



Comparing public rationales for justice trade-offs in mitigation and adaptation climate policy dilemmas

Sonja Klinsky^{a,b,*}, Hadi Dowlatabadi^{a,c}, Timothy McDaniels^{a,d}

^a Institute of Resources, Environment and Sustainability, University of British Columbia, 2202 Main Mall, Vancouver, BC, V6T 1Z4, Canada

^b Cambridge Centre for Climate Change Mitigation Research, University of Cambridge, 19 Silver Street, Cambridge, UK

^c Liu Institute for Global Issues, University of British Columbia, 6476 NW Marine Drive, Vancouver, BC, V6T 1Z2, Canada

^d School of Community and Regional Planning, 6333 Memorial Road, Vancouver, BC, V6T 1Z2, Canada

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ABSTRACT

Despite a great deal of research on public perceptions of climate change science, very little empirical work has attempted to investigate how members of the lay public might evaluate the justice dilemmas inherent within climate policy decision-making. This exploratory study contrasts arguments about justice from a mitigation perspective, with those from an adaptation perspective and draws insights about the contours of politically acceptable climate policy. Using think-aloud protocols and a structured elicitation approach with members of the lay public to generate quantitative and qualitative data, this study suggests that the two types of climate policy trigger different sets of arguments about justice. When asked about mitigation burden-sharing participants overwhelmingly invoke arguments about causality. In contrast, in discussions of adaptation participants emphasized the needs of the afflicted parties and their ability to cope. Furthermore, social and spatial distances were not a factor in allocation of mitigation burdens, but were used to discount the distribution of compensation towards adaptation. These initial data about public perceptions of justice in this area suggest that the public would view adaptation and mitigation as complements not substitutes. These findings also highlight the importance of exploring public reactions to the sub-components of climate policy individually.

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1. Introduction

It is with good reason that Gardiner (2006) describes climate change as a “perfect moral storm”. The justice dilemmas embedded in decision-making about climate change policy have been well identified by a range of scholars (Shue, 1992, 1993; Jamieson, 1992, 2005; Rose et al., 1998; Blanchard et al., 2001; Grubb, 1995; Howarth and Monahan, 1996; Tol, 2001; Tonn, 2003; Ikeme, 2003; Gardiner, 2004; Ott, 2004; Singer, 2006). Despite these ongoing discussions, no single framework of justice has emerged as the rule for dividing the burden of mitigation (Klinsky and Dowlatabadi, 2009), nor is one likely, or potentially even desirable (Müller, 2001). Agreeing on a just division in this context is difficult because countries vary enormously by opportunities to reduce emission, past emission history, projected emission trajectories and financial resources, and good arguments about justice can be made on all of these dimensions.

Simultaneously, countries also vary in terms of their vulnerability to climate impacts, and their social, economic and institutional capacity to adapt to climate change. How adaptation to climate change is to be supported across diverse contexts is a major issue. In addition to a plethora of work invested in understanding vulnerability and adaptive capacity in different locations (Yohe and Tol, 2002; Brooks et al., 2005; Adger and Vincent, 2005; Smit and Wandel, 2006), questions about adaptation finance have become central in international negotiations. The need for adaptation funding has been recognized internationally through the Bali Road Map (UNFCCC, 2007) and the Copenhagen Accord (UNFCCC, 2009) which formally promised US\$ 30 billion worth of “fast-start” climate finance to flow from developed to developing countries in order to help with mitigation and adaptation. How these funds are to be raised or divided remains an open discussion, and little of these funds has materialized (Ciplet et al., 2010).

To some extent distributive justice questions raised by climate change have been debated in policy (Rose et al., 1998; Blanchard et al., 2001; Grubb, 1995; Tol, 2001; Tonn, 2003) and philosophy communities (Shue, 1992, 1993; Jamieson, 1992, 2005; Singer, 2006; Caney, 2005; Page, 2007), but empirical work exploring public perceptions of justice in this context has been lacking. This

* Corresponding author at: Institute of Resources, Environment and Sustainability, University of British Columbia, 2202 Main Mall, Vancouver, BC, V6T 1Z4, Canada. Tel.: +1 604 822 9034.

E-mail address: sonjaklinsky@gmail.com (S. Klinsky).

is problematic because public input is particularly important for several reasons in this context. First, these dilemmas are questions of value as much as they are technical, which reconfigures expertise and demands public input. Recognition of this has been seen in other aspects of climate change analysis, such as in the turn to public participation in integrated assessment modelling (van Asselt Marjolein and Rijkens-Klomp, 2002; Turnpenny et al., 2003; Klopogge and Sluijs, 2006). From this perspective public engagement in these dilemmas is important both because the public may bring novel information or perspectives into the discussion, and because experts do not have privileged knowledge over publics in questions of value.

A second broad call for increased public participation in discussions about climate change policy stems from recognition that international agreements will always lack enforcement, leaving the majority of regulation to the domestic arena (Faure and Rubin, 1993; Hanf, 2000; Underdal, 2000). The interaction between global and domestic obligations both in terms of mitigation and adaptation raises difficult public policy questions for national governments. How should they proceed when faced with potentially non-commensurable claims on resources and competing obligations? How should they balance international obligations across space, and possibly time, with the adaptation needs of their own constituents?

In light of this, climate policies need to resonate with domestic publics for philosophical and pragmatic reasons. Philosophically, democratic governments have an obligation to craft policies that are acceptable to their publics. This is particularly pointed when trade-offs in public revenue-use are considered. Pragmatically, policies are unlikely to be pursued or effective if they do not have some broad appeal and support (Burstein, 2003). This could be measured in terms of political electoral feasibility, in which case governments must be able to ‘sell’ their international commitments to their domestic publics, or could appear as appeals to engage in climate friendly action.

Assessing public arguments about the distributive justice dilemmas inherent to both mitigation and adaptation policies is an important area for exploration. However, with a few exceptions (c.f. Dietz and Atkinson, 2010; Cai et al., 2010) questions about justice have either been missing or only alluded to in passing, and no studies have tackled both mitigation and adaptation from this perspective. The objective of this paper is to explicitly address this gap in our knowledge about public understandings of climate change. This exploratory study identifies and compares the arguments about distributive justice used by the lay public in response to international mitigation and adaptation policy dilemmas.

2. Public perceptions of justice and climate change

The trickle of research looking at public perceptions of climate change in the early 1990s (Kempton, 1991; Löfstedt, 1991; Bord et al., 1998) has steadily grown into a torrent. Work within this area has provided crucial insights about public understandings of climate science (Bostrom et al., 1994; Bell, 1994; McDaniels et al., 1996; Reynolds et al., 2010), the dimensions of public concern and the factors influencing these concerns (Leiserowitz, 2005; Lorenzoni and Pidgeon, 2006; Etkin and Ho, 2007), and the social and psychological barriers to individual action for mitigation (Hinchliffe, 1996; Darier and Schüle, 1999; Poortinga and Pidgeon, 2003; Weber, 2006; Baron, 2006; Swin et al., 2009). Related work has also explored strategies for climate change communication (Moser and Dilling, 2004; Bales, 2007) and the state of media coverage of climate change (Boykoff and Boykoff, 2004; Antilla, 2005; Carvalho and Burgess, 2005).

This body of work has not focused on justice perceptions, but provides some indications of what these might be. For instance, individuals appear less willing to engage in actions to mitigate climate change when key institutions, often governments, are not also involved (Darier and Schüle, 1999; Stoll-Kleeman et al., 2001; Lorenzoni and Pidgeon, 2006). This pattern suggests that the public sees mitigation as a collective action problem, in which the appropriate response might be to divide the pieces of the problem across stakeholders.

Some work has hinted at the presence of moral heuristics, or decision-making “rules of thumb”. Sunstein suggests that people have a moral heuristic stating that “people should not be permitted to engage in moral wrongdoing for a fee” (2005, 537). He argues that this leads to resistance against policies designed to reduce emissions indirectly (e.g. through pricing) instead of using strict quantity limits. Meanwhile, Baron (2006) suggests that people’s tendency to feel that those who caused a problem are most responsible for addressing it has resulted in a bias towards mitigation over adaptation (or other poverty alleviating efforts).

