

PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/68739>

Please be advised that this information was generated on 2019-03-26 and may be subject to change.

Institutions For Climate Change: A Method To Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society

Joyeeta Gupta, Katrien Termeer, Judith Klostermann, Sander Meijerink, Margo van den Brink, Pieter Jong, and Sibout Nooteboom

Abstract

Climate change calls for institutions that promote the adaptive capacity of society and allow society to modify its institutions at a rate commensurate with the rapid rate of environmental change. Climate change potentially brings continuous and unpredictable changes to local weather patterns, water supplies and sea levels. Institutions, traditionally conservative and reactive, will now have to be designed in a way that they support social actors to proactively respond through planned processes and deliberate steps but also through cherishing and encouraging spontaneous and autonomous change that is rapid enough to deal with the impacts, as well as allow for institutional redesign. This paper addresses the question: How can the inherent characteristics of institutions to stimulate the adaptive capacity of society to climate change from local through to national level be assessed? On the basis of a literature review and several brainstorm sessions, this paper presents six criteria: Variety, learning capacity, space for planned and innovative autonomous action, leadership, availability of resources and fair governance. Together these six criteria form the Scorecard for Adaptive Capacity. This card can help academics and social actors to assess the inherent characteristics of institutions to stimulate the adaptive capacity of society to respond to climate change; and to focus on whether and how institutions need to be redesigned.

Key words: climate change, governance, institutions, adaptive capacity, criteria

1. Introduction

Increasing scientific evidence (IPCC 2007) and political recognition of the climate change problem (treaty negotiations under the Climate Convention; European Commission 2007) call for not only climate mitigation but also adaptation to the potential impacts (e.g. Stern 2007). Such adaptation takes place within the local and national social or institutional context (see 2.2). It thus becomes necessary to understand the inherent characteristics of institutions to stimulate the adaptive capacity of society to deal with continuous, uncertain and often unpredictable structural changes (IDGEC 2005). On the basis of such an understanding, institutional redesign based on social debate about what changes are necessary and how they can be achieved needs to be stimulated.

Both the global climatic system and human society are continuously changing systems (see Figure 1). These systems sometimes evolve in response to impacts emerging from

the other system and sometimes autonomously of each other (cf. Gilbert 2006). Institutions evolve incrementally to deal with social problems, but tend to be reactive and conservative. Through history, social systems have reacted to changing circumstances (Delapenna & Gupta 2008). Since the industrial revolution, human activities have led to a more rapid rate of environmental change. While the natural sciences can predict, within limits, the potential future environmental impacts of various human actions on society, political systems are still caught in four to five year democratic cycles, societies are locked into long-term patterns of production and consumption through past and current infrastructural decisions, and lifestyle and ideological premises appear deep-rooted and institutions may often reflect deep social taboos (cf. Pollitt & Bouckaart 2000). From a social science perspective, it is critical to study whether institutions stimulate the adaptive capacity of society to deal with the continuous potentially serious and irreversible impacts of climate change. Since the climate as well as society are continuously evolving systems and since these are interlocking processes with short and long-term impacts, the process of societal response will have to be accelerated to both cope with the impacts of climate change and rapidly reduce the rate of growth of emissions of greenhouse gases. Against this background, this paper seeks to address the question: How can the inherent characteristics of institutions to stimulate the adaptive capacity of society from local through to national level be assessed and through what tools?

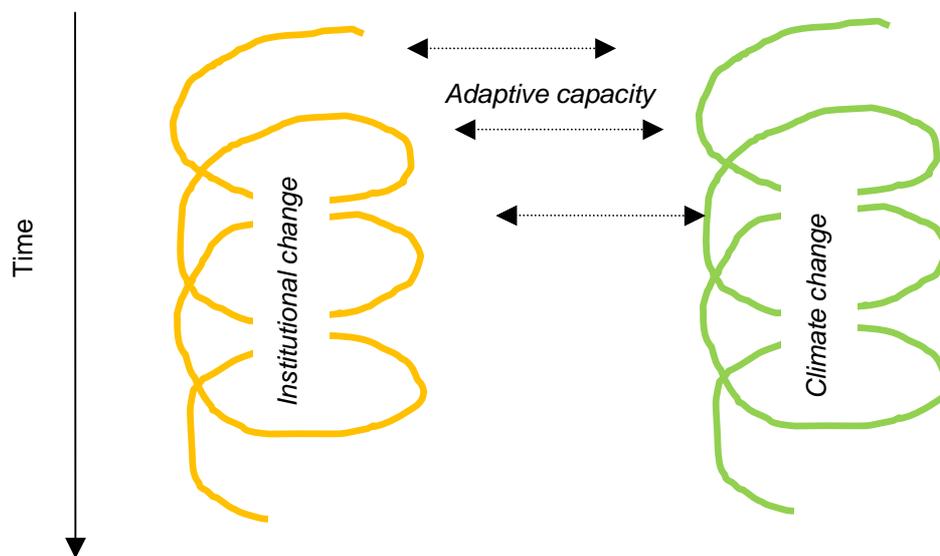


Figure 1: Institutional change and climate change as continuously evolving systems in interaction.

