

**Adaptive Capacity as a Dynamic Institutional Process:
Conceptual Perspectives and their Application**

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Paper Prepared for Publication

in

Derek Armitage and Ryan Plummer (Editors),

***Adaptive Capacity: Building Environmental Governance in an Age of
Uncertainty***

Springer Publishing Company
11 West 42nd Street, 15th Floor
New York, NY 10036

October 25, 2009

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Acknowledgments

While this paper is primarily conceptual, the ideas expressed here have been largely ‘worked out’ in the context of our study of the capacity of Whitehorse, Yukon to respond effectively to the challenges of living in a changing northern environment. It is an instance where the empirical situation and the conceptual framework have been developed iteratively – one feeding on and benefiting from the other. Thus, we are deeply grateful to Mayor Bev Buckway, Councilors and various Administrative Officers and employees of the City of Whitehorse for their willingness to give their time and provide us with their perspectives about how adaptive capacity and sustainability are made possible in an ‘Arctic Gateway’ city. We also thank various employees of the Yukon Territorial Government and representatives of Kwanlin Dün and Ta’an Kwäch’än First Nations, members and staff of various civic and non-government organizations, the Northern Climate Exchange and the citizens of Whitehorse for similar engaging discussions. We are greatly appreciative of the funding we received from the Government of Canada’s International Polar Year (IPY) Fund as part of the CAVIAR Project (Climate Adaptations and Vulnerability in Arctic Regions). We thank the co-directors of the project, Professor Barry Smit and Dr. Grete Hovelsrud for inviting us to join CAVIAR and to be a part of this multi-nation effort. The constructive input of two anonymous reviewers enabled considerable improvement of the manuscript. Finally we thank the editors for their patience and support through some life events that delayed completion of this paper.

Abstract

This paper takes exception to approaches to adaptive capacity derived from either ecology or social science that treats it as a systems response to exposure and vulnerability. It argues that many such approaches are inherently tautological (i.e. adaptive capacity is the ability of a system to adapt) and often provide little more than a classification of the determinants of adaptive capacity without an

analysis or *explanation* of it as a *dynamic* social process. We suggest that such limitations are further compounded in those works that link adaptive capacity to institutional analysis, but which sees institutions largely as cultural straitjackets limiting the ability of societies to respond to either ecological or social changes. We argue, instead, for an approach based in ‘New Institutional Analysis’. Our perspective regards institutions as the cultural frames supporting organizational processes. However, our focus is on the extent to which actors operating in organizations are impeded or facilitated by these cultural frameworks. We argue that it is the capacity of these institutional approaches to permit actions that are effective ‘adaptive’ responses to changing environmental circumstances that is the appropriate measure of adaptive capacity. Such an approach focuses on decision-processes and interactive patterns. It is, we suggest, consistent with the work of Ostrom (2005) and the Institutional Dimensions of Global Environmental Change (IDGEC) of the International Human Dimensions Program (IHDP). We conclude the paper with a brief example of how we are operationalizing our approach in our examination of the adaptive capacity of the ‘Arctic Gateway City’ of Whitehorse, Yukon.

1 Introduction

Whereas most scientific approaches are inherently reductionist, the primary stance of environmental analysis is synthetic. Its roots are in ecology, a late-modern scientific development that emphasizes the importance of understanding environmental observations within a *systems perspective* of integrated organisms. Modern environmental knowledge extends that perspective to incorporate social phenomena into a comprehensive, cross-scale analysis. Gunderson and Holling (2002) have labeled this new systematic and synthetic approach “panarchy” and, of particular relevance given the focus on institutional analysis in this paper, argue that such a perspective:

... must be capable of organizing our understanding of economic, ecological, and institutional systems. And it must explain situations where all three types of systems interact (Holling et al, 2002: 5).

Indeed, many approaches to ecological knowledge regard environments as systems of natural and social processes that have *resilience* and *adaptive* qualities that permit them to withstand *exposures* that would otherwise leave them *vulnerable* and at *risk*. From this perspective *adaptation* and *adaptive capacity*, whether seen from a biological or social perspective, are also seen as embodying system assumptions. For example, Smit and Wandel state:

Adaptation in the context of human dimensions of global change usually refers to a process, action, or outcome in a system (household, community, group, sector, region, country) in order for the system better to cope with, manage, or adjust to some changing conditions, stress, hazard, risk or opportunity. (2002: 282)

As will be shown later in this paper, approaches dealing with the *adaptive capacity* of complex socio-ecological systems tend to look for such qualities within the system itself, while hazards are seen largely as external to the fundamental integrity of eco-systems, thereby making them vulnerable and threatening their resilience (cf. Hall and Taylor, 1996: 7).

While many concepts used in environmental studies are derived from ecology, this is not true of the concept of *institutions*. Institutional analysis has its providence squarely in social science. Used primarily by historians, political scientists, and sociologists, the concept is most frequently used to refer to the habituated and customary dimensions of social life. From such a perspective, institutions are to society what habits are to individuals, namely the largely patterned and taken-for-granted processes whereby things are done within a societal and organizational context. Institutions constitute something equivalent to social glue a, “means for holding society together, for giving it a sense of purpose and for enabling it to adapt” (O’Riordan and Jordan 1999: 81). From such a perspective “institutions have to involve rules, regulations and legitimating devices” (ibid.: 82).