Studies of public concern for climate change are a potentially fruitful source of information about justice perceptions. Recent studies suggest that a majority of people are concerned about climate change (Leiserowitz, 2006; Lorenzoni et al., 2006; Nisbet and Myers, 2007; Carson et al., 2010) but there are two important patterns within this. First, highest concern in the abstract is repeatedly expressed for those temporally, spatially or socially distant (Dunlap, 1998; Lorenzoni and Pidgeon, 2006). For example, when asked to rate concern across a gradient of distance (i.e. myself, my country, the world), the most common response is to express greatest concern for those furthest away. Second, and conversely, there is evidence that local specific impacts attributed to climate change generate significant concern. For example, McFarlane and Witson (2008) demonstrate that those closest to mountain pine beetle infestations were most worried. On one hand we have an image of a public preferentially concerned about the wellbeing of distant others, while on the other hand local, concrete, impacts matter most when they are apparent. From a justice perspective, it is unclear which model of concern the public is more likely to follow when faced with international adaptation funding obligations.

Few public perception studies have had an explicit focus on justice and climate change. Leiserowitz (2005, 2006), and others (Maibach et al., 2009) have argued that underlying values, including egalitarianism, contribute to American public perceptions of climate change. Two other studies used willingness to pay (Cai et al., 2010), and discrete choice type experiments (Dietz and Atkinson, 2010) to explore how people made trade-offs between equity and efficiency in the climate mitigation context. These studies both found that the distribution of costs (equity) was important to their participants. For instance, people were willing to pay more to mitigate some inequities in policy incidence (Cai et al., 2010). In addition, perceived causality and ability to pay were identified as factors in people’s decision-making about mitigation burdens (Dietz and Atkinson, 2010).

These studies are an important first step but have two key limitations. First, they explored only mitigation. Second, these types of experiments necessarily impose a very small sub-set of possible options on participants. For instance, the choice experiment explored only three equity principles: polluter pays, beneficiary pays, or strict equality of burdens (Dietz and Atkinson, 2010). When compared to the body of philosophical and policy literature on the justice of climate change, many more distributive justice arguments may be relevant than have been included in these studies. A short list of principles which have routinely appeared in attempts to reconcile distributive justice claims in international climate policy debates would include causality

(current and historical), ability to pay, protection of the vulnerable, entitlements to climate security and economic development, burden sharing, and entitlements to atmospheric space (see Klinsky and Dowlatabadi, 2009). In addition, work on the social-psychology of justice (Deutsch, 1975; Lerner, 1975; Tyler and Dawes, 1993; Montada and Kals, 2000; Opatow, 1994; Konow, 2001; Wenzel, 2001, 2004) contributes two key themes that have been missing from discussions of justice and climate change. These are the importance of *boundaries and relationships*, and *deservingness*. These are briefly outlined here because they were incorporated into our study.

Decisions about distributive justice can only occur within some kind of boundary, as Walzer states, “there cannot be a just society until there is a society” (1983, 311), but these boundaries are subject to negotiation. Opatow’s theory of moral exclusion suggests that we are least likely to give justice claims weight when presented by those perceived as distant, non-essential and in competition with us. These distant others are, in effect, beyond our boundaries of consideration (Opatow, 1994; Opatow and Weiss, 2000). Public perception of climate change research needs to be sensitive to the process of how people define social boundaries, and the role that distance (spatial, social and temporal) may play in this. Unfortunately this has been largely missing in research thus far.

The connection between justice perceptions and social boundaries is complicated by two factors. First, ideas of justice change within social boundaries. It has been widely demonstrated that people “have situational frameworks that indicate that different principles of justice matter in different settings” (Tyler, 1997, 56). Our situational contexts might vary by the types of relationships that are prominent (Deutsch, 1975), or by the aspects of our identity that are highlighted (Fiske and Tetlock, 1997; Skitka, 2003; Wenzel, 2001, 2004). The roles and relationships participants feel themselves to be in when faced with specific climate change dilemmas will likely shape their responses, but this is often left implicit in public opinion research on climate change.

A second complicating factor in the relationship between justice perceptions and boundaries is that it may be ambiguous whether a party receives a negative outcome because it is outside our boundaries (so is ignored in decision-making), or whether this party is within our boundaries but judged undeserving (Hafer and Olson, 2003). Merit or deservingness emerges repeatedly in justice perception research. For instance, equity theory (Walster and Walster, 1975) suggests that people often judge comparative inputs and outputs to argue that those who have not invested as much do not deserve as much in return. Focussing less on the division of benefits, Heider (1958) outlined variations of causality (i.e. from accidental to premeditated direct causation), that colour how merit is constructed in a given context. How the public might judge merit in the climate context remains an open question but it is likely an important consideration.

This study builds on insights from social–psychological theories of justice in three ways.

1. It includes arguments about relationships and identity roles, and merit in its exploration of justice perceptions. These arguments have formerly been excluded from the few studies addressing public perceptions of justice in the climate context discussions of justice and climate change.
2. This study explicitly identifies public responses to particular sub-components of climate change (adaptation and mitigation) because social–psychological theory stresses the fluidity of justice perceptions across contexts. Climate change can take many forms and it is likely that public arguments for justice may shift among them.

3. Methodologically this study reflects both points above. A relatively open structure is used to leave space for a diversity of justice arguments, care is taken in understanding where these arguments come from, sub-components of climate change are dealt with individually, and in the adaptation context the identity roles of participants are explicitly manipulated. This is discussed in more depth below.

3. Methodology

The public perception of climate change research provides clues about how people might approach justice but very little work has explored this area explicitly. There are three major challenges to studying public justice perceptions or reasoning patterns. First, justice perceptions are highly contextual (Deutsch, 1975; Opatow, 1994; Wenzel, 2004). There are many contexts within climate change, and different justice arguments might be used within each of them. It may therefore, be productive to examine facets of climate change individually. The strains of argument considered appropriate for a mitigation setting may not be considered appropriate when considering the possibility of funding adaptation projects overseas. From this perspective, it would be very unlikely that evaluations of justice would remain stable across contexts. Explorations of justice perceptions within climate policy need to keep this fluidity in mind: at the very least characteristics of specific contexts should be made explicit so that justice perceptions can be interpreted accordingly.

Climate change’s complexity poses a second challenge. There are many considerations to balance in decision-making, even within sub-components such as mitigation and adaptation. Moreover, based on observations about limited public knowledge about climate change (Nisbet and Myers, 2007; Reynolds et al., 2010), the public may lack familiarity with many of the considerations that enter into climate policy dilemma. However, it has long been recognized that humans have great difficulty with decision-making in complex or unfamiliar contexts (Slovic et al., 1977). Answering questions about justice perceptions may have added difficulty because we are rarely asked about values directly, may lack experience expressing them and may not have firmly established preferences (Fischhoff, 1991; Gregory, 2002). The unfamiliarity with climate change and justice as concepts to be addressed in unison creates a risk of placing participants in situations in which they are unable to respond meaningfully without the provision of some external skeleton structure.

Third, there is currently little evidence explicitly investigating public perceptions of justice and climate change. In-depth interviews and other qualitative techniques offer some advantages in exploratory research endeavours because they leave space for novel insights from participants and can allow glimpses into reasoning processes but they carry the limitations identified above.

Recognition of these challenges led to a methodology which:

- Asked participants to solve specific mitigation and adaptation justice dilemmas separately so that two large aspects of climate change policy could be explored explicitly.
- Provided structured information to help participants assimilate multiple dimensions of the justice dilemmas implicit in climate policy decision-making.
- Gathered qualitative data that facilitated analysis of quantitative data emerging from decision-making processes and which tracked the process participants used to resolve the justice dilemmas.

This study used an exploratory design to elicit participant reasoning about justice in three distinct climate change policy

contexts. Aspects of two existing methods – structured decision analysis and think aloud protocol analysis – were combined. Structured decision analysis has been used in a wide variety of contexts (McDaniels et al., 1996; Gerwing and McDaniels, 2006; Gough and Shackley, 2006) and often includes the use of decision-analytic aids like written scenarios, influence diagrams, or simple models in order to highlight the central dimensions of the problem and help participants integrate information (Gregory, 2000). In think aloud protocol analysis participants are asked to resolve dilemmas while saying all of their thoughts out loud. These verbalizations are audio-recorded and transcribed for detailed analysis. Think-aloud protocols do not, of course, provide perfect access to participants' decision making but can allow glimpses of the ideas that they are using to resolve the dilemma, and may help identify the trade-offs that they are making. The utility of this approach has been demonstrated across multiple fields for these reasons (Ericsson and Simon, 1984, 1998; Schkade and Payne, 1994; Someren et al., 1994; Jaaskelainen, 1996, 2002; Earle, 2004).