This conceptual paper builds on the literature (see 2), internal brainstorm sessions and responses from social actors and scientists (see 3) to identify criteria and a related Adaptive Capacity Score Card (see 4), which will be tested over the next two years.

2. Literature review

2.1 Selection of literature

The adaptation literature addresses questions such as: What will the impacts of climate change be? How can they be downscaled to local level? Who should adapt to these impacts? What are the generic measures to encourage adaptation in different sectors? However, there is little research on assessing institutions (e.g. WRR 2006). This paper attempts to bridge this gap by connecting the literature on institutions, governance and management with that on adaptation and adaptive capacity.

2.2 Institutions and governance

Institutions have been defined by many including Nobel laureate Douglas North. The International Human Dimensions Programme's Institutions project defines institutions as: "systems of rules, decision-making procedures, and programs that give rise to social practices, assign roles to the participants in these practices, and guide interactions among the occupants of the relevant roles" (IDGEC 1999: 14). The rules and roles can be formal and informal, visible and latent, and conscious and unconscious (Arts 2006). Institutions both enable and yet restrict the opportunities for actors to respond (Sharpf 1997) to changes in the environment.

'Institutions' sometimes refers to 'organizations' since these are formalised patterns of rules and decision making and in ordinary speech, 'institutions' has become synonymous with 'organizations'. However, in this paper institutions are not equivalent to organizations as institutions also refer to underlying ideological values and norms (Zijderveld, 2000; Young 1989; IDGEC 1999) and they are not actors.

Institutions reflect formal governmental processes as well as formal and informal social patterns of engagement. This approach is consistent with the discourse shift from rigid, centralised, unitary, hierarchical 'government' founded on instrumental reasoning to 'governance' where networks and horizontal relations between interdependent actors have grown in importance (Hanf & Sharpf 1978; Blatter 2003; Arts & Van Tatenhove 2005; Hajer & Wagenaar 2003; Rhodes 1997; Pierre 2000; Kooiman 1997; Rhodes 1997; Pierre 2000) giving rise to related concepts like network management (Kickert *et al.* 1997; Koppenjan & Klijn 2004) or deliberative policy making (Hajer & Wagenaar 2003; Fischer 2003). Governance bridges the gap between state and civil society and uses the interdependencies in a network society for decision making procedures instead (Van Gunsteren 1976; Castells 1996; Commission on Global Governance 1995; Krahnmann 2003).

If institutions are developed by humans, they can also be changed by humans. However, institutions are inherently conservative. This is a weakness and yet a strength. Institutions are agreements following long debate, and if these hard-won institutions would not survive until the next day, there would be little point in creating them. Therefore, all institutions embed a degree of robustness and resistance to change. This process is called institutionalization. The institutional literature has largely focused on explaining the sta-

bility and persistence of institutions without which every form of collective behaviour would be impossible (Garud *et al.* 2007, March & Olsen 1989; Hemerijck 2001; Sharpf 1998). They are difficult to change, because they carry the bias of previous interactions, views and power relations (Klijn & Koppenjan 2006). However, institutions do not determine human action. They shape social practices, but it is also social practices that constitute (and reproduce) institutions (e.g. Giddens 1984). And, if enough people act in innovative ways, their action may have the consequence of transforming the very structures that gave them the capacity to act. The same agency that sustains the reproduction of structures also makes possible their transformation (Sewell 1992). Thus, the inherent characteristics of institutions to stimulate the adaptive capacity of society involves both the possibilities that institutions give society to respond to climate change and the possibilities that institutions offer to be redesigned themselves by social actors.

Hence, institutions *can* be changed, but it is difficult to do so. It is critical to ask: Do institutions allow society to adapt fast enough to the ecological changes? What is needed is a balance between absolute rigidity and total flexibility; where should this balance be if we look at the problem of climate change? Is the 'natural' turnover speed of institutions enough to keep up, or do we need an extra effort? And if we do, which institutions are the most inhibitive and should be redesigned as a matter of priority?

2.3 Adaptation

Human societies have always had to adapt to their environment or risk decline. This phenomenon has been studied in history, sociology and evolutionary biology (Ridley 1996, Diamond 2005). Usually a system or individual characteristic helps it to react to the external events and the system or individual's behaviour is also accordingly changed.