This institutional perspective fits nicely with the ecological concepts previously mentioned, as it also inherently embodies a systems perspective. However, perhaps because institutions are the only distinctly social element in the environmental toolbox, they are also

frequently accorded the potential to be the regulatory dimension of socio-ecological processes and the agent of potential change. When this happens, institutions are seen as the basis for overcoming the (largely social) forces that are seen as threatening ecological well-being. This is probably best expressed in the Brundtland report when it states, “This real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must” (World Commission on Environment and Development, 1987:9).

When institutions are conceptualized in this way, (i.e. as change agents) their meaning and role is seen differently from being just the normative social glue and a body of cultural constraints. With this formulation, institutions become the basis for adaptation to the ecological changes that are occurring. Just as resilience becomes the antithesis or response to ecological vulnerability, so institutions are seen as the ‘mechanisms’ for providing adaptive capacity within socio-ecological systems (c.f. Ostrom et al 2002; Brunner et al, 2005). That is, in environmental analysis, institutions and adaptive capacity are inextricably linked. Any analysis of that relationship requires one to focus on how institutions operate so as to bring about mitigation and/or adaptation to environmental changes.

The focus on institutions as a fundamental mechanism of adaptive capacity requires a conceptual framework for examining how such dynamic institutional processes occur. Thus, an underlying tenet of this paper is that a focus on institutions simply as normative constraints, while consistent with systems assumptions about equilibrium, cannot address the ways in which actors and groups operate in institutional contexts. What is required is an institutional perspective that links culture, organizations and the actions of individual actors.

This forms the basis for our advocacy of an approach to institutional processes developed mostly in political sciences and sociology known as ‘*New Institutional Analysis*’ (NIA). In the following pages we explore this perspective, focusing on its ability to provide a framework for assessing dynamic behavioural processes within organizational contexts. NIA focuses particularly on how actors behave within organizational settings. While not ignoring the cultural

dimensions of institutions, it focuses on whether the institutional culture of such settings constrain actors from dealing effectively with new circumstances, or whether such organizational cultures can actually facilitate adaptive capacity. We see this approach as offering the often missing dynamic social component in much ecological analysis. As part of our presentation of this perspective we will also briefly link NIA with recent work on the institutional dimensions of global environmental change, including relevant work by Ostrom (2005) and by the International Human Dimensions Programme (IHDP) (Young et al, 2008).

Furthermore, there are relatively few attempts to empirically utilize this NIA approach and those that do provide little in the way of a systematic operationalization of it. Therefore, we conclude this paper with a (necessarily brief) presentation of the framework for our study of governance responses to climate change in the ‘sub-Arctic’ Canadian city of Whitehorse, Yukon. In this ongoing study we are taking preliminary steps to operationalize aspects of the NIA approach as the basis of our research on the dynamic aspects of adaptive capacity of governance institutions. Although we cannot here present much in the way of findings of our Whitehorse study, we can demonstrate how we apply the NIA perspective in our analysis.

2 Adaptive Capacity in Context

Many conceptual analyses treat adaptive capacity largely as a cultural and tautological ‘black box’ in which adaptation is seen as a function of the adaptive capacity of socio-ecological systems, with little explanation of how this takes place. It is, as Yohe and Tol (2002: 25) put it, treated as “an organizing concept”. Even an impeccable source like the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) defines adaptive capacity as “the ability of a system to adjust to *climate change*...to moderate potential damages, to take advantages of opportunities, or to cope with the consequence” (2007:869 emphasis in the original), without articulating how this capacity is put into action. In fact, throughout the Report, adaptive capacity is treated categorically.

There is simply ‘more or less of it’, as a result of pre-existing conditions. Similarly, Adger (2006: 270) declares, “adaptive capacity is the ability of a system to evolve in order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope”. As Smit and Wandel (2006: 285) state (albeit in another context), an approach such as this “does not attempt to identify the processes, determinants or drivers” of adaptive capacity.

However, while there are few efforts that seek to identify the *processes* of adaptive capacity, there are numerous works that seek to categorize its *analytic dimensions*. Thus, there is a literature on what are declared to be the *determinants* influencing whether or not a place can be considered to have adaptive capacity. Most such lists overlap (see Table 1) and frequently the identification of such dimensions leads directly to the development of a matrix in which they are related to one another and a range of other variables.

Prime amongst these ‘other’ variables are *vulnerability* and *exposure*. Hence, Swanson et al (2007: 13) state:

The *vulnerability* of a socio-economic and environmental system to climate change is conceptualized as a function of a system’s *exposure* to climate change effects, and its *adaptive capacity* to deal with those effects.

Smit and Pilifosova (2003: 13) capture that relationship in an equation in which vulnerability is stated to be a function of exposure, sensitivity and adaptive capacity. Furthermore, the three concepts of *vulnerability*, *exposure* and *adaptive capacity* are also related to *resilience*. Resilience and vulnerability are defined as counter opposites. Following what is clearly an ecological comparison, resilience is defined as “the magnitude of a disturbance that can be absorbed before a system changes to a radically different stage, as well as the capacity to self-organize and the capacity for adaptation to emerging circumstances” (Adger, 2006: 268). Conversely, vulnerability “is usually portrayed in negative terms as the susceptibility to be harmed” (Adger, 2006: 269).