Formalized choice methodologies stemming from economics were initially considered but were not used for several reasons. First, it was not felt that this context sufficiently satisfied the core assumptions of this approach. As Bateman et al. note, stated preference options are based on fundamental assumptions that "individuals have underlying preferences, which are clear, comprehensive, well behaved and reasonable stable" (2002, 378). As discussed above, based on the fluidity of justice perceptions demonstrated through social-psychological research we expected that the evaluations offered by subjects to be highly contextual and did not expect participants to have established or necessarily entirely coherent ideas about justice in the climate policy realm. Second, and related, at this stage of knowledge about public perceptions of justice we did not feel that we could pre-identify all the potential arguments about justice participants might make. Together these concerns led us to opt for a more exploratory design focused on being able to document and analyse the process participants used to grapple with the justice dilemmas posed.

The important part of this methodology was that both the quantitative and qualitative data was used to inform analysis. Each interview was recorded and transcribed in full. Qualitative data, often from focus groups (Bateman et al., 2002), is sometimes used to inform the design of choice experiments but in these cases these data are not considered valuable in and of themselves. In our case we felt that the qualitative data was essential, not only because it helps establish some baseline insights in a new area of enquiry but also so that the final quantitative resolutions to the policy decisions presented participants could be linked to the actual rationales participants used through this process. In a subject area as slippery as justice perception we did not want to assume that participants would necessarily link their rationales to quantitative responses in consistent or predictable (from the perspective of the researcher) ways. Careful attention to qualitative explanations of justice rationales helped ground the researchers' interpretations of participants' quantitative responses.

For this study we designed three policy dilemmas that highlighted key distributive justice arguments; one focused on mitigation and two on aspects of adaptation. These dilemmas were presented to participants who were asked to resolve them while thinking out loud. The dilemmas resulted in two types of information: quantitative resolutions to each dilemma and qualitative data that followed each participant's thought process as they considered the situation.

3.1. Dilemma design

In the mitigation dilemma participants were asked to allocate greenhouse-gas (GHG) emissions reductions across six countries.

This exercise explicitly explores the justice dilemmas inherent in trying to share an emissions reduction burden across parties characterized by vast differences in emission profiles, human development and relationships to the participants. There were two adaptation dilemmas designed to respond to the public policy trade-offs implicit in allocating funds to adaptation projects that vary across multiple dimensions. For instance, international recognition of the need for substantial adaptation funding has grown significantly and has been reflected in the last several years of United National Framework Convention on Climate Change decisions (UNFCCC, 2007, 2009, 2011). Within the UNFCCC framework pressure is placed on Annex-1 countries to provide this funding. However, Annex-1 countries may have domestic adaptation needs and obligations. How would their publics expect them to balance their international and domestic duties? In these participants were asked to (1) rank the priority of adaptation across five communities internationally, and (2) allocate financial obligations across stakeholders for adaptation in *each* of the five communities. The purpose of the first adaptation dilemmas was to explore how participants would make trade-offs between justice claims for competing resources across widely varied communities, while the second investigated the stability with which participants assigned responsibility to diverse actors in each of these communities.

All three dilemmas were informed by on-going justice debates in climate policy arenas and by the factors social-psychologists have suggested shape justice perceptions. The key factors highlighted in the dilemmas were distance (both social and physical), causality, equal burdens, equal entitlements, merit, need/ability, and identity role. Each theme was linked with information in the structured decision dilemmas (see Table 1). Causality is a particularly important argument in climate policy debates and was reflected through both country-level and per capita emissions levels as it was expected that these two frames could alter how participants assessed these data. Historical responsibility, reflected through cumulative emissions, is an important debate international but was not explicitly included in this study due to the sheer quantity of emission data already provided participants. This remains an area for further exploration.

Care was taken to provide parallel information in the mitigation and adaptation contexts to the extent possible to maintain focus on the comparison of rationales used in the two situations. The countries (Canada, United States, China, Russia, Finland, Bangladesh) and the communities (Delta, Tuktoyaktuk, Seattle, Shanghai, lower Ganges Delta) were chosen to mesh with each other and to exemplify a wide range of possible arguments about justice. Delta, British Columbia, Canada was where all participants lived, Tuktoyaktuk is a small community in the far north of Canada (spatially distant but within Canada), and Seattle is very close to Delta but across the Canada-US border. Shanghai and the lower Ganges Delta were chosen because they are large population centres with vulnerability to sea level rise and because many Delta residents are of Chinese or South Asian descent, thus possibly raising interesting questions about similarity of situation, as well as physical and social distance to these centres. In order to keep the dilemmas as simple as possible participants were asked to consider only one adaptation, building sea-walls. This simplification of adaptation was used because it is an action participants could understand and visualize. The focus here was less on the localized dynamics of specific adaptation projects, and more on the potential justice tensions triggered by local and international claims for funding.

The goal of the first adaptation scenario was to assess how different aspects of distance would contribute to the justice arguments participants saw as valid when faced with zero-sum trade-offs across locations. The second scenario looked at the extent to which the specific context of adaptation shaped participants ideas about who was responsible for addressing

Table 1
Summary of structured justice dilemma designs.

Context	Dilemma task	Justice arguments	Information provided ^a
Mitigation	(1) Divide an emission reduction burden (50% of group emissions) across Canada, United States, China, Russia, Bangladesh and Finland	Causality/Equal Burdens Merit/Equal Entitlements Need/Ability Distance Identity Role	National Emissions Per Capita Emissions Growth in Emissions Population Life Expectancy Income Per Capita Range of Countries Implicit (Canadian)
Adaptation	(2) Rank Delta BC, Seattle, Shanghai, Tuktoyaktuk, and lower Ganges delta in order of priority for receiving adaptation assistance to address sea level rise (3) Assign burden of financing sea wall adaptation construction across six possible stakeholders in each community: impacted residents, local government, national government, richest nations, other nations, and corporations	Causality/Equal Burdens Merit/Equal Entitlements Need/Ability Distance (social) Distance (spatial) Identity Role Cost-Effectiveness	National Emissions Per Capita Emissions Growth in Emissions Population Life Expectancy Income Per Capita Community Income Inequality Community Locations (inside/outside national bounds) Community Location (spatially nearby and distant) Participants ranked communities twice (from personal and international perspectives) Estimate of expense to protect community with a sea-wall

^a National emissions, per capita emissions, population, growth of emissions, income, and life-expectancy data came from the Human Development Index (2004). Measures of inequality are based on country GINI co-efficients (2004). Cost estimates were general (high, medium, low) and were based on the scale of the required project only.

adaptation. Are corporations as culpable for contributing to adaptation in Tuktoyaktuk as they are in Shanghai, and why or why not? How do perceived responsibilities of national states shift depending on which state and which community in this state requires adaptation?

In addition to the information provided participants (see Appendix A) a computerised budget tool was used to graphically facilitate participants' decisions. Each participant could iteratively assign and alter the obligations of each stakeholder until s/he was satisfied with the final division. This tool was used for the mitigation dilemma (Fig. 1) and for the five adaptation funding allocation dilemmas (one for each community). In the mitigation dilemma participants divided an emission burden across six countries. In the adaptation dilemmas participants allocated funding responsibility for building a sea wall across six stakeholders (impacted residents, local government, national government, richest nations, other nations, corporations) in each of the five communities.

3.2. Analytical strategy

This study generated two types of data. First, it yielded quantitative allocations of emission reduction (mitigation) and

financial burdens (adaptation), and rankings of communities to receive adaptation funding. Second, it elicited qualitative data tracing the arguments participants used to resolve these dilemmas. These qualitative data were analysed in terms of the order of arguments, the frequency of arguments, and the specific language used to express them. Appendix B presents an overview of the categorization of arguments for thematic qualitative analysis. Thematic qualitative analysis was conducted with the assistance of the Atlas.ti software.

In many cases it was possible that participants could use information to support multiple justice claims. For instance, noting a country's emissions can be used for arguments about merit, about causal responsibility, or about perceived economic vitality and thus ability to shoulder burdens. This possibility makes the think aloud portion of this study essential because it helped track the use of information to support particular justice arguments. Each participant's responses were recorded and fully transcribed. Subsequently each argument about justice was mapped in order for each participant which allowed the frequency of arguments to be tracked and which helped identify central concepts for particular individuals. Appendix C presents several examples of these maps as an illustration of how these data were systematized.

