and its connection with intra-network and extra-network reputations. Of these factors, there was disagreement as to which is most influential and inclusive in decision-making for different systems. This explains the existence of three distinct behavioural groups identified through the Q Method by-person factor analysis (Table 1): (1) risk-sensitive; (2) deliberative democratic; and, (3) political individualism.

Group 1 ranked statement 1, on climate change and its impacts, as +4 (strongly agree) while group 2 ranked the same statement as −3 (almost strongly disagree) and group 3 were fairly positive on the statement (+2). Group 1 also ranked the importance of having an engaged community and a community voicing their concerns towards flooding (statement 6) as a +4. That the provincial and/or federal governments should be taking the lead on flood management (statement 9) was for groups 2 and 3 a +4. Group 2 gave a +4 to the dependency on increasing communication and collaboration between different levels of government (statement 10) while group 3 gave a +4 to the important dependencies on the political cycle (statement 7). Through this analysis of the full set of responses, the characteristics of groups were established.

Group 1: risk-sensitive governance

The output scores of +4 demonstrate that group 1 considers climate change as an important factor and that success depends on an engaged and vocal community. In a broader sense, group 1 is characterized by risk, vulnerability and uncertainty. They are most likely to take a precautionary approach to flood response as they would rather be protected from a potential event than face the consequences from no preventative action. The +4 value for statement 1 in Table 1 indicates that this group gives high importance to risk and vulnerability to drive flood management action. They recognize the uncertainties of disasters and the complexities of competing priorities on investment in flood management, but the risk and exposure to floods and their associated impacts gives rise to a necessity for action. Regardless of whether or not they agree or disagree with emergency management being a municipal responsibility, action is deemed necessary when risk is present. This is particularly evident when comparing their views on the first statement (+4) with the outputted values for statement 9 on provincial and federal responsibility versus municipal (0) and statement 7 on the dependencies on the political cycle (+1).

While risk, exposure and vulnerabilities to floods are critical for the action that is taken by this group, this does not negate any influence that the public has on the planning, decision-making and implementation of flood management initiatives. In fact, their views for statements 2, 5 and 6 indicate a critical role of public involvement. On statements 2 (the public being the most influential factor in driving action) and 5 (success is dependent or will increase with public pressure on local practitioners) the group's scores of +2 indicate that response is reflective of the desires of the public. That said, the results of the by-person factor analysis and the views expressed by the interviewed participants suggest that while the public remains an influential driver in disaster governance to this group (statement 6), their influence is primarily reflected in the response itself and not necessarily the necessity to act proactively. This would be reflected in determining acceptable day-to-day interference to operations and aesthetics that responses may have during implementation and long-term planning.

Forecasting models and historical data show that the probability of a flood occurring in the area force municipal response through proactive preparedness. This is consistent with the review of existing responses in the City of Vancouver and the views expressed by interviewed participants in the city. The approach taken to disaster risk management is primarily driven by risk, exposure, and the vulnerabilities to flooding. The City of Vancouver's municipal Climate Change Adaptation

Table 1 By-person factor analysis results

Meaningful Statement	Group	Output score for statement
1. The major driver for developing and implementing flood management initiatives exceeding provincial and federal legislation is climate change and impacts from storm surges, sea-level rise and/or spring snowmelt.	Group 1	4
	Group 2	−3
	Group 3	2
2. The major driver for developing and implementing flood management initiatives exceeding provincial and federal legislation is public concern/advocacy for flood management.	Group 1	2
	Group 2	2
	Group 3	−1
3. The major driver for developing and implementing flood management initiatives exceeding provincial and federal legislation is the potential economic impact that a flood could have on the city or business.	Group 1	2
	Group 2	3
	Group 3	2
4. The uncertainty of floods—in terms of when, where and intensity—and frequent changes to recommendations on how to reduce impacts of flooding, deter investment in flood management and more towards other high priority projects.	Group 1	1
	Group 2	2
	Group 3	2
5. Successful flood management is dependent on or will increase with public pressure on local practitioners and on government for increased action.	Group 1	2
	Group 2	1
	Group 3	2
6. Success of flood management is dependent on or will increase with having an engaged community and a community voicing their concerns towards flooding.	Group 1	4
	Group 2	3
	Group 3	2
7. Flood management initiatives are dependent on the political cycle.	Group 1	1
	Group 2	2
	Group 3	4
8. There is disconnect between staff with each other, others in your profession, and/or council on the understanding of the effectiveness of existing flood management in the city.	Group 1	−2
	Group 2	0
	Group 3	2
9. The provincial and/or federal government should be taking the lead on flood management, including the financing of flood management initiatives being done at the local level by either the municipality or local practitioners.	Group 1	0
	Group 2	4
	Group 3	4
10. Future flood management is dependent on increasing communication and collaboration between different levels of government to work together and share the responsibility of flood management.	Group 1	2
	Group 2	4
	Group 3	2

