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How Decisions Are Being Made: Methods in Selecting Adaptation Actions

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Methods in Selecting Adaptation Actions: How Decisions Are Being Made

Executive Summary

Adaptation to the actual and expected effects of climate change is a necessary means to reduce the impacts that are occurring now as well as increase society's resilience to upcoming atmospheric deviations (UNFCCC, 2012). Part of this process entails selecting from an extensive list of options- the adaptation actions that are to be implemented. This paper discusses which methods local governments use when deciding this; it compares the recommendations of guidebooks, academic sources, and grey literature to the approaches actually used by local governments. It has been found that despite having a number of possible methods within the guidebooks as well as academic and grey literatures, local governments need to choose the options that can be addressed in projects which have already been taken on in other sectors. This is so as these options are easily justified; they provide co-benefits that are appealing especially facing the uncertainty of not known to what extent climate change impacts will occur. There are possibilities to expand the horizons of adaptation actions that can be implemented. The first and most prudent step is getting all federal, provincial, and local governments, as well as stakeholders, and experts working together to formulate focused and small-scale methods for selecting between adaptation action options. From this point, the continuation of exploiting windows of opportunities needs to occur and more funding strategies need to be developed within local governments.

1. Introduction:

Climate change poses a significant, unavoidable and, pressing issue that is currently threatening the whole world; it puts pressures on social, economic and, environmental sectors in all societies. As a means to minimize the impacts of climate change, individual communities would do well to adjust to and prepare for these changes accordingly. Aside from putting in efforts to mitigate these climate change issues, local communities need to adapt to them. Adaptation to climate change includes actions that will reduce specific risks and increase the overall capacity to manage climate change and its impacts. There are a number of definitions pertaining to climate change adaptation; the Intergovernmental Panel on Climate Change (IPCC) provides a good starting point as they define it as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (2007, Glossary).

One example of an adaptation action could be preparing for increased sea level rise and storm surges by building permanent flood defenses and barriers. However, more often than not adaptation actions are not that simple; communities and local governments could have a number of adaptation action options to choose from. Drawing upon the same example of sea level rise, possible options could include: inaction, changing the land cover in the area to better suit occasional flooding, development regulation, and the organization of response plans in case of flooding.

With a plethora of options such as these for each response and preparation to climate change, how do communities and local governments decide which of those adaptation action options to implement? The objective of this paper is to discover just that;

it seeks to determine how local governments decide which adaptation actions to implement. In shaping a response to this, the recommendations given by a number of guidebooks for local governments, academic sources, and grey literatures provide for choosing between adaptation actions will be discussed and compared to the processes local governments actually follow when implementing these actions.

1.1 Arriving At Adaptation Action Options

To begin, we need to have an understanding of how we arrive at these options in adaptation action. Regardless of the cause of climate change or of the extent to which it will occur, societies should be coming up with methods of effective management as a certain level of changes have already happened and will continue to strike. A number of regions have realized this and have begun to take initiative. From speaking to a number of local governments I have found that generally the process prior to arriving at possible adaptation actions involve communities conducting an assessment to help them discover what climate change impacts they are vulnerable to (A Representative From the City of Vancouver, 2012). The next step is typically prioritizing these risks by the most prominent to the least; risks of high probabilities and high impacts are often times what constitute being the most prominent (A Representative From the District of Saanich, 2012). Once this is complete, lists of possible adaptation actions to these risks are created and from there, decisions need to be made regarding what actions should be implemented. As will be seen in subsequent pages, this process for selecting an appropriate method to use when choosing which adaptation action to implement can be confusing as there is yet to be any sound guidance on the matter.

2. Comparisons: Methods

As far as consulting the current literatures on methods in selecting adaptation actions, the majority of this paper is western Canada focused. This was done for a variety of reasons. Firstly, western Canada has taken great initiative in the adaptation field thus resulting in a sufficient amount of guidebooks to consult. Moreover, many of these communities have assigned positions that focus on adaptation to climate change therefore enabling them with the capacity to provide sound and consistent responses regarding their methods used. In looking at the academic and grey literatures, this paper veered towards a global view as in their case studies the methods they used when selecting which adaptation action options should be implemented were actually mentioned. Limiting the scope in this manner hinders the capacity for large-scale conclusions while conversely, gives insight into the issues occurring in method selection at a smaller, more focused scale.