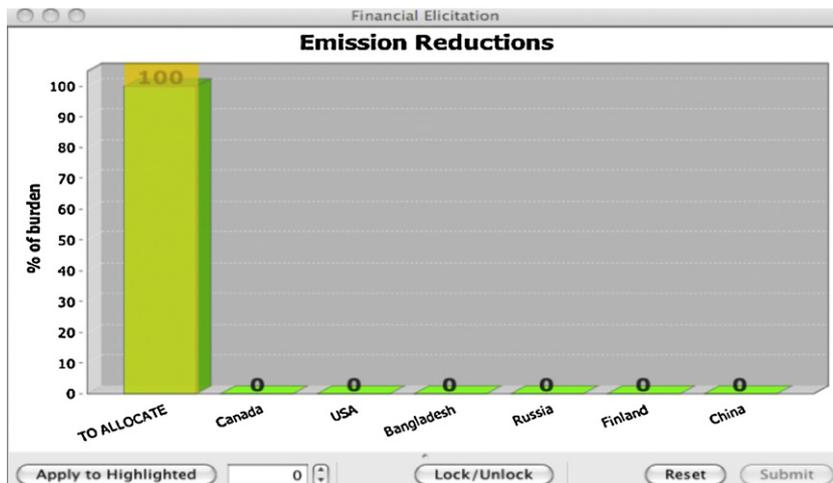


Fig. 1. Dynamic bar graph decision aid.

3.3. Participant selection

In total 25 people were interviewed after careful piloting. Twelve previous pilot studies revealed a number of distinct justice arguments likely to be employed by the public in solving the dilemmas. The identical set of justice arguments was repeated by the 15th interview in Delta. We conducted a further 10 interviews to explore any additional argumentation, but none were found. Since the goal of the study was to observe in detail how justice arguments get used in these two contexts this was considered a sufficient sample size but is not necessarily representative of the public at large. We do not claim any representative implications for our findings based on our small sample size however, we think that our results point to several important considerations for further research on justice perceptions within the climate change policy space, and for policy makers interested in assessing public opinion.

The participants for this study were all residents of Delta. Delta is a municipality of 97 000 people on the Fraser River delta along the south coast of British Columbia (BC). Delta was chosen because it is vulnerable to sea-level rise. In 2003 beachfront homes were damaged by storm surges and the local council has subsequently invested in public education about climate change. Delta is already protected by dykes and there has been discussion of sea-wall construction in the area. It was hoped that the tangible experience of climate change risks would make the policy trade-offs, especially of adaptation, more realistic to participants. In addition, it was hoped that this approach would reduce the potential biases towards heightened concern for distant or abstract others that could emerge from focussing only on unknown or abstract risks. This study cannot be considered representative of the larger 'public' which would include people not at risk of flooding due to their residence location. It was decided that this did not negate the benefits of having participants more likely to see the dilemmas as potentially real situations.

Participants were recruited through the community newspaper and were offered an honorarium. Each interview lasted between

1.5 and 2 h. The benefits of offering an honorarium were that more people were recruited than was necessary so that the greatest diversity of participants could be ensured, and that people who had fulltime jobs felt that participating would be worth their time. This resulted in a diverse sample relatively close to the larger community's demographics (Table 2).

The categories of census data in Table 2 do not match the demographics categories used in this study. Age ranges in the census do not start at 18 but instead have a category of 20–24. The census data have therefore been adjusted to reflect the same age classes as used here based on the same demographic profile as found in Delta BC (participants had to be over 18). Similarly, education levels reported in the study also vary from census categories. The data for no diploma is used to estimate the less than and grade equivalent, while all apprenticeship, college and university levels have been agglomerated. No data exist for graduate degrees at the census level. Percentages of census data have been generated by using the proportion of people at each level from the total number of people aged 15 and above (thus resulting in lower proportions for higher educational attainment).

4. Results

4.1. Mitigation

As seen in Fig. 2 the quantitative data suggests that participants are likely using some ideas about causal responsibility for emissions, and perhaps, ability to pay. These initial results resonate with other studies on public justice evaluations of mitigation burdens (Dietz and Atkinson, 2010; Cai et al., 2010). The United States can be characterized as having contributed a large proportion of global GHGs and as having sufficient wealth to make changes. Similarly, an allocation which gives Bangladesh, the country with lowest per capita emissions and GDP in the group, the least responsibility for emission reductions seems reasonable. However, the think-aloud protocol revealed more sophisticated reasoning, and a greater

Table 2
Demographics of study compared to local community of Delta in general.

Category		Number of people (% of sample in brackets)	% of Delta
Gender	Male	11 (44%)	49
	Female	14 (56%)	51
Age	18–24 years	0	8.5
	25–34 years	0	12.7
	35–54 years	11 (44%)	43
	55–60 years	10 (40%)	23
	Over 70 years	4 (16%)	12
Education	Less than grade 8	1 (4%)	17
	Grade 8	0	
	High school	2 (8%)	30
	College	15 (60%)	52
	Graduate degree	7 (28%)	
Income	0–\$35 000	6 (24%)	median income is \$77 966
	\$36 000–\$72 000	9 (36%)	
	\$73 000–\$118 000	3 (12%)	
	Over \$118 000	4 (16%)	
	Na	3 (12%)	
Years of residency	0–3 years	3 (12%)	94% lived at same address 5 years ago
	3–5 years	4 (16%)	
	5–10 years	3 (12%)	
	10–20 years	5 (20%)	
	Over 20 years	9 (36%)	
Parent	Yes	20 (80%)	na
	No	5 (20%)	
Visible minority	Yes	7 (28%)	27
	No	18 (72%)	73

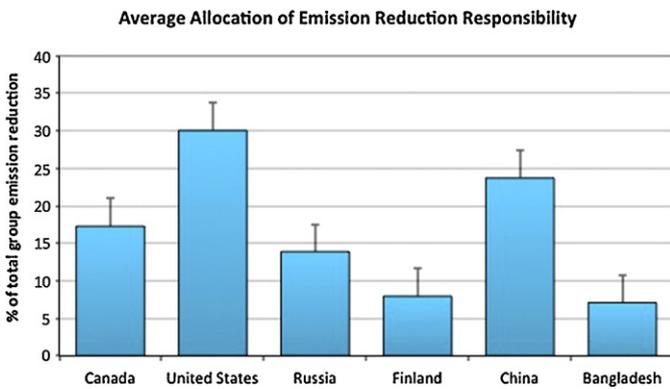


Fig. 2. Allocations of reduction burdens across six countries.

diversity of argumentation, than would have otherwise been visible through quantitative allocations alone.

Several patterns emerge when the rationales used in the mitigation context are examined in more depth qualitatively. First, causation is of central importance to participants in the mitigation context. Some element of causality involving per capita or national emissions was the first argument used by 18 of 25 participants when resolving the dilemma. All but one participant considered it at some point in this exercise.

In many cases causality was seen as a direct link between emissions and responsibility for mitigation. This participant's comments are typical of this almost ubiquitous approach; "if one country is responsible for creating the mess, you [the country] are jolly well responsible for clearing up your mess". However, causal arguments were also used more subtly. Arguments about merit or deservingness were extremely important in this sense and came up in several ways. These arguments have not previously been included in studies of justice and climate change perceptions, but were clearly important to many participants in this study. Participants' used their judgements about countries' perceived attitudes towards emissions to link deservingness and causality. Four of 25 participants made comments about the attitude of the countries in question. A good example of this was seen when a participant assigned China a large emission reduction burden based on the perception that they closed their "dirty" industries during the Beijing Olympics only because international pressure forced them to:

I'm sure if they figured that they could have gotten away with [not closing their industries] without anyone noticing they would not have done that. It is as simple as that, you know? It's covering your butt. They have to, I'm sorry, but they need to be punished, you know?

Perceptions of attitude were expressed in a diversity of ways. For instance, three of 25 participants made comments about the extent to which some countries should know better, such as, "[Canadians] still have not done enough [to reduce emissions] because we know better." Emission trajectories were also often included in these discussions. Six of 25 participants used emission growth rates to help assign reduction burdens based on the argument that rapid growth suggested a lack of concern about climate change. For example, only one participant thought that Bangladesh should not reduce any emissions despite their human development needs, and their rapid emissions growth was usually the rationale for this view. This logic was also used to reward countries seen as being proactive. Several participants did not assign Russia large emission reduction burdens because "it was going the right way". Participants did not appear to know the reasons behind Russia's reduced emissions and this information was not provided. What is important here is that

perceived deservingness shaped the burdens allocated in the mitigation dilemma. As was seen repeatedly, discussions about causality frequently spilled out beyond a focus on emissions and included a wide range of perceptions about countries' merit as displayed through a range of behaviours. This highlights the difficulty of cleanly linking particular quantitative allocations to justice arguments.

Similarly, countries' reason for emitting was also an important factor for participants. For instance, six participants used waste explicitly in their rationales for allocating burdens. As this participant stated, "Canada pollutes a lot and it wastes a lot. It has the most amount of waste of countries per capita. So I think that Canada should cut 30%". The reverse argument was that countries whose emissions are seen as necessary should not bear heavy reductions. In a sense they are seen as more deserving, because their emissions are less bad. This is clearly observed in the following statement;

What [Bangladesh is] doing at the moment right now is just trying to raise the level of standard of living or whatever you call it, you can't condemn their emissions that much because they are just at survival at the moment. Well, that is exactly the opposite in like say the United States or Canada for that matter. We have more than what we are required per person, in terms of consumption, which leads to emissions or whatever. So the US and Canada, they have a lot to answer for.