Table 1: Proposed determinants of adaptive capacity

Smit et al (2001, quoted in Swanson et al 2007:)	Yohe and Tol (2002: 26)	Brooks and Adger (2004: 168)	IPCC 2001 (as quoted in Alberini et al 2006: 124)
Economic resources	available resources and their distribution across the population	resources	Available technological options
Technology	Structure of critical institutions and the allocation of decision-making authority	financial capital	Resources
information and skills	stock of human capital	social capital (e.g. strong institutions, transparent decision-making systems, formal and informal networks that promote collective action)	The structure of critical institutions and decision making authorities
Infrastructure	System's access to risk spreading	human resources (e.g. labour, skills, knowledge and expertise)	The stock of human capital
Institutions	way in which decision-makers maintain and distribute information	natural resources (e.g. land, water, raw materials, biodiversity)	The stock of social capital including the definition of property rights
Equity	public's attribution of the source of stress significance of exposure in the local situation		System's access to risk spreading processes Information management and the credibility of information supplied by decision makers Public perceptions of risks and exposure

Notably, both vulnerability and exposure are seen as conditions of the adaptive capacity of a community or region so that “the key parameters of vulnerability are the stress to which a system is exposed, its sensitivity and its adaptive capacity” (Adger, 2006: 269).

Whether or not they can be identified as antecedents or consequences is not made clear.¹

¹ We are aware that it is something of a misnomer to refer to vulnerability as if it was in some sense a singular variable. Indeed, vulnerability, like adaptive capacity, is usually conceptualized as a very complex array of intervening dimensions and processes. However, to dwell further on it here would deflect us from our primary focus on adaptive capacity.

Another body of literature focuses on the appropriate geographic scope for any adaptive capacity analysis. Some contend that adaptive capacity is primarily a consequence of *local conditions*. Thus, for Smit and Wandel adaptive capacity is “context specific, and varies from country to country, from community to community, among social groups and individuals, and over time” (2006: 287). Likewise, Yohe and Tol (2002: 28) emphatically declare, “We argue that adaptive capacity is a local characteristic”, although there is little attempt to be specific about just what constitutes ‘local’. Smit’s and Wandel’s statement quoted above includes everything from groups to countries as potentially local units. What is implied is not so much that adaptive capacity is only influenced by local events, but rather that it can only be understood in the context of whether ‘local’ areas (be they communities, regions, or nations) have the appropriate economic, social, cultural and political resources to respond in ways that enable them to reduce their level of exposure to risk, recover from the impacts of stressful events, or in some cases, to take advantage of opportunities that may emerge (Vincent 2007). The fundamental issue here seems not to be so much whether a phenomenon originates locally, but rather whether the local area (however defined) has the capacity to deal with the challenges that it must face, either through its own internal resources or through its ability to access external sources of support, information, and actual physical assistance.

This means that, almost invariably, any analysis of adaptive capacity involves a *geographic scale* element, in that it is necessary to examine both the exposures and the capacity of the local region, and also the resources that this community or region can draw upon from a larger area. An isolated community with limited resources is far less likely to withstand environmental exposure than a similarly affected community that can call upon a wide range of internal and external ecological and social resources to assist it. The potential adaptive capacity of each differs dramatically.

Furthermore, the lists of determinants affecting the adaptive capacity of localities that were outlined above, all emphasize that it is primarily (if not exclusively) a social process. Thus, the primary resources necessary to enhance adaptive capacity are such fundamentally social processes and products as social capital, human capital, financial

capital, decision making, and trust. Of particular note, Pelling and High (2005) make a strong case that it is the social capital of communities that is critical to the development of effective adaptive capacity. By this they infer that the ability of a local community to be adaptive depends very much on its ability to use its established social networks to access various human, social and economic resources. Only by knowing the extent of resources (economic, social, political, cultural, and knowledge) that the local unit and those responsible for its governance have at their disposal, are we likely to be able to assess the adaptive capacity of any locality.²

However, space is not the only scale variable related to adaptive capacity; time *is also a critical scalable dimension*. Risk is usually defined in terms of exposure over *time*. Some exposures are sudden and overwhelming, making the temporal dimension irrelevant. Others involve long-term processes. Climate change is both. Climates may change only gradually, but such changes are often manifested in sudden catastrophic events such as floods or droughts, fires or pestilence. The adaptive capacity of a region then is a function of its ability to withstand both long-term and sudden threats.

To summarize, the perspective on adaptive capacity that emerges from this body of literature regards it as the outcome of a wide range of other social variables, local and distant, immediate and temporally remote. These serve to determine the ability of a local area to respond to climate change challenges. However, for the most part, these attempts to identify variables and their impact as well as to locate them in geographic and temporal contexts, contain little attempt to actually depict or understand the *processes* through which these factors work to produce the adaptive capacity of any locality. As we have noted already, neither the categorization of the attributes of adaptive capacity nor the identification of influences such as spatial resources and time, provide much of a basis for understanding how adaptive capacity takes place.

Not all approaches to adaptive capacity ignore the process whereby it is achieved. For example, Brooks (2003) contended that the as-

² Matthews work on social capital (Enns et al, 2008; Matthews, 2003; Matthews and Cote, 2005; Page et al, 2007; Matthews et al, 2009) strongly supports this position.

assessment of adaptive capacity requires understanding of both how it is constituted and how it is translated into adaptation, "...in other words, we must understand the adaptation process (2003: 11). In making this distinction he broke out of the tautological tendency to define adaptive capacity as the ability to adapt. Yet, despite recognizing the importance of process, Brooks' analysis focuses little on it. Rather, his concern is primarily the one already identified as the role of geographic scale factors in effecting adaptive capacity. Brooks argues (2003: 11) that the factors determining adaptation processes depend especially on the scale of the "systems that are adapting", (i.e. households, communities vs. nation states). Brook's attention largely is directed to the intersection of local versus distant factors in the adaptive capacity process. He argues that it is a trap to focus merely on local, endogenous factors to the exclusion of broader political and economic forces. Such 'exogenous' factors are sometimes characterized as 'political will' and, though often poorly defined, can have a powerful influence on the adaptation process (Brooks 2003). However, the processes whereby adaptive capacity occurs still remain largely unexplored.