2.1 Guidebooks

Five guidebooks were consulted:

- The International Council for Local Environmental Initiatives (ICLEI)
guidebook - Preparing for Climate Change: A Guidebook for Local, Regional,
and State Governments
- Canadian Communities Guidebook for Adaptation to Climate Change
- Climate Change Adaptation Planning: A Handbook for Small Canadian
Communities
- Adapting to Climate Change: A Risk-based Guide for Local Governments in
British Columbia

-Alberta: Climate Change Adaptation Framework.

All of these guidebooks provide a step-by-step guide to the risk identification and management process however, are a less comprehensive guide once adaptation action options have been identified. The Alberta: Climate Change Adaptation Framework, for example, does not mention a single method for choosing between adaptation action options. The other four guidebooks do, at the very least provide in-depth lists of possible methods to rate and/or rank adaptation action options. For example, British Columbia's guidebook for local governments discusses the possibilities of evaluating actions in terms of effectiveness, costs, residual risks, or stakeholder acceptance (Black, Bruce and Egner, 2010). Similarly, the Canadian Communities guidebook discusses feasible evaluation methods in quite detail but does not allude to or suggest any dominant selection methods. Included in these methods are trade-off analysis, multi-criteria analysis, cost-benefit analysis, no regrets, and windows of opportunity (Bizikova, Neale and Burton, 2008). The most notable difference of this guidebook in comparison to the others is that it does recognize the need for more sound evaluation methods in selecting the most feasible adaptation option (Bizikova, Neale and Burton, 2008). The Handbook for Small Canadian Communities barely addresses any methods for choosing between actions however, it does mention one intriguing option; to "incorporate adaptation in plans policies and budgets" (p.41) that are in the process of being created or are already occurring (Bowron and Davidson, 2001). Which is as what will be seen, what local governments actually do.

Arguably the most comprehensive guidebook regarding how to determine adaptation actions was ICLEI's guidebook; it highlights a number of key criteria in the form of questions intended for local governments to be able to readily choose and justify their

adaptation actions. Those questions include whether or not the adaptation action meets the goals of the community, the benefits of the action exceed the costs, the action is flexible, windows of opportunity are present, the action is equitable, the action will decrease the risk of losing unique environmental or cultural resources, and the implementation of the action is feasible (Snover *et al*, 2007). Between the five guidebooks only one produced a sound, recommended method to follow regarding making choices between adaptation action options. Thus, it is relatively safe to say that despite the majority of guidebooks for local governments having quite in-depth method lists most are quite weak when it comes to how to choose between adaptation action options.

2.2 Academic and Grey Literatures

An array of case studies, books, reports, websites, and journal articles were reviewed to discover what selection methods for choosing adaptation actions were recommended. As a general conclusion, the majority of these literatures suggest either consulting other jurisdictions to see what has and has not worked for them, or using a multi-criteria assessment technique. Two case studies were consulted; one from China and one from Egypt. Both used and recommended a multiple criteria selection method when deciding on adaptation action options. The Egyptian case study emphasized the importance of including all stakeholder objectives and using those objectives as the criteria in an adaptation decision matrix, as seen in figure 1 (Raey, Dewidar and Hattab, 1999). Thus, environmental and social objectives are given importance in this method and, economic benefits were still incorporated as a cost-effectiveness ratio (figure 1) (Raey, Dewidar and Hattab, 1999). Reinforcing this is the case study from China; they too believe that multi-criteria assessments are a practical method of informing decision-making as many values

(not just economic) are included and evaluated in the process (Tanner, Xia and Holman, 2011).