This differentiation, along with participants' observations about countries' attitudes, draws attention to the importance of perceived deservingness which is an argument often excluded from discussions of distributive justice and climate change but which is well established social psychology of justice research (Heider, 1958; Walster and Walster, 1975; Hafer and Olson, 2003). It is important to note that perceptions of deservingness stem from wide reaching observations, and are not focused solely on greenhouse gas emissions. The range of factors considered relevant by the participants in this study highlight the multi-dimensionality of public perceptions about climate policy questions – greenhouse gas emissions are not the only metric of interest to the public.

Despite the importance of causation and deservingness, the perceived ability of countries to reduce emissions (typically linked to income) was an argument used by over half of the participants in this study. As one participant argued; "the same rules applied to developed countries cannot apply [to developing nations] because they don't have the wealth to do it [i.e. reduce emissions] as much as developed countries." Notably no participants stayed strictly within an ability framework but used it to modify causal arguments, presenting yet another case in which it would have been difficult to interpret participant's use of these arguments without the qualitative data. The use of ability to modify causal arguments often emerged in the argument that Bangladesh "should cut [emissions] as they are producing things, but they don't have enough money". Similarly, China was seen as "a toughie" because of its low per capita GDP but large and growing emission profile, which pit causality and ability against each other.

Finally, the idea of equal burdens was often included in allocations although it was rarely a dominant theme. Assigning two or more countries identical allocations was one way this emerged. Just over half of participants tied at least two countries during the mitigation exercise, making comments like, "overall I think that Canada, the US and Russia are all the same". In some situations, like the one suggested by this quotation, matching countries could have been a strategy for simplifying the decision-context, in effect demonstrating the use of an heuristic to make a complicated situation more tractable (Messick and Schell, 1992). However, participants often provided a rationale

for this perceived equality which provides insight into how they interpreted the relationships of the countries. For example, by arguing that the “US and Canada should be equal or thereabouts equal. Because they are trading partners with NAFTA [the North American Free Trade Agreement], they are partners in this whole thing, so [they are] equal players”, this participant was using the social and economic context of countries to categorize how they should be treated. The use of country matching is a way to simplify the situation, but the reasons used in this process help clarify how participants were doing this simplification, a process which might have been less visible if relying only on quantitative data.

The equal burdens argument also played out in more subtle ways. For example, most participants appeared to see mitigation as a global collective action problem. As one participant stated, “everybody is involved as sort of helping [climate change] or making it worse”. Six of 25 participants felt that countries with higher populations should reduce more, not because they caused more emissions but to make the emission reduction burden more equal per capita. The implications of dividing the global burden equally per capita is nicely illustrated by this participant’s comment; “if everyone is sort of doing their part China and the States need to do more than the lion’s share, Bangladesh and Russia need to do a reasonable amount”.

The use of a collective action framing resonates with findings from other studies which have emphasized the importance of public perceptions that others, often governments or corporations, are also contributing to emission reductions as a precondition for actions themselves (Darier and Schüle, 1999; Lorenzoni and Pidgeon, 2006). However, if the mitigation is perceived as a global collective burden, using per capita emissions as a metric can lead to what would be strongly regressive emission reduction allocations. It is possible that inclusion of cumulative emissions data might have shifted these allocations as it would have drawn attention to the historical nature of mitigation requirements. However, it is notable that only one participant assigned Bangladesh zero emission reductions despite widespread recognition of their human development needs and negligible per capita emissions.

As is not surprising based on previous evidence, overall the dominant argument about justice in the mitigation context is causality. All but one participant mentioned it at least once, and it was often the first argument used. However, other important arguments included ability, deservingness, and equal burdens. The use of multiple arguments simultaneously, and the active process of modifying one argument by using another demonstrates the active engagement participants in this study had with the dilemmas, and draws attention to the complexity of public justice perceptions in this field.

4.2. Adaptation

As discussed earlier, the only studies that have explicitly examined justice perceptions in the climate change context looked exclusively at adaptation (Dietz and Atkinson, 2010; Cai et al., 2010). This study included two sets of dilemmas to explore perceptions of justice in the adaptation context. The first adaptation dilemma forced participants to make trade-offs across communities. Based on social–psychology of justice theories of distance and boundary setting (Opatow, 1994), this dilemma was designed to investigate the role of relationships and distance in shaping participants’ ideas of justice in relation to the provision of adaptation funding. This dilemma was presented to participants twice – they were first asked to rank communities in order of priority to receive funding as though the participant him/herself was contributing money to the cause. Participants were then asked to repeat the ranking, this time from the perspective of a representative from an international funding body. Asking

participants to do this from the two perspectives stemmed from arguments from social–psychological that identify roles are crucial in determining justice perceptions (Deutsch, 1975; Fiske and Tetlock, 1997; Skitka, 2003; Wenzel, 2001, 2004). Altering the identify roles in this dilemmas aimed to identify the extent to which explicitly manipulated identity roles would shift arguments about distance and justice within the same set of adaptation trade-offs. The second set of dilemmas asked participants to allocate responsibility for funding an adaptation in each of the five communities as though the decision to do the adaptation had already been taken. This dilemma was designed to identify differences in the way that participants viewed obligations within specific adaptation contexts and across stakeholders.

4.2.1. Adaptation ranking

When asked to rank communities in order or priority for receiving adaptation funding from a personal perspective two-thirds of participants placed their home-town of Delta first (Fig. 3) based primarily on arguments that “charity begins at home”. Tuktoyaktuk was most commonly given second place because it too is located in Canada and participants felt special obligations to other Canadians, even if they had no personal experience of Tuktoyaktuk. However, Seattle was also commonly ranked second due to its spatial proximity. The competition between social and physical claims of proximity was articulated by this participant who felt that in Tuktoyaktuk “they are practically our own people, so we have to protect each other” but ended up choosing Seattle because “we are like twins. We are stuck together”. As would be suggested by theories of moral exclusion (Opatow and Weiss, 2000), these results indicated the importance of the boundaries of consideration used to adjudicate perceptions of justice when forced to make trade-offs across communities.

However, a third of participants placed the lower Ganges or Shanghai first. The argument used in these cases was that global need was the correct moral consideration and should trump the special relationships of spatial or social closeness. Explicit awareness of the tension between concerns for those with whom one has special relationships, and the global claims of need was repeatedly expressed. For instance, after grappling with this dilemma one participant decided “to take the *moral high ground* and say that the most vulnerable, most highly populated, countries should get the most support.” Throughout the personal form of the ranking exercise 21 of 25 participants explicitly considered arguments about “home” which highlights the importance of special relationships in shaping obligations.

The rankings changed dramatically in the international frame of reference (Fig. 4). Delta and Tuktoyaktuk shifted to 4th and 5th

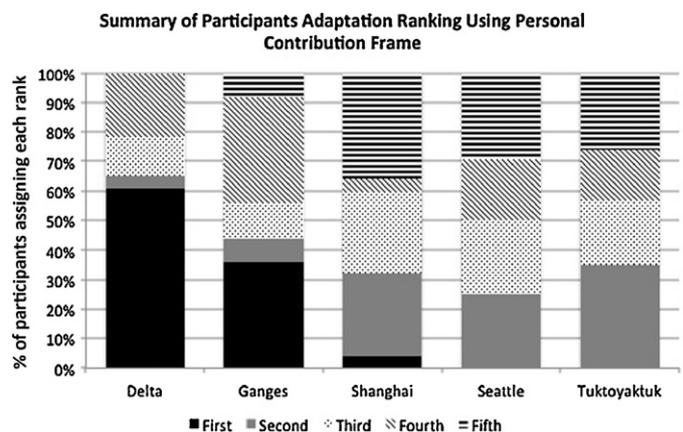


Fig. 3. Summary of participants’ adaptation rankings by community when making personal contributions to an adaptation fund.

places, while Bangladesh or Shanghai became participant’s top priorities. When shifted to the international framework participants in this study depended heavily on arguments about relative need and often used a utilitarian estimate of the number of people affected by adaptation risks to guide their rankings. This explanation was typical:

[Shanghai and Bangladesh] have huge populations, and they will be affected by climate change by floods and raises of sea level. Delta, it has a very small population, and Tuktoyaktuk has only 1000. Seattle has a large population, but they can move somewhere else. In Shanghai and in Bangladesh they are hooked, they have nowhere to move. So those would be my priorities if I was the head of the UN.