In contrast, Smit and Wandel (2006) advocate an approach to understanding adaptive capacity that is process oriented. They contend that the appropriate way to undertake such analysis is to begin at the community level and reason "from the bottom-up". In doing so, they eschew the notion of measuring vulnerability or attempting to establish indicators or measures of adaptive capacity. Rather, they advocate strongly for a dynamic understanding of adaptive capacity that takes into account the local social processes involved. As this fits closely with the approach we take here and throughout the remainder of this paper, we quote them at some length:

This body of work ... tends not to presume the specific variables that represent exposures, sensitivities, or aspects of adaptive capacity, but seeks to identify these empirically from the community. It focuses on conditions that are important to the community.... It employs the experience and knowledge of community members to characterize pertinent conditions, community sensitivities, adaptive strategies, and decision-making process related to adaptive capacity or resilience. It identifies and documents the decision-making processes into which adaptations to climate change can be integrated. (ibid.: 285)

Finally, some consideration needs to be given to the methodological conundrums involved in identifying or measuring the adaptive capacity of any social unit. Smit and Wandel capture this best with

their depiction of a “nested hierarchy model of vulnerability” involving exposure-sensitivity on the one side and adaptive capacity on the other as essentially the outcome of the intervening complex array of processes (2006: 286). To complicate this further, it is not clear whether adaptive capacity can, in any way, be regarded as a linear process. Indeed, there is evidence that it is frequently discontinuous and, depending on the rate of exposures, may operate at variable speeds (cf. Holling et al, 2002). This seems to be particularly true of the adaptive capacity of social units, though it may also be true of ecological ones. Given this, no set of mechanisms or determinants, no matter how thorough the resulting matrix, is likely able to do more than generally assess what is essentially a social process of considerable complexity. For that, we need to focus on ways in which the more dynamic relationships of adaptive capacity are developed and expressed. To do so, we will turn to the role of institutions.

3 Adaptive Capacity and Institutional Structures:

Earlier, in our discussion of the concepts used in understanding environmental change, we identified ‘institutions’ as the one widely used concept derived from social science. As just demonstrated, it is frequently linked to adaptive capacity. In a comprehensive recent analysis, of “The Role of Local Institutions in Adaptation to Climate Change”, Agarwal summarizes this position:

Adaptation to climate change is inevitably local and ...institutions influence adaptation to climate change in three critical ways: a) they structure impacts and vulnerability, b) they mediate between individual and collective responses to climate impacts and thereby shape outcomes of adaptation, c) they act as the means of the delivery of external resources to facilitate adaptation and thus govern access to such resources (2008:1)

That is, institutions structure the way in which risks impact people and communities, and they channel (or enable) various processes of response. Whether or not risks constitute vulnerabilities is largely determined by the capacity of existing local institutional arrangements to: (1) provide access to various local and more distant physical, social, and economic resources, and (2) enable their effective application. It follows that, the adaptive capacity of any community

to changing environmental conditions is inevitably a social process that is largely guided by institutional relationships. The response to climate change is a social process no matter whether that response is identified as mitigation, adaptation, or some hybrid of the two. Institutional arrangements and institutional processes constitute the foundation of all social types of responses to environmental threats.

But, if that is what institutions do, it is necessary to address how institutions actually work. If adaptive capacity is largely determined by institutional arrangement, then attention needs to be given to the way in which such institutional arrangements operate. North (1990) was among the first to recognize the important role played by institutional arrangements in shaping human action and social change, though his focus was on economic and not ecological change. He saw institutions largely in terms of the constraints that they put on entrepreneurial actors as they sought to create new economic organizational practices (1990: 84-88). North argued that institutions generally created transaction costs for such persons as they attempted to bring about change, and he emphasized the slow and incremental character of institutional change relative to changing economic demands (*ibid.*, 89). North regarded institutions less as the glue holding society together, than as the impediments holding entrepreneurial actors back (*Ibid.*, 103-104).

Some subsequent analysts in the ecological / climate change area have largely adopted North's stance. For example, Fiori (2002: 1026) provides an extensive discussion of formal and informal institutional constraints, arguing that formal constraints are more amenable to change than informal ones that remain essentially hidden if not unconscious. Still others examine the design of institutional structures. For example, Pelling and High (2005) focus on the ways in which these designs operate to facilitate or impede change. They argue that the economic and social development of lower and middle income countries is hampered by the influence of 'slow moving' cultural institutions that do not adapt to or keep pace with economic institutions that are declared to be 'fast moving' and adaptive. In a similar vein, Portes distinguishes between "slow moving institutions like culture", or "fast moving institutions like legal rules and organizational blueprints" (Portes, 2006: 235). Unfortunately, such explanations appear to have a bias toward the cultural fabric of non-

western societies found in earlier approaches to modernization (cf. Inkles and Smith, 1974).

Of particular interest are those papers that explicitly address the relationship between institutional forms and organizational practices, if only because of the confusion that exists in the use of the two terms. Organizations are the social entities that are created to accomplish tasks. Institutions are the cultural norms, values and accepted practices that govern how behaviours in and between these organizations takes place. Fiori (2002: 1028), again based on North's work, declares that institutions determine the opportunities in a society while organizations are created to take advantages of those opportunities. Likewise, he discusses the constraining role of institutions on organizations, but argues that organizational change can, in time, bring about institutional readjustments. Such work, focusing on how institutions operate in relation to organizational structures and human action, invites further discussion of how institutions influence both the actions of individuals and the adaptive capacity of organizations and communities. We suggest that 'New Institutional Analysis', through its focus on institutions as theatres for individual action and decision-making, provide a basis for doing just that.

