The Possibility of Uniting Risk Management and Adaptive Co-Management – Envisioning Adaptive Collaborative Risk Management (ACRM) for Climate Change

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Abstract

Communities are increasingly confronted with the need to identify, characterize and respond to the global challenges of climate change. Risk management is a well established tool for climate change adaptation, but critical questions about past management techniques and the emergence of 'alternative approaches' raise possibilities for novel new directions. This paper conceptually explores the synergies from combining risk management as a tool for climate change adaptation with adaptive co-management as a governance strategy. The possibility of uniting the two approaches is envisioned using the Canadian Standards Association's (CSA) current standard for effective risk management. An approach termed adaptive collaborative risk management (ACRM) is proposed as an outcome. ACRM offers considerable innovation because it addresses both technical and governance concerns associated with climate change adaptation in a single process.

Keywords: Adaptation; Risk Management; Adaptive co-management; learning; community; implementation

1. Introduction

Various jurisdictions worldwide, including Canada, are increasingly turning to risk management and associated techniques to address climate change adaptation. This turn is intuitively logical as risk management is a generally accepted approach for identifying and quantifying threats and developing control mechanisms to reduce risk to individuals, communities and society. This also coincides with the convergence of the disaster risk management and climate change adaptation discourses. As Sperling and Szekely (2005) point out, the starting point for any adaptation measures is the assessment of existing vulnerability to climate variability and extremes.

At the same time as risk management is being pursued as a logical and generally accepted approach, increasing questions are being asked about risk management. In considering what constitutes effective risk control, Klein et al. (2003) ask how useful the concept of resilience is for operational decision-making. How do we go about addressing overall capacity for planned and unplanned adaptation (Smit and Wandel, 2006)? How do we

increase community participation in developing risk reduction measures (UN ISDR, 2002)? These questions are being posed at a time where the limitations of conventional approaches to management are being realized and the concept of control is increasingly being regarded as inappropriate in the context of social-ecological systems (Holling and Meffe, 1996; Cortner, 2000; Kettl, 2002; Plummer and Armitage, in press). Further compounding these limitations are the complexity and uncertainty of social-ecological systems (multi-scale variables, cross-scale and non-linear interactions, reflexivity) and therefore a shift is underway to 'alternative management' approaches that are responsive to change (adaptive, learning oriented) and participatory in nature (Holling and Meffe, 1996; Walker et al., 2002; Gunderson, 2003; Berkes et al., 2003).

As communities increasingly must identify, characterize and respond to the global challenges of climate change, there is a pressing need to accelerate the transition to 'alternative management' approaches. This paper explores the synergies from combining conventional risk management with adaptive co-management. In combining the technical aspects of risk management with the social aspects of adaptive co-management a hybrid model, adaptive and collaborative risk management (ACRM), is offered. Conclusions reflect upon the potential to enhance the effectiveness of risk management and governance that lead to effective community climate change adaptation.

2. Risk Management: A Tool for Climate Change Adaptation

Risk management as a structured tool for decision making has had a complex history and there at least three discernable facets to its foundation. The first is the issue of how best to address the question of making choices on technological risk under conditions of uncertainty (Kates and Kasperson, 1983). The second is the way in which risk management has been applied to global environmental problem solving in the context of hazards and disaster management (Whyte and Burton, 1980) and across a host of environment and health related issues (Fowle, et al., 1988). The final facet to its foundation concerns inquiries on the social aspects of risk as well as the role of risk perception (Krimsky and Golding, 1992).

Risk research has been conceived and executed in various ways. These include a number of different foci: the actuarial approach, the toxicological and epidemiological approach, the engineering approach, the economic approach, the psychological approach, social theories of risk, and cultural theories of risk (Renn, 1992, 56). Each has major applications for policy and decision making and has resulted in a number of valuable tools that can be applied to persistent risk problems. Loss exceedance probability curves (Kovacs and Kunreuther, 2001), lifetime health risk methods and drinking water (Liu et al., 2009), and multi-hazard risk assessments of water systems (Ballantyne, 2003) are three such examples. Understandably, they are highly technical, sophisticated and procedurally complex.

How best to use complex and technical risk management in the context of sound climate change adaptation policy has been the subject of international attention (Lim and Spangler-Siegfried, 2005). Key to making risk management operational in this context is the sound examination of current and future climate risks, as a precursor to assessing and enhancing overall adaptive capacity. In order to accomplish this task there are an increasing number of related, yet different structured frameworks from which local practitioners can choose in their evaluation of climate change adaptation strategies (Fenech et al., in press, Lynch et al, 2008, UNDP, 2002, Willows and Connell, 2003). All either implicitly or explicitly concern themselves with risk management decision making.

The use of risk management is important for climate change adaptation. In order to address an increasing adaptation deficit, there is also a need to connect climate science and decision-making across scales in a more effective process of adaptation, through effective mainstreaming that includes both structural and non-structural measures (Burton, 2004). Given its use in a number of different risk contexts, there is the possibility to use it for cross-functional decision making. For instance, communities must consider the impacts of climate change on appropriate water infrastructure design, land use planning, housing development, transportation, and energy production, and emergency and disaster management due to their investment time scales (Hallegatte,

2009). Because of this cross-functional character, can we conceive of a risk management process that is more collaborative, more inclusive, and ultimately more adaptive?