From this perspective partiality to their own community was not seen as an appropriate response and participants in this study relied on universal measures like population. Cost-effectiveness was occasionally considered in this ranking exercise. Ten of 25 participants used arguments about cost effectiveness, but typically these were brief and were used only in this portion of the interview. Here the concern was entirely with how to “get the most bang for your buck”. The finding that cost-effectiveness appears almost solely when participants were using an international identity role reinforces the emphasis participants placed on quantifiable, numerical measures when thinking at the international level.

Importantly, and in contrast to the mitigation dilemmas, no participants discussed causality or equal burdens during the ranking exercises. Instead participants’ reasoning processes hinged on tensions between special obligations engendered through physical or social proximity, and claims of need beyond these boundaries. The sensitivity of the responses of participants in this exploratory study to the degree of distance included in the policy context provides further insight into the somewhat confusing observations about the degree of public concern stemming from other public perception studies. As discussed earlier when asked to indicate concerns about climate change in general, as a global abstract concept, member of the lay public repeatedly tend to express most concern for those far away (Leiserowitz, 2005; Lorenzoni and Pidgeon, 2006; Vignola et al., 2012). However, when faced with specific impacts, some evidence is starting to appear that suggests people do place higher concern on these local threats (McFarlane and Witson, 2008). The exploratory exercises included in this study highlight the importance of explicitly identifying the exact policy context within climate change that is being addressed: the challenges of scale and distance are likely to shape the kinds of justice arguments and concerns the public will express.

4.2.2. Adaptation allocations

The second set of adaptation exercises focused on allocating responsibility to provide funding for adaptations in each of the communities. The purpose of this set of dilemmas was to understand how participants’ ideas about justice responded to shifts in context. Does the Canadian government have the same obligations to Delta and Tuktoyaktuk? Do corporate responsibilities stay constant across communities, or are they seen to differ? Consistent differences in funding obligations across locations emerged (Fig. 5). Rich nations were assigned the bulk of the adaptation costs in the lower Ganges, with secondary support flowing from their own national government and corporations. However, rich nations were expected to provide a small fraction of costs in Delta or Seattle, while national and local governments carried the largest burden. In addition, immediately affected residents in Delta and Seattle bore more obligations than those in the lower Ganges or Tuktoyaktuk. A Hotelling T test was used to test significance of all means. All five locations were significant at the 95% level.

When this initial assessment is further probed by qualitative data analysis it becomes clear that ability was the dominant frame for adaptation burden sharing. The most common argument used by participants in the adaptation allocations was that stakeholders with greater ability should bear more adaptation costs. As one participant summarized, “the simple logic here is whether the nation is a richer nation, [if yes] they pay for themselves, and when it is a poorer nation they get help from someone else”. Comments focused directly on the presence or absence of financial ability accounted for 35% of the total reasons (each participant listed multiple reasons) considered in this exercise, and was the first set of reasons considered by 40% of participants.

Financial means were important in discussions of ability but ability was also sometimes framed as the ability to play a role in decision-making. As this participant argues, “you don’t always have to monetarily contribute, [stakeholders] could contribute in different ways”. ‘Token’ allocations of funding burdens were a common way of symbolically involving those without financial means in decision-making. For example, over half of the participants allocated between 1% and 3% of adaptation responsibility to a given stakeholder, such as impacted residents, during the allocation exercises. One rationale behind this was that if stakeholders are asked to pay nothing they will expect to have things provided for free. A second argument was that even small contributions ensure engagement. For example, while discussing impacted residents in the lower Ganges this participant argued: “I’m not sure that I don’t want them to not pay anything because they need to be engaged in some way.”

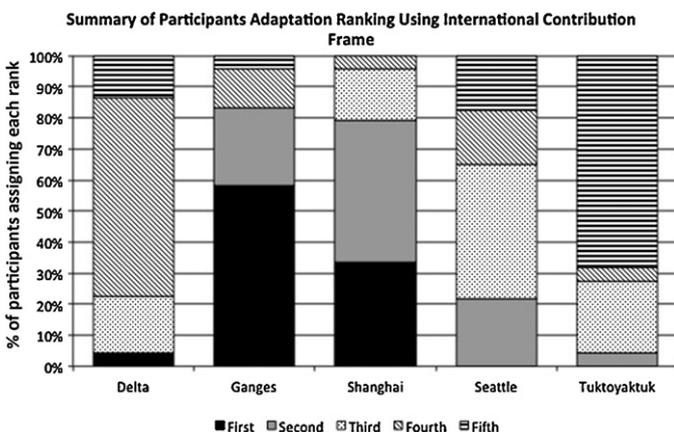


Fig. 4. Summary of participants’ adaptation ranking by community when asked to allocate funds from an international funding body.

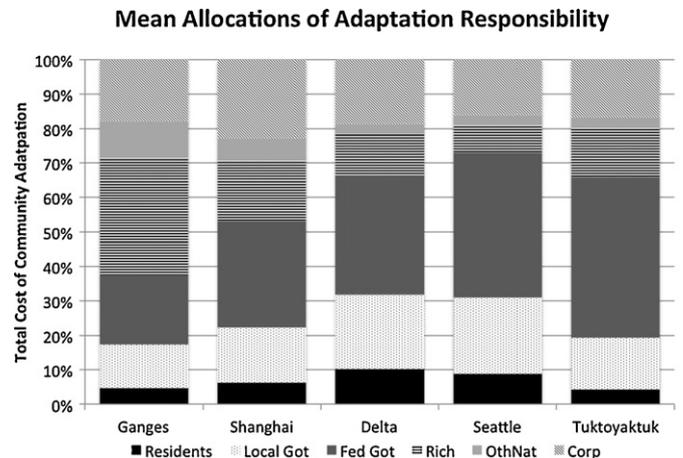


Fig. 5. Mean allocations for adaptation payments by stakeholder for five locations.

As with the first set of adaptation exercises, the idea that relationships engender special obligations was a second major argument. However, while the earlier exercise highlighted the role that direct social or physical distances tended to play in participants' judgements of obligations, the logic repeatedly used in this dilemma was that those who have benefitted in the past from activities in a given area bear extra responsibilities towards it. For instance, as one participant argued, "if Dell goes into Bangladesh because they can produce this computer for 1/18th of what they can produce in North America, then they are responsible for improving the environment there". As is suggested by this quotation, discussions of the obligations that former benefits create were particularly linked to corporations, although 3 participants also referred to ideas of colonialism and exploitation of developing countries. The message from these considerations is that special obligations stem from relationships mediated by economic ties. Focusing on economic ties as a mediator of obligations is a slight different variation of the earlier emphasis on shared nationality and proximity, but still places understandings of the nature of relationships once again at the heart of justice evaluations.

Recognition that special obligations flow from formalized relationship – either through the provision of benefits or through institutional structures – was also expressed as expectations that countries or communities had a basic moral responsibility for taking care of their own constituents. One participant's comment is typical of this argument: "the people that live there should put in something because they do live there, but you know, I don't know what to say... [laughing awkwardly and holding out his hands to indicate how obvious this is]". In every community allocation the stakeholder most commonly considered first was the national government, a pattern typically explained with comments such as "the United States federal government should be responsible for caring for its citizens". In several instances, particularly with Bangladesh, participants initially considered the responsibility of national governments to care for their citizens, highlighting the responsibility this level of government was morally assigned, but reverted to arguments about need and ability, underlining the importance of these justice considerations in adaptation contexts.

Casual responsibility was a much less important theme for participants in the adaptation context than it had been for mitigation. 44% of participants made reference to direct causation but it was almost never the dominant argument. Notably causation in its most direct form was often linked to corporations. For instance, participants commented that corporations bore obligations because they "have contributed so much pollution".

Some elements of causality were more commonly linked to merit or deservingness which highlights how difficult it can be to directly link particular metrics with the arguments for justice used by participants *ex ante*. One manifestation of this was the idea of general carelessness. This is seen in comments like, "they [China] really don't care about the environment so they should be held to task". This general principle was nicely summed up by a participant who argued that "the attitude of the country that is going to be assisted" was essential in determining adaptation assistance. Put simply, "they have to be very sincere in wanting to change" if assistance is to be granted.

Similarly, many participants felt that those who are innocent were more deserving than those who were not. In several cases innocence was defined as having absolutely no causal connection to the problem at all and very little choice. For example, in the case of Tuktoyaktuk one person argued:

I think we are causing the problem for them so I think the Canadian federal government [should be responsible]. I can't see them [the local government] taking responsibility for anything because these

poor people haven't done anything wrong, they have done very little up there to ruin things.