Strategy (2012) sets out a need to conduct a coastal flood risk assessment, including the types and severity of impacts that would likely occur through storm surge and sea-level rise. Through this assessment, the municipality has recognized that the results of various models and extreme scenarios present a range of risks to the region for which the costs of not acting is too great. Regardless of the uncertainties that surround natural hazards, the municipality and the participants working in this region have recognized a need for action. Emphasis on protecting the public in the event of a flood has become a priority with the population of the city growing.

Group 2: deliberative democracy

Group 2 can be characterized by institutional tension existing among different levels of government or with organizations, and the risk management system that results is more socioeconomically based, as opposed to group 1's risk-based approach. This is different than groups 1 and 3 in that this group emphasizes greater reliance on socioeconomic factors. This group, as identified in the by-person factor analysis, shows consistency with interviewed participants in the District of Maple Ridge.

Group 2's view is that flood management should be a provincial and/or federal government responsibility (+4) based on the position that exposure to a natural hazard extends beyond the municipality's political boundaries and that tight budgets and resources further constrain the district's ability to act. This is not to say that group 2 refuses to implement disaster risk reduction strategies. Instead, there is a shift in focus from flood management to other high priority projects that may serve an immediate impact/need. The investment and attention that flood management receives tend to be placed on hold and serve as a secondary assignment within the region.

The group's +3 on potential economic impacts driving proactive measures to flooding and +2 to uncertainty deterring investment suggests that this group will proactively manage disaster risk when they can afford to or when the uncertainty is minimized and economic impact is apparent. This is different than group 1's view of risk as they are more associated with the connections between public concern/advocacy for action and the influence that environmental stressors can have on business(es) and the state of the economy. For statements 2, 5 and 6 of the questionnaire, group 2's outputted scores were +2, +1 and +3, indicating a strong influence of the public on the attention and investment that flood management receives. This suggests a more deliberative democracy approach to disaster risk management and one that centres on collective mobilization.[3]

According to some researchers, the public, media, interest groups and politicians express greater concern over disaster management systems when a perceived threat becomes a reality (True et al. 2008; Birkland 1998; Baumgartner and Jones 1993). The attention to public problems increases when events exploit failures in existing policies and practices (Moynihan 2012; Baker 2014). In both the City of Vancouver and District of Maple Ridge, interviewed participants explained that public concern for flood action is highest post-event and it is not a day-to-day matter that people are concerned with. As one participant explained, "People worry about: how much they are paying for housing; are their children looked after; are they going to a job during the day or school or whatever it is that they want to be; increasingly, are my parents looked after if they are senior; and then transit." For the municipality to address disaster risk more proactively, it is necessary that there be public pressure demanding such an increase. In the District of Maple Ridge, participants noted that public concern and advocacy for flood management tends to be highest when a flood in the area has occurred and, ultimately, this has affected the behaviour of the municipality. The municipality's attention to and investment in flood management have fluctuated in response to the public's stance on the issue.

In alignment with this position, group 2 tends to act based more on public input regarding the present existing issues in the region than the potential risk of a flood occurring. When the impacts are visible (whatever their reality is), an issue is more influential on institutional behaviour than when it is a perceived threat. As such, there is greater reliance on public input into the politics of urban governance and, subsequently, local disaster risk management than that which characterizes group 1's approach. While this group may have some disaster risk reduction strategies in place, the strong presence of jurisdictional conflict coupled with a need to serve the public's needs and/or desires at present, compared to projected exposures, risks and vulnerabilities that have attached uncertainties, often constrain, by facilitating reluctant management and municipal governments ability to proactively manage risk.

[3] Deliberative democracy is the democratic process through publicly expressed reasoning, mutual understanding and political inclusion (McLean and McMillan 2015).