3. Adaptive Co-management

Adaptive co-management bridges adaptive management and collaborative management and offers "...a potentially important innovation in natural resource governance under conditions of change, uncertainty and complexity (Armitage et al., 2007, p. 5; Berkes et al., 2007). It is generally considered "a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, on-going, self-organized process of learning by doing" (Folke et al., 2002, p. 20; adopted by Armitage et al., 2007; Plummer and Armitage, 2007b; Berkes, 2009).

Adaptive co-management is conceptualized as "a governance system involving networks of multiple heterogeneous actors across various scales which solve problems, make decisions and initiate actions (Fennell et al., 2008, p. 20; Carlsson and Berkes, 2005; Berkes, 2007, 2009; Schultz, 2009). Experiences with adaptive co-management are being gained in several different resource contexts and to address several aspects of the environment. These include fisheries, forestry, parks and protected areas, water resources and wildlife. While the number of associated case studies is still relatively small, the accumulation of these experiences and corresponding analytical efforts, are yielding valuable insights that enhance understanding of adaptive co-management.

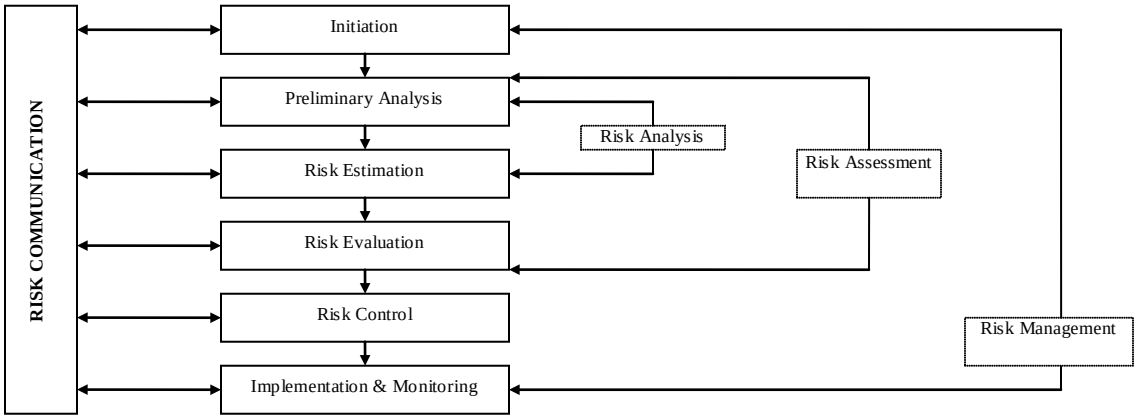
Despite the enthusiasm and rapidly growing experience, it is imperative to remember that "adaptive co-management is not a governance panacea and will not be appropriate in all cases" (Armitage et al., 2009, p. 100). Nadasdy (2007) further draws attention to the need to critically question the sociopolitical context in which adaptive co-management is framed and the inherent biases therein. Finally, and especially relevant to this paper, is the reminder by Berkes (2009) that learning does not always lead to adaptation.

4. Adaptive Collaborative Risk Management (ACRM) for Climate Change Adaptation

To envision these synergies for climate change adaptation by combining risk management and adaptive co-management, we present the Canadian Standards Association's (CSA) current standard for effective risk management and discuss how it could be enhanced by incorporating adaptive co-management.

Climate change adaptation has direct manifestation at local scales, and as such, communities require practical strategies to deal with uncertainty (Hallegatte 2009). In Canada, the Canadian Standards Association (CSA) has developed a standard for effective risk management (CSA, 1997 reaffirmed 2009). The Standard sets out an iterative six step process to determine the most appropriate risk control and risk reduction options to come up with an indication of residual risk. Figure 1 illustrates these six steps and the relative positions of risk analysis, risk assessment, risk management, and risk communication.

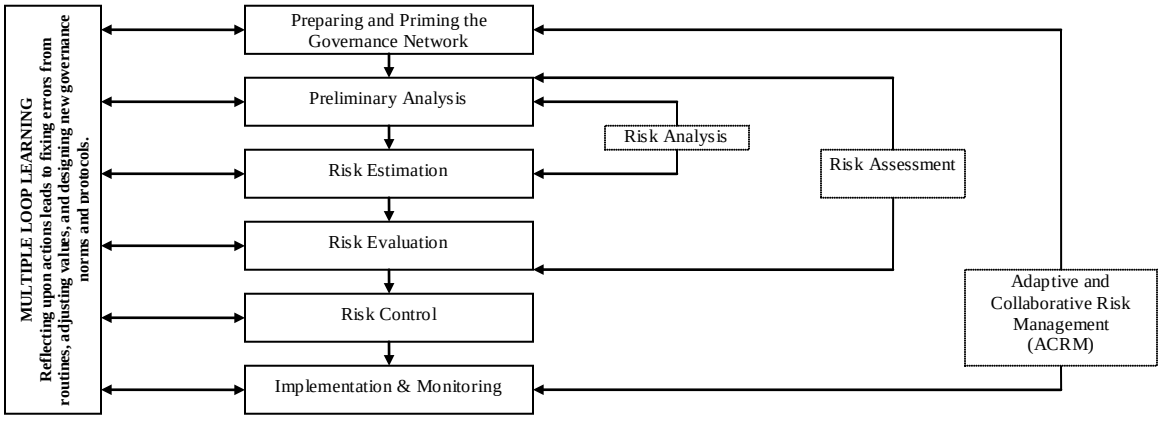
Figure 1 – Canadian Standards Association Risk Management Standard (CSA, 1997 reaffirmed 2009)