Table 6. Coastal resource adaptation decision matrix (scale of 1 to 10) for Alexandria Governorate. Values by which the objectives are weighted are given in parentheses. na: not applicable

Measure	Scenario	Weighted objectives				Score	Total score	Cost of measure (million US \$)	Cost-effectiveness (cost/incremental unit of benefit)
		Property protection (3)	Flood avoidance (3)	Coastal development (3)	Wetland preservation (1)				
Current policy	Rise	6	5	4	2	47	95	na	na
	No rise	5	3	7	3	48			
Beach nourishment and groins	Rise	7	6	8	6	69	150	54	0.98
	No rise	9	7	9	6	81			
Breakwaters	Rise	8	8	5	7	70	150	468	8.5
	No rise	9	8	7	8	80			
Legal development regulation	Rise	2	2	3	4	25	101	20	3.3
	No rise	8	8	7	7	76			
ICZM	Rise	8	7	7	7	73	158	550	8.7
	No rise	9	8	9	7	85			
Land use change	Rise	3	2	3	6	30	100	900	180.0
	No rise	8	7	6	7	70			
No action	Rise	3	2	3	2	26	55	2 500	-62.5
	No rise	4	2	3	2	29			

Figure 1- Adaptation Decision Matrix Example Used in a Community in Egypt (Raey, Dewidar and Hattab, 1999 p.127)

The United Kingdom Climate Projections (UKCIP) website, similar to the guidebooks, simply provides a list of possible criteria which includes the effectiveness, the efficiency, the equity, and the flexibility of the possible adaptation action (UKCIP, 2012). They also however, recommend that if your organization already has some sort of established method that is what should be utilized over their recommendations (UKCIP, 2012). WeADAPT, another web page, vouches for communities to work with other regions and learn from their adaptation action selection methods (WeADAPT, 2012). To promote this, a Google Earth Adaptation Layer has been developed which allows individuals to see and consult various adaptation case studies that are occurring around the world (WeADAPT, 2012).

Conversely, the Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures, a book written in 2004, suggests that the four most useful methods for selecting adaptation actions are as follows: cost-benefit approach (CBA), multi-criteria analysis (MCA), cost-effectiveness approach (CEA), and expert judgement (Burton, *et al.*). In this book, Burton *et al.* provide a choosing tool as seen in figure 2 to determine which method your organization should utilize.

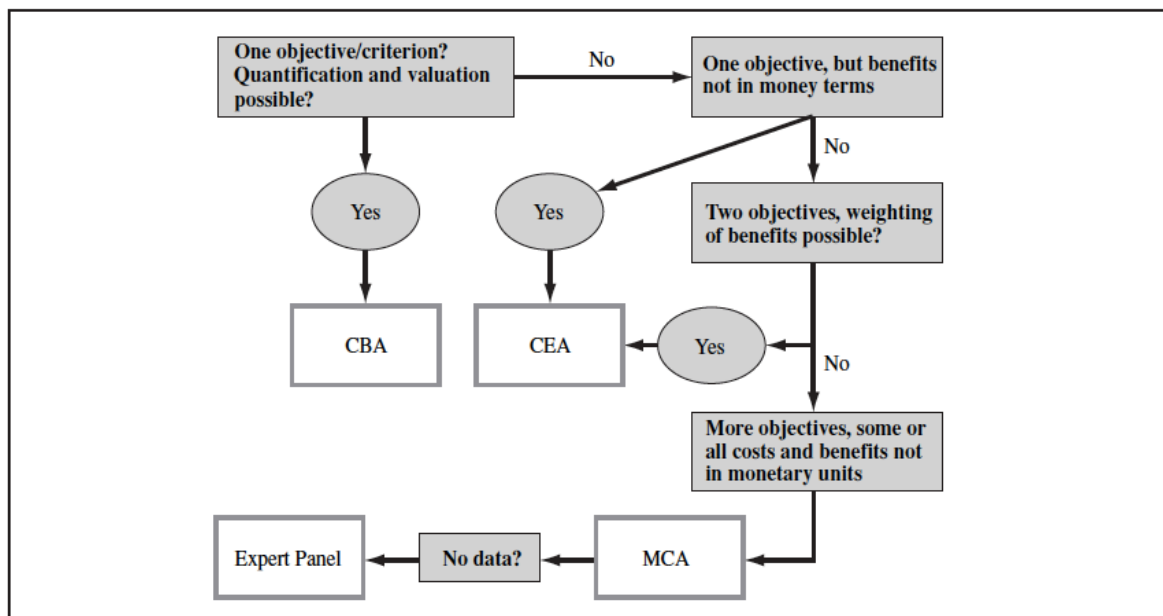


Figure 8-4: Choosing a tool for the prioritisation and selection of adaptation options