Group 3: political individualism

The third group (group 3) identified in the by-person factor analysis can be characterized based on its organizational or institutional structure. These views control both the investment in flood response and who is responsible for the development and implementation of the organization or institution's approach. Although group 3 recognizes the importance of communication and collaboration in successful flood management (value of +2), disconnect among staff and senior officials within the organization or institution is present (+2) and reflects the current state of flood management system in the region. This group views climate change and the potential economic impacts associated with a major flood as being significant drivers for flood management, but less important than group 1. Also, for this group, the diverse opinions by individuals within the organization or institution on the state of the current system and the need to improve that system constrain the attention to and investment in flood management projects.

While action in groups 1 and 2 focused more on the external factors influencing the planning, decision-making and the direction of flood management within the two cities, group 3 is more politicized in its approach. It is characterized by the politics of approaching issues where short-term results can be seen for the purpose of re-election and keeping the public happy by approaching their expressed concerns, in preference to what may or may not be overlooked issues. Ultimately, response occurs when needed. The by-person factor analysis supports this assertion with an outputted value on the dependencies on the political cycle as +4.

This group is the most reluctant in adopting disaster risk reduction strategies due to the potential impact that investing in this approach could have on their intra- and extra-network reputations given the uncertainties of future events. They believe that disaster risk reduction strategies are risky investments that could be used against them in future elections if an event does not occur. The absence of conditions that would test the effectiveness of implemented disaster risk reduction strategies could be used as leverage by opposition parties during elections and discomfort staff requesting resources for other high priority projects, such as transit. Their moderate level of agreement (+2) on the influence of uncertainties on deterring attention to and investment in flood management further supports the reluctance to adopt proactive/precautionary strategies.

Additional political considerations

In British Columbia, local elections for mayor and council must be held every 4 years as required under the Local Government Act (RSBC 2015 c1, as amended). Although municipal leaders are expected to raise awareness on the concerns of the public and promote their plans to ensure that the wants, needs and values of the public are kept, little emphasis is given on flood management in campaigning. In the City of Vancouver, candidates' campaign during 'election season' on issues based on past successes where there is the greatest ongoing debate. As one participant explains, there is little emphasis on flood management in campaigning, in part, because "nobody cares" about how much is spent on flood management even though the "single largest allocation in the Capital Plan is flood management related." This participant further stated, "people will argue over the $3 million for whatever bike related infrastructure is in [the Capital Plan], but the $325 million for the sewage upgrades is like 'Meh. Whatever. Fine. Sure.'" Candidates focus on the issues where there is the greatest public debate because these are the issues that the public really want something to be done and it is what will determine winners in elections. Why campaign about the problems of the current flood management policy and practices if the public does not think that the existing system is broken?

The results of this study show that changes in government have resulted in variations in government focus on and investment in disaster risk management over time as different players with different objectives and political platforms prevail. This is reflected most notably in +2 and +4 scores of groups 2 and 3 on the dependencies of flood management on the political cycle. As changes in government, including staff, occurred, municipal priorities were affected. These changes did not and do not occur overnight, but take at least months to years of restructuring.

While all three groups recognize risk, vulnerability and uncertainty, public behaviour, and the political cycle as influential (positive or negative) on their behaviour and, therefore, their approach to disaster risk management, local disaster risk management systems whose institutional agendas are dictated by the electorate, determine the attention, if any, to and investment in the resulting disaster risk reduction. Electors have the ability to make long-term commitments for their communities, but the importance of re-election, and intra-network and extra-network reputations, have, in some cases, proven to hinder long-term commitments on issues that are surrounded with uncertainty. Questions of whether or not the individual(s) is capable of managing a dynamic system or serving the interests of the community as a whole when investment into an area where results are not evident or lack sufficient evidence to support successful investment, can deter electors from making these decisions. This reinforces this culture of reactive management. Even when disaster risk reduction strategies are adopted, they may be in response to a recent event, and the attention and investment quickly dissipates as the public, media and interest groups shift their focus to other day-to-day concerns. Therefore, it is reasonable to suggest that local disaster risk reduction receives less investment and attention by policy-makers when their agenda setting criteria is aimed at public desires as opposed to recognizing and acting on the risks, exposures and vulnerabilities of natural hazards that are surrounded with uncertainties.

Discussion

This study compares local disaster risk management in a large versus small municipality and the responsible organization or institution's political will to proactively manage that risk. The results show institutional behaviour characterizing that political will, as well as reasoning for the alignment of these different institutional behaviours with larger municipalities, such as the City of Vancouver, and small municipalities, like the District of Maple Ridge.