The first step in the CSA risk management process is the "initiation" phase and it provides an ideal starting point for enhancing risk management. The initiation phase conventionally concerns the establishment of administrative details of the process and the

identification of issues at stake. It is here that stakeholders are identified and the risk management process is fleshed out. This initiation phase is of paramount importance because it acts as a foundation to the entire risk management enterprise. Adaptive co-management is making considerable strides in understating how to initiate such processes in light of the themes described above. Schultz has pioneered the approach of a social-ecological inventory which involves "…a method for mapping and analyzing social structures and processes underlying ecosystem services in a landscape" (2009, p. 29; Schultz et al., 2007). Application to climate change adaptation is already gaining a foothold in Sweden where stakeholder mapping and perceptions of risks were the entry points in the Stockholm Regional case study (Andre, 2008; Simonsson et al., in press). Figure 2 illustrates how the "initiation" phase of conventional risk management in the Standard could be relabeled as "preparing and priming the governance network" which encompasses conducting social-ecological inventories, stakeholder assessments and engaging stakeholders in understanding perceptions of and policies about climate change.

Figure 2 – Suggested Adaptive Collaborative Risk Management Process



The requirement for risk communication throughout the process is conventionally understood as "any two-way communication between stakeholders about the existence, nature, form, severity, or acceptability of risks" (CSA, 1997, p. 3) and is a cornerstone of the CSA process (Figure 1). Adaptive co-management emphasizes the need to go well

beyond two-way communication and to consider the possibilities associated with deliberative and interactions among pluralistic stakeholders across different levels. In establishing such a process in place of the conventional initiation phase (as above), possibilities are opened for the actors engaged in the climate change adaptation dialogue to become not merely participants in a process but co-creators in a social learning process (see Figure 2). The goal is then for actors to develop real, relevant, and lasting adaptation solutions (or mitigation or transformation or sustainable development, as the local situation might dictate). The concept of multiple loop learning for environmental and resource management (Armitage et al., 2008; Diduck et al., 2005; Keen et al., 2005) is thus incorporated. Single loop learning involves addressing errors that are evident from established routines. Double loop learning corrects errors by making adjustments to values and policies. Triple loop learning seeks to correct errors by addressing/designing governance protocols and norms. Shifting the focus from risk communication to multiple-loop learning also recognizes the importance of the social context in the ultimate realization of climate change adaptation. Finally, initiating a multiple-loop learning process can address known challenges to risk management.

Making these two important changes to the conventional Standard alters the entire 'spirit' of the process from one of risk management to one of adaptive and collaborative risk management (Figure 2). In line with van Nieuwaal et al. (2009), the starting point of ACRM is to characterize the existing system, explore the possibility of a window of opportunity, and prime the governance network for possible transformation. The multi-loop learning process is the mechanism by which the actors in the network engage, learn about and modify their actions, values and underlying governance norms relating to climate change adaptation. All phases of the conventional risk management Standard are functionally enhanced by these alterations.

5. Conclusion

The proposed model of ACRM is positioned to more robustly respond to the complex and uncertain challenges of climate change and overcome some of the contentious issues that arise from traditional risk management. For instance, the nature of risk transference and

driving forces towards more mega-disasters (Etkin, 1999) can be explored during stakeholder engagement, as the time frames for climate change adaptation decision making are expanded. Consideration of the way in which hierarchies for coping with threats from natural hazards are "nested" from individuals to communities to government (Newton, 1995) can be examined in a structured fashion by those most affected, via a learning process of collective decision making.

The ACRM approach being conceptually advanced here next requires empirical testing. This process is being initiated in the Niagara region of Ontario, Canada. The overarching goal of this collaborative research between Brock University, Environment Canada and the University of Toronto Scarborough is to explore the intersection of issues related to sustainable development, climate change adaptation, social learning and adaptive collaborative risk management using the most up-to-date research tools. In ensuring effective climate change adaptation, the relevance of such an approach must also be examined within multiple social-ecological contexts. The work underway in the Niagara region is therefore being paralleled and coordinated with a Mistra-SWECIA project in the Stockholm Region of Sweden (see Nilsson and Swartling, 2009) for comparative purposes.

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