Figure 2- Choosing Tool Used to Determine Which Method Organizations Should Utilize (Burton *et al.*, 2004, p.200)

Following similar approaches to this are a number of scholarly articles. One article puts emphasis on using effectiveness, efficiency, equity and legitimacy as criteria for selecting between adaptation action options (Adger, *et al.*, 2005). Others simply provide lists of appropriate actions similar to the guidebooks. One article stresses the need for selecting an adaptation action that is reversible in case new information arises that may allude to a more appropriate decision (Loe, Kreutzwiser and Moraru, 2001). Drawing upon

this criterion is another article that argues that climate change uncertainty needs to be taken into consideration when selecting adaptation options (Hallegatte, 2009). Moreover, this article- similar to the Egyptian case study- vouches for utilizing a number of criteria in an adaptation matrix that can be seen in figure three (Hallegatte, 2009).

Sector	Examples of adaptation options	No regret strategy	Reversible / flexible	Existence of cheap safety margins	Soft strategy	Reduced decision horizon	Synergies with mitigation	Ranking
WATER RESOURCES	• Institutionalization of long-term prospective	++	+		+			1
	• Loss reduction (leakage control, etc.)	++						1
	• Demand control and water reuse	++	+		+			1
	• Storage capacity increase (new reservoirs)	+	-	+				2
	• Desalination and water transport	+	-	+			-	3

Figure 3- Adaptation Matrix: "++" indicates options that yield benefits regardless of the extent of climate change whereas "+" are no-regret in some cases. (Part of table 2 via Hallegatte, 2009)

Despite having many similarities in the options for methods when selecting adaptation actions- such as using multiple criteria as well as communicating with other jurisdictions- the academic and grey literatures all provide slightly different frameworks within those methods consequently, making it confusing for jurisdictions to know which to follow.

2.3 Local Governments

Six local governments were interviewed: the city of Vancouver, the district of Delta, the district of Saanich, the regional district of Central Okanagan, and the city of Calgary. Each of them was independently asked the same set of questions and it was found that there is a great deal of consensus within their responses. When asked whether or not the guidebooks intended for local governments were followed when choosing between adaptation action options, all of their responses were no. The city of Vancouver mentioned

something I feel most other cities were thinking; that they expected more from these extensive guidebooks as far as distinguishing between Methods as well as addressing constraints such as funding (A Representative From the City of Vancouver, 2012). Despite not necessarily utilizing these guidebooks' actions, at one point throughout the interviewing process each of the local governments admitted to reviewing them to ensure nothing had been overlooked. After admitting this, the municipality of Delta as well as the city of Calgary both showed their appreciation for ICLEI's guidebook; while not following this or any other guidebook exactly, ICLEI's is the one they would turn to for advice when reaching standstills in deciding which adaptation action to implement (A Representative From the City of Calgary, 2012) (A Representative From the Municipality of Delta, 2012).

Like the grey and academic literatures suggest, Delta makes their selections based on lessons from their past and from consulting other jurisdictions (A Representative From the Municipality of Delta, 2012). The regional district of the Okanagan on the other hand, follows the decisions of elected officials when selecting which adaptation action option to implement (A Representative From the Regional District of the Okanagan, 2012). They deem that these decision makers are reflecting the visions, goals, objectives, and policies outlined in communities plans thus providing solid representation of stakeholders (A Representative From the Regional District of the Okanagan, 2012). Both the district of Saanich and the city of Vancouver follow quite a similar method when considering the various adaptation actions suggested in preparation for one climate change threat. Predominantly, they follow three guiding principles: co-benefits, no-regrets, and flexible (A Representative From the District of Saanich, 2012) (A Representative From the City of Vancouver, 2012). Therefore, despite having overlap among the options given in the

guidebooks as well as the suggested methods and lists in the academic and grey literatures, local governments mainly follow their own strategies which appear to be quite economically focused.