4 Adaptive Capacity and Institutional Dynamics:

Hall and Taylor (1996: 7) state that the fundamental question for any institutional analysis is whether institutions can affect human behaviour. Somewhat akin to the discussion between the normative/cultural and process/action approach we have been developing above, they distinguish between a "cultural approach" and a "calculus approach" to this question. Like our prior discussion, the cultural approach is depicted as having a focus on path dependence and cultural norms (ibid.: 7). As Hall and Taylor note, such a perspective leaves little room for explanations of events as being directed by individual choice (ibid. 8). In contrast, the calculus approach focuses on the way in which individuals act, within the cultural framework provided by institutions, so as to achieve benefits for themselves and others. In particular, according to Hall and Taylor, this approach fo-

cuses on how individuals, operating within organizations, engage in strategic interaction in the determination of outcomes (ibid:12). Actors are expected to act strategically and instrumentally within a set of preferences influenced by their institutional location and its normative expectations, their social locations, and their own values and goals. That is, while actors operate strategically and with calculus, they do so in ways that are influenced by their institutional and personal preferences.³

The Hall and Taylor approach to institutions emphasizes the role of individual choices and strategizing in determining the resilience and adaptive capacity of communities and regions. As such, it moves analysis away from a focus on adjustments and forces within systems. Now the concern is with the way in which acting individuals, operating within the context of institutional frames, significantly affect adaptive capacity through their behaviour. From a focus on the architecture of institutions, the balance has shifted to a concern with organizations as institutional arenas that shape behaviour, albeit in culturally influenced ways.

A focus on how actors make “choice within constraints” (Brinton and Nee, 1998: xv; Nee, 2005) constitutes a new approach to institutional analysis that has come to be identified generally in the sociological literature as ‘new institutionalism’ or ‘new institutional analysis’. Nee (1998: 6) sums up the basic stance of new institutional analysis as follows:

... the new institutionalism seeks to explain institutions rather than simply to assume their existence. In this endeavour, new institutionalists in the social sciences generally presume purposive action on the part of individuals, albeit under conditions of incomplete information, inaccurate mental models, and costly transactions.

Hall and Taylor (1996: 15) describe this as a sociological perspective:

³ In case this statement leads to confusion of our intention, we emphasize that we are not arguing that individuals always act to maximize benefits. Much research in sociological psychology demonstrates that this is not the case. Rather, people seek to achieve a satisfactory level of benefit by engaging in what is called ‘satisficing’. Likewise, we are not contending actors always engage in objectively ‘rational’ action. Rather than engage in action that is ‘rational to them’, given their own values and goals for themselves and others.

The new institutionalists in sociology ... have a distinctive understanding of the relationship between institutions and individual action.... that is to say, they emphasize the way in which institutions influence behaviour by providing the cognitive scripts, categories and models that are indispensable for action.

Furthermore, as Taylor and Hall (1996: 6) point out, this is fundamentally a question of legitimacy, authority and power. In their words:

Central to this approach, of course, is the question of what confers 'legitimacy' or 'social appropriateness' on some institutional arrangements and not others. Ultimately, this is an issue of cultural authority. (ibid.)

This point has profound implications for the assessment of how institutions play a role in adaptive capacity, as it raises the issue of how authority and legitimacy is enacted within institutional processes. It opens up the issues of control and power within institutional contexts. If institutions are now seen as cultural forms constraining human action and in which individuals construct what they perceive to be appropriate courses of behaviour, then whose values dominate in the determination of what are legitimate values? Similarly, whose values and goals guide the perception of what are the appropriate courses of behaviour to take in varying circumstances?

With this, we have embedded the discussion of institutions and adaptive capacity into the broader issues related to social structure of particular concern to sociologists. Institutional values do not exist in a vacuum. They exist because they are the product of certain social relations that give them legitimacy, and they support the interests of those with the resources to make them dominant. Thus, to talk about the relationship between institutions and adaptive capacity without reference to these broader issues of control, power and resources is to leave out significant aspects of adaptive capacity. Twenty-seven years ago, DiMaggio and Powell (1983) argued that the power of elites influences institutional genesis, reproduction and transformation in at least two ways: in the initial shaping of institutional "premises" and at key moments or turning points where elites are favourably positioned to make choices and decisions that may have persistent temporal influence over the course of organizational goals and policy. More recently, Hotimsky et al (2006) maintain that the nature and distribution of power in society effects the functional

roles of institutions, such that it is not enough to ask for what purpose institutions exist, but also in whose interest they exist, persist, or change.

Power takes many forms. It can be obtained through coercion, or it can be achieved through knowledge. It can be realized through force, or it can be granted through legitimate political processes that are institutionalized in a society. Yet, there can be no doubt that power relations are important to the adaptive capacity of any community – including the capacity to deal with the risks produced by climate change. For example, the extent to which a community is vulnerable to environmental risk is, to a large degree, a product of the extent to which those in control have the knowledge and legitimacy to respond appropriately. We see this particularly clearly at the national and international level where, in some countries, those with the most power to act to ameliorate the negative effects of global warming develop ‘solutions’ more inclined to protect particular economic interests than to develop policies aimed at reducing greenhouse gas emissions. However, it is also true at the community and regional level. Portes (2004: 243) best captures this set of issues. Institutions, he argues, need to be understood with respect to clear definitions of the role of *culture*, including norms and associated social roles, and *social structure* as it arises from the distribution of power and social class (Portes 2006: 239).