The reverse argument was used for communities like Delta and Seattle where it was argued that people living here have "accepted the risk of living in an area that is going to be flooded slowly." These residents are not completely innocent and are expected to pay more of their adaptation costs themselves. Interestingly, although these judgements often contained reference to the ideas of waste or consumption, they were not directly linked to per capita emissions levels. The idea of choice was one that emerged without any explicit prompting through the provision of information – there was no index of voluntariness for instance – but is important to the idea of innocence used in these arguments.

As discussed throughout, these results are exploratory but provide some first glimpses into adaptation-specific experimental investigations of public perceptions of justice. It is striking that across participants the key arguments from an adaptation perspective are ability/need and recognition of special obligations flowing from relationships. The idea of ability or need has emerged in studies of public perceptions of mitigation, but the importance of public perceptions of relationships and the obligations that flow from these has been largely overlooked in previous studies of climate change perceptions. Not only did participant's understanding of the relationships embedded in adaptation dilemmas shape how they allocated adaptation resources across communities, but also did this contribute to their assessments of who should bear which burdens in particular communities. This systematic finding draws attention to the need to pay attention to the larger context being used to communicate climate change policy or to evaluate public responses to it.

5. Discussion

Participants in this study used different arguments in mitigation and adaptation contexts. Fig. 6 presents a summary of the frequency with which justice arguments were used by participants while resolving these dilemmas. These relative frequencies were generated by adding up each reference to each argument and then dividing by the total number of arguments used in each context. They do not add to 100 because some individuals mentioned arguments more than once.

One of the major overarching observations about these findings is that participants almost always used multiple arguments about justice in these contexts. Only 2 of 25 participants thought only one argument about justice was sufficient in any of the dilemmas. This observation highlights the complexity of the responses of the participants in this study. The quantitative results were not quick, off the top of head responses, but emerged through a process of reflection and engagement with the specific characteristics of the context and stakeholders involved in each dilemma. The reflective nature of participant's thought processes was made visible through the qualitative data and sequential mapping of justice arguments as each participant made them.

Previous work has long highlighted the communication difficulties posed by global environmental issues (Hincliffe, 1996; Myers and Macnaghten, 1998), and psychologists working on climate change perceptions have articulately identified key reasons why climate change "does not scare us" (Weber, 2006). The lack of research explicitly exploring public perceptions of justice could stem from assumptions that the public cannot meaningfully engage with the complexities of justice in climate change or other global policy questions.

The richness of participants' reasoning processes in this exploratory study demonstrates that, when provided information and a supportive venue, members of the public are capable of

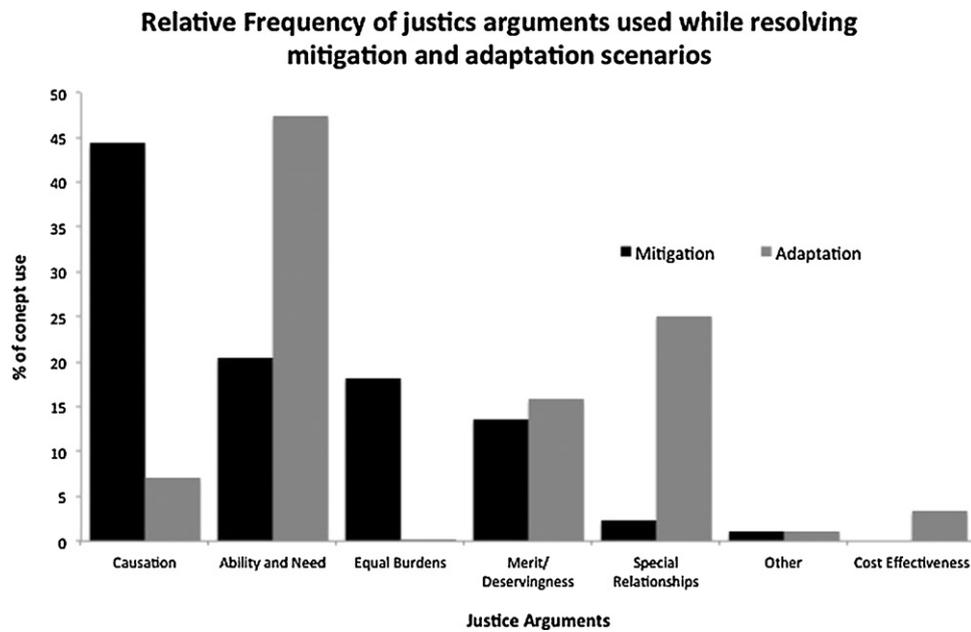


Fig. 6. Relative frequency of justice arguments used when resolving mitigation and adaptation dilemmas.

grappling with the multidimensional challenges of climate policy without overly simplifying the depth and range of dilemmas it presents. However, it is possible that a study design that did not include qualitative data might have missed the complexity displayed by participants. This exploratory study underlines the need for public opinion research that allows participants to express multiple approaches to justice, especially for multi-dimensional issues such as climate change in which specific policy responses are couched in different sets of relationships and acknowledged obligations.

Second, despite their recognition of the complexity of the justice issues, the participants in this study systematically differentiated among the arguments for justice they considered more appropriate in the specific policy dilemmas. As demonstrated (Fig. 6), the most striking difference among the two sets of dilemmas was that causation is the primary frame of reference in the mitigation context, but arguments about need or ability are central for adaptation. Similarly, an equal burden framework is important in the mitigation context but is absent from an adaptation perspective. The sensitivity to context observed in this study fits well with theories from the social-psychology of justice which stress the centrality of people's understandings of any situation in determining their approach to justice (Deutsch, 1975; Opatow, 1994; Tyler, 1997). Attention to public sensitivity to context is important because even within the small sample size included in this study, it was repeatedly demonstrated that different narratives or arguments about justice directly contributed to the distributions of obligations or assistance participants considered acceptable.

For instance, equal burdens arguments were often used to highlight the global nature of the mitigation problem and stressed equal per capita obligations for collective action. This argument often resulted in higher obligations for countries like Bangladesh or China based on their populations alone, and identifies the power of arguments about collective action for "global climate change" to minimize other justice claims. In contrast, in the adaptation context, distance and special relationships become more important and equal burdens are almost never mentioned. From this perspective climate change was not about global collective action. Instead participants balanced obligations to different stakeholders based on specific relationships. While the specific allocations

emerging from this study cannot be considered representative, the sensitivity of participants' reasoning processes to changes in context is an important finding.

Third, as stressed by others (Wenzel, 2001, 2004), the identity role assumed by participants contributed to the ideas of justice they used in this study. Even in the relatively crude shifts in identity incorporated in this exploratory study, it was routinely observed that participants used different arguments to justify ranking communities for adaptation assistance depending on which identity role they were using – their individual capacity or as a decision maker in an international organization. In this study participants relied on metrics of need, vulnerability and total numbers of affected people in order to allocate scarce resources in an international frame of reference. In contrast, when asked to think about adaptation needs from a personal perspective roughly two-thirds of participants gave preference to the needs of those socially or physically close. The sensitivity of justice argumentation to the identity frameworks aroused through the dilemma designs in this study highlights the need to make implied identity roles of participants explicit – especially in an area as complex as climate change policy. Are study subjects asked to complete public opinion surveys as individuals, city residents, national citizens, global citizens or using some other aspect of their identity? For issues such as justice perceptions, it is likely that these roles are crucial in shaping public responses to polls and surveys.

Fourth, even though the idea of merit or deservingness has not previously been included in climate change perception studies, it emerged as an important theme for both mitigation and adaptation. In both contexts it includes arguments based on perceived carelessness, intentionality and the attitude exhibited by the stakeholder in question. These arguments resonate with the importance social-psychological studies place on relationships and social context for determining justice perceptions (Deutsch, 1975; Tyler, 1997; Opatow and Weiss, 2000) and remind us that judgments about justice involve more than cool-headed accounting of costs and benefits, or of causation and obligation. More amorphous aspects, such as perceived attitudes or acknowledgement of norms, are crucial in public approaches to these dilemmas. We suggest that better integration of insights from social-psychology work would be a fruitful for further work on public perceptions of climate change generally.

Finally, it becomes clear through the analysis that the combination of quantitative and qualitative data is important for understanding people's perceptions of justice dimensions. In many cases the quantitative allocation data alone would have obscured the diversity of justice reasoning. In some situations the same numeric burden allocations were associated with very different reasoning. This observation suggests that research methodologies should be sensitive to the difficulties of capturing justice perceptions in similarly complex or multi-dimensional contexts and is an area for further study itself.