3. Analysis

Within all categories researched, there seems to be general consensus however, when crossing over and comparing each there is a minimal amount of commonality. The main mutual consensus between all categories include implementing adaptation actions that have no-regrets and low-regrets, provide co-benefits, and are flexible. It is quite surprising that the majority of the guidebooks are not satisfactory when it comes to choosing superior methods for selecting between adaptation action options. The academic and grey literatures provide multiple guidelines for local governments to utilize decision matrixes and are beginning to elaborate on the robustness of sharing case studies with other jurisdictions. The usefulness of these decision matrixes is high as economic benefits are not the sole values being highlighted; the objectives of all stakeholders are included thereby incorporating environmental and social benefits into the decisions. While these first two categories highlight a number of methods, the unfortunate reality of selecting between adaptation action options is that the most accepted measures local governments can take is to implement actions that have low economic costs. Mentioned in some of the academic literature, the other method that can be and is taken by these local governments is choosing adaptation actions that can be integrated into projects various sectors may already be taking on. It is in this manner that all stakeholders will be more willing to accept these actions which unfortunately results in a gap between all three categories.

4. Recommendations to Federal, Provincial and Local Governments

There are a number of possible actions all levels of government can take to minimize these gaps. With the shocking finding that local governments do not follow guidebooks when selecting a method to decide which adaptation actions to implement, federal and provincial governments would do well to provide a general chart that local governments can use as a template. Based off of the adaptation decision matrix used in the Egyptian case study, I have created an example of such a prototype which is seen in figure 4. It is in this manner that a framework can be created which will incorporate not only economic values but environmental and social ones as well. Moreover, it would be beneficial for federal and provincial governments to be providing guidance to local governments regarding finding methods to distinguish and unearth the objectives of all of their community's stakeholders.

Risk	Adaptation Action	The Projected Extent of Climate Change Occurs (Yes or No)	Communities Objective Criteria Met (ranked 1-10)				Total Sum	Cost To Implement	Cost-Effectiveness: Cost/Sum of Objectives Met	Ranking
			Objective A	Objective B	Objective C	Objective D				
		Yes								
		No								
		Yes								
		No								
		Yes								
		No								
		Yes								
		No								

Figure 4- Possible Methods Outline For Local Governments to Follow

That being said, because of the differences in risks, adaptation action options, and objectives between all regions it would be most beneficial for local governments to create their own objectives based on their community's intentions rather than follow exactly what other jurisdictions have done or having them provided by federal or provincial governments. Despite these recommendations to not follow the exact criteria for selecting adaptation actions other jurisdictions have used, the need for local governments to publish their methods in selecting between options is still necessary. Regardless as to whether

their publications are uploaded as a document on their web pages or a case study in the Google Earth adaptation layer, having the capabilities to review what methods and criteria others have utilized is beneficial as the assessors can identify what has and what has not worked for jurisdictions. Moreover, if there have been oversights in their own works regarding selecting between adaptation action options these can be addressed before the implementation stage.

5. Conclusion

In researching the methods used for selecting between adaptation actions guidebooks for local governments, both academic and gray literatures were consulted and compared to the methods actually taken by local governments. It has been found that in much of western Canada, local governments do not utilize guidebooks or the academic literature when making their decisions as to which adaptation actions to implement. Instead, the drivers of their decisions entail implementing actions that have no regrets, low regrets, and provide an alternate benefit to any other sectors instead of implementing the action solely for the benefit of being prepared for a risk that has the possibility of occurring. In order to address this gap in the decision making process, all parties involved need to communicate with one another to continue to come up with innovative ways of implementing adaptation actions. Incorporating actions into current as well as up and coming policies and plans in various sectors is something that local governments should be continuing on with. Given the conclusions of this research, it is appropriate to end with areas that need further attention. At the forefront of this is the need to develop more financing in order to implement important adaptation actions for the purpose of being prepared. Without these budget constraints, environmental and social needs are likely to be more readily accepted

by societies. However, until then, the emphasis when making adaptation action decisions will remain focused on the monetary values of doing so.

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