The mechanisms in place for gaining additional external funding are inherently different for smaller municipalities who lack administrative capacity. According to the Organization for Economic Co-operation and Development (OECD 2010), approximately 70% of urban public spending is the responsibility of local governments. Carmin et al. (2012) found that approximately 60% of local governments are not receiving any financial support for climate change adaptation, which includes emergency management preparation.

The purpose of disaster risk management is to protect people, property and resources. Communities with a large population are able to access external resources more readily. For smaller municipalities, a greater reliance is on joint municipal agreements. In the absence of cross-boundary risk to municipalities, it becomes more difficult to access the resources necessary to adopt or improve existing disaster risk reduction strategies requiring large inputs of hard infrastructure, such as dikes. With tight budgets and limited resources (Henstra 2013), these smaller municipalities are more reliant on the expressed interests of the public as opposed to larger municipalities who can more freely distribute resources based on risk. Not only does institutional behaviour influence the disaster risk management system, but the external mechanisms in place to support proactive management force smaller municipalities to be more attuned to public influence and be more politically sensitive in contrast to the risk-sensitive approach that larger municipalities can more easily align with.

Interviewed participants in the District of Maple Ridge stated that the costs to maintain dikes and adopt hard infrastructure disaster risk reduction strategies exceed the municipality's capacity to manage risk while maintaining their other duties. Given

that risk often exceeds political boundaries, such as flooding along the Fraser River, the question is if it is fair to these smaller municipal institutions to be solely responsible for financing risk reduction strategies? The +4 scores of groups 2 and 3 on flood management being a provincial and/or federal responsibility suggest that the cost of disaster risk management is viewed as exceeding local institutions capacity. In addition, resulting disaster risk management systems in smaller locales are dependent on the political cycle (+2 and +4). For the organization or institution to adopt a proactive disaster risk management system, they need political leaders advocating for this system and public backing to support initiatives that may deter investment elsewhere; viz. to be supported, it must be an express priority from the public. As researchers (Baker 2014; Moynihan 2012; Birkland 1998) have shown, this express concern over existing disaster risk management systems is typically highest post-event. There is a significant need to create a cultural change in both public and policy arenas so that smaller municipalities can make the transition from reactive risk management to one that is more risk-sensitive within the existing system.

The City of Vancouver, on the other hand, takes this risk-sensitive approach to disaster risk management. The city was identified as being aligned with group 1. The +4 to statement 1 (risk being the major driver for proactive management) compared to group 2's −3 value suggests less publicly motivated decision-making in disaster risk management than that of a smaller municipality because they have the resources to meet the demands of risk-sensitive disaster management while maintaining their commitments to other societal issues and legislative duties. This reduces the dependencies on the political cycle, particularly, if disaster risk reduction projects are connected to earmarked contributions from external sources.

At issue is the problem of creating this cultural change so that all municipalities and local authorities have the means to approach disaster risk proactively. In the absence of an event, the mechanisms/vehicles that can facilitate this cultural shift need to be explored. The central questions are how to create/incentivize a more inclusive system of governance that provides smaller municipalities with the means and motivations to make this transition to precautionary disaster risk management and how to structure this system.

Under the Sendai Framework for Disaster Risk Reduction, the four priorities for action in building disaster resilient communities and countries are understanding disaster risk, strengthening disaster governance, investing in disaster resiliency, and strengthening disaster preparedness (UNISDR 2015). Not being able to make the transition to proactive disaster risk management undermines these priorities for action. Exploring the transitional pathways is the next step in disaster risk management research.

Conclusion

Local authorities and municipal institutions must make difficult decisions that involve many interacting factors. Risk, vulnerability and uncertainty, public behaviour and the politics of action, including the political cycle and its connections with intra- and extra-network reputations, influence institutional behaviour and, therefore, the organization or institution's political will. While the degree of influence of these factors on institutional behaviour will be different from municipality to municipality, the administrative capacity of the institution may predetermine the organization or institution's behavioural orientation. As disaster continue to rise in frequency and intensity, it is critical to understand response capacity and the mechanisms that can foster transition away from reactive risk management.

Acknowledgements We thank the Marine Environmental Observations, Predictions and Response (MEOPAR) centre of excellence for their funding support. We would also like to thank the local practitioners that were involved in this study, and the reviewers for their constructive feedback.

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