6. Conclusions

This exploratory study was designed to provide a useful basis for further work on the important question of public perceptions of justice in the climate change policy arena. We are not claiming our results to be representative of the public in general but the consistency of several results bring attention to several crucial issues for further consideration as research on public perceptions of climate change policy continues to develop.

First, this study shows that members of the lay public evaluate justice claims differently in adaptation and mitigation policy contexts. This study does not claim representativeness for a region or nation; it sought a diverse sample of individuals from a municipality to identify the breadth of arguments that members of the public might use in adaptation and mitigation contexts, and to observe how these arguments were applied and used. It found that causation is a key concern from a mitigation perspective, while arguments about ability and need are much more powerful in adaptation contexts. Similarly, ideas about equal burdens were important in mitigation, but issues of distance were more central in adaptation dilemmas. Equally important, most participants integrated multiple claims to justice, including arguments about merit, equal burdens, and special obligations due to special relationships which demonstrates the ability of the participants in this study to engage with the complexity of the issues.

These findings have implications for research on public perceptions of climate change, and for climate change policy. First, there have been on-going arguments about the ideal relationship between mitigation and adaptation (Tol, 2005; Bizikova et al., 2007; Swart and Raes, 2007; Yohe and Strzepek, 2007). This study illustrates that the underlying rationales respected by the public may differ across the two contexts. One implication is that it may be difficult to get public acceptance for transitioning from one frame of reference to the other bringing further emphasis to the need to treat them as complements as opposed to substitutes. Similarly, policy approaches seeking integration could also run into difficulties if public approaches

to mitigation and adaptation are at odds with each other in particular circumstances. Public communication about either of these aspects of climate change may want to consider the underlying arguments about justice most likely considered valid in the particular situation.

Second, differentiation of public arguments about justice between mitigation and adaptation suggests that public opinion research needs to be more explicit about the sub-components of "climate change" included in studies. The mitigation and adaptation context included in this study are just possible lenses for climate policy, but there are many other ways of approaching the core issues that need to be addressed. Different aspects of climate change policy are likely to resonate differently with the public, which is important information for policy makers considering particular options. Similarly, sensitivity to relatively coarse manipulation of identity roles in the adaptation prioritization exercise echoes Sagoff's (1998) suggestion that people may approach environmental valuation differently as consumers or citizens. This suggests that in a multi-scalar issue like climate change it is important to make identity roles explicit in the elicitation of opinions or values. This study was a first attempt at exploring out some of these variations but this remains an area ripe for further exploration.

Public acceptance is not the sole factor considered by policy makers, but policies not predicted to be politically feasible are unlikely to be seriously considered. This study identified the basic contours of public perceptions of justice across both mitigation adaptation contexts, but it is only the beginning of the research needed as we grapple with the messy and difficult trade-offs presented by climate change policy locally and globally. Henry Shue famously argued that in the climate change context debates about justice are unavoidable (1992). This may be true, but research on public perceptions of justice in this area may help structure policies that are socially accepted, implementable and ultimately more effective.

Acknowledgements

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Appendix A

Tables 3 and 4

Table 3

Information provided to participants for mitigation dilemma.

	Canada	United States	Finland	Russia	China	Bangladesh
<i>Mitigation Dilemma:</i> Internationally countries are in the process of deciding how to deal with climate change. Climate change is linked to the emission of greenhouse gases such as carbon dioxide and methane. These gases are emitted through the use of fossil fuels such as oil and coal and agriculture, all of which have historically driven industrialization and wealth production. Below are several countries that represent the range of countries globally. Some basic information about each country has been provided. According to the Intergovernmental Panel on Climate Change, if we want to keep climate change within a range that will avoid extreme consequences, we will likely have to reduce global emissions by at least 50% of total current global emissions. Based on this, please think about how emission reductions should be shared.						
Population in millions (2007)	32.9	303.9	5.3	141.9	1331.4	147.1
Per capita emissions (tCO ₂)	20	21	12.6	10.6	3.8	0.3
National emissions (MtCO ₂)	639.0	6045.8	65.8	1524.1	5007.1	37.1
% ANNUAL change in emissions 1990–2004	+3.8	+1.8	+2	-1.9	+7.8	+10.1
\$GDP/kg emissions per capita (i.e. \$ of wealth created for each kg of emissions produced)	2.0	2.4	3.0	2.2	2.1	8.2
Life expectancy (years)	80.3	77.9	78.9	60.5	72.5	63.1
GDP per capita (Can \$)	40000	50000	38500	24000	8000	2500

Table 4
Information provided to participants for adaptation dilemmas.

	Delta B.C.	Tuktoyaktuk	Seattle	Lower Ganges Delta in Bangladesh	Shanghai
Key aspects	<ul style="list-style-type: none"> • Growing community near Vancouver (a major centre) • Significant agricultural population 	<ul style="list-style-type: none"> • Large aboriginal Canadian community • Canada's most northern mainland community 	<ul style="list-style-type: none"> • Largest city in Washington State • Major port and economic centre 	<ul style="list-style-type: none"> • Large rural agricultural population • Several large towns 	<ul style="list-style-type: none"> • One of the fastest growing urban regions in the world • On the Yangtze River delta.
Landscape features	Wetlands Agricultural areas	Tundra Wildlife areas	Temperate Rainforest	Mangrove wetlands Agricultural areas	Wetlands
Population	97 000	1000	3.4 million	17 million	20 million
Per capita income	High	Medium	High	Low	Low
Emissions/capita	High	High	High	Low	Low-medium
Relative income inequality	Low	Low	Medium	Low	Medium
Life expectancy	High	Medium-High	High	Low	Medium
Relative cost of protection/capita	Low	Medium	Low	High	Medium

Appendix B

Table 5

Table 5
Definitions of justice arguments used in qualitative data coding.

Key justice arguments	Definitions of justice arguments used in coding
Causality	Arguments that link levels of emissions directly with responsibility to reduce emissions.
Ability/need	Arguments that claim that those who are unable to bear costs should not be asked to. Also includes arguments that those who have few resources may need help from others in order to bear costs (such as adaptation costs). Due to the integrated nature of arguments about need and ability they were combined into one category.
Merit/deservingness	Arguments that explicitly evaluate how deserving stakeholders as a means of assigning costs or assistance. This includes ideas of virtue, bad behaviour, punishment and rewards.
Equal burdens	Arguments that all stakeholders should bear equal costs.
Special relationships	Arguments that claim special consideration for particular stakeholders because of the relationships between stakeholders or between the participant and the stakeholder. This category includes claims that countries owe special assistance to those within their bounds, that physical boundaries of communities result in special obligations or that other social or economic ties result in special obligations.
Cost effectiveness	Arguments that focus on how to get the greatest overall good by using resources most efficiently.

Appendix C

Fig. 7

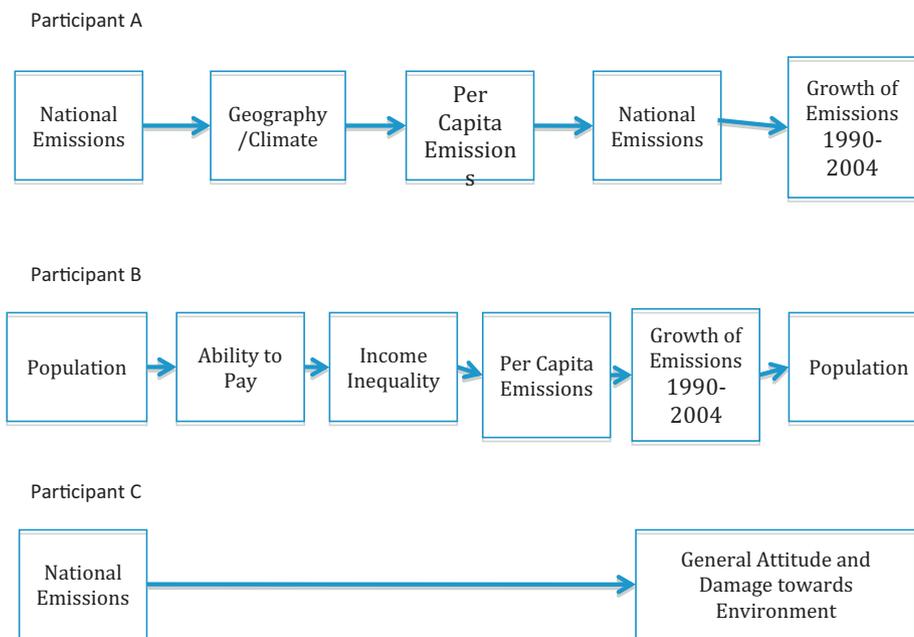


Fig. 7. Examples of thought maps from three participants.

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