It is our position that, when studying the adaptive capacity of communities or larger locations, it is not enough to define institutions as simply “blueprints” or “rules of the game”. One must also examine what groups or individuals have the power, legitimacy and authority to act within, or outside of, these institutional blueprints to influence adaptive capacity. For us, the empirical analysis of adaptive capacity with respect to environmental change begins with a consideration of those organizational structures in any locality that have the responsibility, the power, and the legitimacy to respond to environmental challenges within it. In any state where the rule of law is paramount and where civil government operates at the local level, this is almost invariably the civic leadership and governance structures responsible for maintaining order and delivering services within that local area. These civic political organizations constitute the frontline in responding appropriately to climate change challenges. That is, to the

extent that adaptive capacity requires local solutions, then it is local civic government that has the immediate responsibility of guiding and managing societal responses to social-ecological changes. Municipal councils are the social units most directly vested with levels of legitimacy and power to act on behalf of their locality. This is particularly true of larger and more complex centres where the responsibilities of local government are explicitly articulated, but is no less true of small local communities where the legitimated authority may be the result of custom and tradition.

In making these claims, we have been careful to respect the distinction between institutions and organizations, and the relationship between them. Institutions remain the normative architecture for action that both legitimates governance organizations and provides the blueprint of how they appropriately operate. For example, when bureaucrats talk about governmental organization as being constructed into silos, they are essentially talking about the underlying institutional norms that led to this form of organizational structure. However, behaviour within these organizational forms is also structured in institutionalized ways. In part, this is simply the result of the way in which these organizations have been normatively structured over time. Institutions shape organizations, and organizations shape behaviour. However, behaviour within these organizations is also very much a product of what is deemed normatively appropriate. Some actors operate totally within the normative expectation of their role responsibilities. Others go beyond the expectations of their positions and act in unique, and sometimes creative, ways to achieve complex organizational goals.

That is, actors not only occupy roles, they also construct them. In the context of concern here, namely the roles played by civic officials and administrations, it is this ability to reconstruct roles in ways not institutionally prescribed that may make the difference between a community with resilience and adaptive capacity, and one that remains vulnerable and threatened by environmental changes. Hence, by examining processes of governance and governing at the local community level we hope to reveal some of the complex ways in which governance institutions effect or contribute to adaptive capacity. We are particularly interested in the institutionalized ways in which the power to make decisions is unevenly distributed through-

out organizations and how this distribution influences the ability to take action, the paths in which action occurs, and the likelihood of appropriate and successful outcomes being achieved. Our approach, based on the perspective of new institutional analysis, places its emphasis on how regulatory structures actually work in terms of: (a) the accepted and expected ‘habits’ (i.e. the habitus) for operating within them; (b) what interests are served by them; and, (c) the capacity of these organizational structures to respond to the risks related to climate change. In the context of this approach, the adaptive capacity of a community is influenced by the way its fundamental governance organizations and the behaviour of those within them are constrained by the institutional requirements of the organization. In some cases, the institutionalized ways of dealing with situations can contribute to the resilience and adaptive capacity of communities. In other cases, where new approaches are required but the capacity of undertaking them is limited by institutionally based processes, the community remains vulnerable in the face of changing conditions (Berkes et al, 2003). We focus therefore, on the way in which organizations embody institutionalized cognitive maps and normative expectations that either facilitate or block adaptive responses to climate change. By examining these processes in and through the actions of individuals in civic governance positions, we are better able to understand whether, how, and, how successfully, a community can face climate change vulnerabilities now and in the future.

Though we have outlined an approach that has its roots in sociological analysis, its basic stance is compatible with several recent works that also seek to provide an action orientation to institutional analysis of climate change. Of particular relevance is Ostrom’s (2005) *Institutional Analysis and Development* (IAD) framework, and the work on *Institutional Dimensions of Global Environmental Change* (IDGEC) that has been developed by the Institutional Human Dimensions Program (IHDP) (Young et al, 2008).

Ostrom’s (2005) analysis focuses on what she calls “action arenas”. These are said to include two essential elements (called holons), an action situation and the participant in that situation (2005: 14). Her work links both the cultural and the action approaches identified above through a focus on how rules affect decision outcomes (2005: 29). In such situations, actors are seen to choose an appropriate

course of action. Such ‘choices’ are governed by normative expectation but also involve “decision points” (2005:44-45). A strong focus of Ostrom’s work is on the “strategy” used by actors within institutional contexts. As we have similarly noted, such strategies are influenced by trust and by the social capital relations developed through interaction in institutional settings (2005: 70-78).

The IDGEC project summarizes a decade of analysis and research by an international and interdisciplinary team of social scientists. It has deliberately sought to incorporate an NIA perspective.

Our research has sought from the outset to take advantage of the intellectual capital of the *new institutionalism* in formulating our research agenda... The project shares with the new institutionalism a strong interest in what are known as collective action problems, or situations in which seemingly rational choices on the part of individual members of a group lead to societal results that are understandable from the perspective of all the members of the group (Young, 2008:6).

The main independent variable in the IDGEC framework is institution, and the focus is on how institutions are “embedded in more comprehensive process of learning and response” (ibid.: 53-55). Their analysis provides something akin to a template of what aspects to examine when considering the role of institutions in adaptive capacity. In particular, they highlight six dimensions of research and analysis on which to assess institutional capacity. These are: (1) design; (2) performance; (3) causality; (4) fit; (5) interplay; and (6) scale. While all are relevant, the last three of these are particularly germane to our own research in governance in an Arctic gateway city. *Fit* relates to the extent to which governance institutions are congruent with ecological needs. *Interplay* is the extent and manner in which different levels of governance interact. *Scale* refers to the geographic range of governance institutions from the local to the global (ibid.: 26-35). The approach favors what it refers to as a “diagnostic method”, by which is meant a focus on the nature of specific institutional arrangements as they guide the behaviour of individual actors (Ibid.: 120). Central to that method is an analysis of “the four Ps”: (1) problems; (2) politics; (3) players; and (4) practices (Ibid., 121-134). We cannot here present the detailed criteria provided for each of these dimensions, other than to note that they deal with actors (players), behaviours (practices), normative contexts (problems) and power relationships (politics), all of which we have identi-

fied as crucial to a dynamic institutional analysis of adaptive capacity.

As the preceding analysis demonstrates, there is now a growing body of conceptual analysis in the field of environmental analysis that identifies the adaptive capacity of institutions as a dynamic process involving strategic decisions by actors. There is also an awareness of this as a governance process involving the interplay of different jurisdictions and multiple dimensions of scale, performance and cause. In environmental analysis, there is even something akin to a template for carrying out such analysis, focusing on the readiness for, and responses to, global warming. Yet, despite a growing call to assess the responses to climate change in such terms, there is little empirical research being carried out utilizing this 'new institutional' approach. Hence, in the next section, we will provide a brief introduction to our own efforts to implement a NIA approach, in our analysis and assessment of the responses of the City of Whitehorse to the challenges of climate change in Canada's north. Our study demonstrates how the framework we have advocated here may be used in actual policy research linking issues of ecological change and social analysis.

5 Operationalizing *New Institutionalism* in an 'Arctic Gateway City'

The City of Whitehorse, located just north of the sixtieth parallel is the capital of Yukon Territory. With almost 26,000 residents the City is home to approximately three quarters of Yukon's population. The city limits encompass some 416 km² giving it the largest per capita land base of any city in Canada. In popular mythology, Canada's north is peopled by mostly indigenous persons living in small communities. The reality is that over two-thirds of northern Canadians live in larger administrative centres (e.g. Whitehorse, Yellowknife, Iqaluit) some hundreds of kilometres south of the Arctic Circle. These are administrative and economic development centres for the whole Arctic and, as such, constitute what we call 'Arctic Gateway Cities'. The City of Whitehorse not only links the Territory

to the amenities and opportunities that emanate from the south and is a gateway through which southern resources, goods and services are channeled. For the City of Whitehorse, these are both exciting and demanding times. Whitehorse is in a period of economic and population growth, spurred primarily by economic benefits from mineral, oil and gas exploration and from a tourist boom. On the other hand, the western sub-Arctic region immediately north and west of Whitehorse is experiencing significant impacts from global warming and resulting ecological changes. Glaciers are melting and permafrost disappearing. Located on a low-lying plateau at a bend in the Yukon River, Whitehorse's downtown is potentially subject to flooding. There is also the risk of increased forest fires. The climate itself is also changing. While winters are somewhat warmer than previously, in summer there is increased overcast and rain, reducing the quality of outdoor life for people who spend long winter months in sub-Arctic darkness looking forward to long, clear summer days and sunny evenings.

The City of Whitehorse, including its Mayor, Council and senior administration, are very much aware of the impact that global warming is having elsewhere and of the need for the City to prepare for change and to engage in sustainable practices. Accordingly, the City, with considerable community input, has developed a Sustainability Plan and has established the position of Sustainability Manager to oversee its implementation. With their concern for environmental issues, the Mayor and Council was willing to grant our request to meet with them to consider being part of a study of sustainability and adaptive capacity to climate change, and subsequently agreed to partner with us in it. Over the past several months we have interviewed elected officials (Mayor and Council) and senior and middle-rank officials within the City administration. As these interviews progressed, it became clear that many of the City policies and actions were influenced by policies and actions of other levels of government and, as a result, we have also interviewed many officials within the Yukon Territorial Government (YTG) whose work activities bring them in close contact with City officials.

Throughout this paper we have argued for an approach to adaptive capacity that focuses on institutions as arenas in which actors work. We have suggested that adaptive capacity is created not through the

normative regulations but through the capacity of actors to operate in strategic ways within the normative contexts of organizations. In particular, we have recommended a focus on those who, at a community level, have the authority of legitimacy and the power to act, either within established normative procedures or with flexibility to respond in new ways to unique situations. We have also emphasized the importance of what Ostrom has labeled 'decision points' as key windows through which to identify whether organizations are adaptive to new situations that confront them.

Our Whitehorse and YTG interviews reflect these principles. We have focused on those with various levels of power and authority to make decisions and probed deeply into decision-making processes and practices as they are played out in the context of both routine and unusual circumstances. It is through the multiple decisions made within government agencies and organizations that processes, regulations, and priorities are applied. It is through decision-making strategies that problems are resolved and plans developed - all critical elements of governing and responding to change. At the same time, examination of the way decisions are made, who makes them, and the various actions that precede and follow decisions, reveals certain cultural and social elements of institutional process and organizational structure.

We focus on two types of decision; (1) routine decisions made around regular or repeated administrative actions that in many respects define the day to day, or season to season, operations of the community; and, (2) decisions made under unusual or unique circumstances - things outside the 'ordinary' or things that come about through gradual or sudden shifts either to social or ecological conditions. In our analysis we explore multiple levels of *government* in order to gauge and understand how *governance* processes vary between and within institutions. This involves a thorough understanding of existing social and political structures or the architecture of governance institutions (Pelling and High 2005). In this respect, we focus on the institutional architecture of the City administration, and we look at the organizational relationships, flows of authority and the allocation of resources (e.g. budgets) that occur within it. We examine the locations and applications of power and the cultural dimensions and roles that characterize relationships and interactions.

To ensure that we cover these dimensions adequately, we use an interview schedule that covers the following areas:

- Workplace Roles, Relations and Culture
- Decision Processes
- Capacity and Change – Economic, Environmental, and Climate Changes
- Sustainability – Culture and Goals, Measures and Indicators

Throughout our interviews, we seek constantly to understand how behaviour is constructed and strategies developed within the context of institutionalized relations to deal with the usual and the unusual, the normal and the unique. We remain vigilant in our efforts to determine whether the City administration retains the flexibility both to respond in well-practiced ways when these seem appropriate, and to seek new patterns of response when new approaches are required. In particular, we focus on the capacity of actors to cross institutional boundaries, both within the City administration and in contact with the YTG, as well as with civic organizations. Our reports and papers developed from these data will utilize NIA and other institutional perspectives such as those by Ostrom and the IGDHC. Through them we will explain and evaluate the extent to which those responsible for the management and planning of Whitehorse demonstrate adaptive responses to the environmental challenges that they face.

6 Conclusion

This book examines what its editors describe as the quintessential contemporary question, namely the relationship between sustainability and adaptive capacity. In this chapter we contribute to this goal by providing an analysis of the relationship between adaptive capacity and institutional processes. In particular, we argue that adaptive capacity is related to the capacity of institutional processes to adapt to unique challenges. This, in turn, is related to the ability of individuals within institutional contexts to pursue strategies that respond effectively to new situations and unique events. We also suggest that decision-making processes within various levels of gover-

nance institutions are critical to adaptive capacity, particularly at the community level. We are in agreement with Adger's observation that, "adaptive capacity is only potential until there are governance institutions that make it realizable" (2003: 33).

In reaching these conclusions, we have carried out four tasks. *First*, we have analysed some of the existing perspectives on adaptive capacity, highlighting that it is both an ecological and a social process. This is an important starting point given the somewhat disparate, and occasionally contradictory, literature on adaptive capacity as a social process. In our analysis, we have emphasized the extent to which much of the adaptive capacity literature rests on systems assumptions common in ecological reasoning, and has generally adopted a similar systems stance when it comes to the social sphere. Instead, we have espoused a more dynamic perspective. *Second*, we have presented a similar overview of the work dealing with the relationship between adaptive capacity and institutions. Here, our predominant concern is the extent to which institutions have been conceived largely as normative brakes on change, rather than as frameworks for strategic interaction within organizations. In contrast, we have advocated a focus on the dynamic processes of organizational and institutional change and the processes of decision-making and strategic interaction that occurs as a result of environmental challenges. *Third*, we have outlined the 'New Institutional Analysis' perspective deriving from history, sociology and political science. We propose that it provides the basis of the dynamic institutional perspective that we see as important. Further, we have linked NIA to other recent work on institutions by Ostrom and by the IDGEC that provide analytic frameworks based in empirical research that also contribute much to this way of looking at institutions as dynamic contexts for strategic action. *Fourth*, we have provided a very brief (though we hope useful) introduction to one of our empirical research projects that is seeking to operationalize this approach to institutional analysis in a specific community context. Our aim is to show how the institutional approach we have been advocating can be operationalized as a research tool for effective empirical analysis of adaptive capacity as a social process.

This paper has involved a complexity of conceptual terms and abstract analyses. While adaptive capacity is the unifying theme under

discussion, we (and we suspect other contributors to this volume) discuss at length how we define adaptive capacity, how it relates to other key terms in the global change literature such as vulnerability, resilience, adaptation, risk, social learning and, most particularly, institutions. The definitions are myriad and as varied as the disciplines from whence they emerge. We suspect that the civic leaders and officials, whose responses are the subject of our empirical analysis in Whitehorse, would be bemused (if not aghast) at what is presented here. We fear that they might view this as merely the intellectual pastime of academics and respond with a combination of disbelief and ridicule at our diversion into such arcane pursuits. How, they might ask, can this possibly help them chart an appropriate strategy to deal with any of the very real and multifaceted challenges and demands involved in running a mid-sized city in an isolated and harsh northern setting? It may, at this stage, be of little assurance to them that we also are constantly asking ourselves, "How will this help Whitehorse?" Our generally positive response rests on our belief that both the causes of climate change and the responses to it are inherently social processes. We are attempting to hold up a mirror for the civic leaders of Whitehorse to better enable them to see of how these social processes operate in their city and identify how they might pursue effective responses to environmental and related changes.

We have argued that it is important to focus on local governance processes as these are the keys to effective adaptive capacity. This is not to suggest that local communities must 'go it alone' in responding to environmental changes. Brooks (2003: 12) is rightly critical of a strategy that allows us to "avoid challenging the powerful political and economic vested interests that determine the nature of the geopolitical and economic contexts within which adaptation must be carried out". We agree. On the other hand, as has been repeatedly stated in the literature, adaptive capacity occurs locally and a focus on the relationships of control, power, and governance at the local level is also critical to designing appropriate responses. Our work, then, is the appropriate first step in understanding the broader nexus of governance processes and power relationships that may ultimately determine local adaptive capacity. Adaptive capacity is ultimately the ability to respond effectively to the uncertainties of short-term

hazards and long term risks. Understanding the processes leading to effective governance responses is a critical aspect of achieving that capacity.

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