Adaptation is complex and definitions vary focusing on the process of adaptation or the end product (Smit *et al.* 2000, Smithers & Smit 1997, Pielke 1998; Leary 1999; Adger & Kelly 1999). The Intergovernmental Panel on Climate Change (IPCC) provides a consensus definition of adaptation 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" (IPCC 2001a: 982). Adaptation aims at preventing risk and reducing vulnerability, coping with extreme events and capitalising on the opportunities provided by the potential impacts of climate change.

Adaptation can occur locally through to global levels, by individuals or collectively, on micro through to long time scales. It can be reactive or anticipatory, private or public, planned or autonomous (IPCC 2001b). In short, anything, anywhere can be labelled as adaptation, which can make it a difficult phenomenon to research. Generally planned anticipatory adaptations are often undertaken by government (Olmos 2001) although distinguishing types of adaptation according to actors is not easy (Fankhauser *et al.* 1999). Reactive (or autonomous) adaptation includes coping strategies that actors make in response to a specific climatic impact (ex-post). This requires that the actors are aware of the impacts and are able to react appropriately. Ex-ante strategies are useful because they minimise potential impacts on society, but since such strategies are developed in an uncertain climatic context, they may be more expensive. Ex-post strategies react to an event and have to deal with the impacts after the fact – and this can also be more expensive than society anticipates. The costs of the Katrina disaster in New Orleans, for exam-

ple, were estimated between USD 100 and 200 billion in 2005 and 2006, while a programme constructing levees as proposed in 1998 would have cost USD 14 billion (Frischetti 2005: A23). Decision-makers have to make decisions under uncertainty. Much of the literature focuses on planned and precautionary adaptations (e.g. Mendelsohn 1999; Burton 1996; Smit & Pilifosova 2001; Bryant *et al.* others 2000; Lewandrowski & Brazee 1993; Fankhauser 1996; Smith 1997; Pielke 1998; UNEP 1998; Burton *et al.* 1998; Fankhauser *et al.* 1999).

Mainstream organizational change research suggests that the unpredictability and continuous character of environmental change call on organizations to deal with uncertainty, volatility, and surprise through continuously changing and innovative behaviour (Lengnick-Hall & Beck 2005; cf. Weick 1988: 70; Wildawsky 1988) Weick & Sutcliffe (2001) add that in dynamic, ambiguous and unpredictable environments, planning can weaken the ability to respond to the unexpected. Cybernetics and complexity theories use the term “adaptation”, in particular, in “complex adaptive systems” (CAS). Duit & Galaz (2008) operationalize this for the extremely complex system of the earth with its human governance system. They contend that societies need to govern a system that is actually a CAS, and understanding that reality may help to govern it.

There is also literature on practical adaptation strategies, instruments and measures in different social sectors (e.g. IPCC WGII 2007, EEA 2006, Walsum *et al.* 2005). This literature often discusses policy options, but does not discuss institutions in much detail. They often see institutions as barriers to adaptation (Hargadon & Douglas 2001, McEvoy 2008), and the process of embedding the findings in institutions is scarcely attempted.

2.4 Vulnerability, resilience and adaptive capacity

The capacity of a system to react to external stimuli has been described in the literature (e.g. Smit *et al.* 2000) in terms of vulnerability, sensitivity, resilience, and adaptive capacity. The concept of adaptive capacity has been influenced by work done in the area of social-ecological systems (Holling 1986). Institutions are explicitly included in this literature and provide integrated frameworks for analysis of social and physical aspects of a system. The concepts, however, have been used in different ways in the literature (Perrings, 2006; Dalziell, 2004).

IPCC (2001: 6) describes *vulnerability* as “The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.” This definition can apply to other natural (e.g. earthquakes), political (e.g. wars) or social (e.g. economic) stressors beyond climate change. For IPCC, *exposure* refers to the chance that a system is actually exposed to a natural or anthropogenic disaster. *Sensitivity* is a characteristic of the community and the ecosystem in a certain area, describing the degree of harm that can occur when a disaster hits the area. *Adaptive capacity* describes the ability of the community and the ecosystem to prepare for, or cope with such a natural or man-made disaster.

Adaptive capacity, defined by the Millennium Ecosystem Assessment (2006: Glossary, 599) and IPCC (2001: 6, IPCC WGI 2007) focuses on: “The ability of a system to adjust

to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences”.

Adaptive capacity and resilience are sometimes used interchangeably, however, resilience has been used mostly in relation to natural systems (Holling 1986). In evolutionary studies a high resilience is indicated when a system quickly returns to an equilibrium state after a crisis (Pimms 1984) or one can measure a system's resilience is measured by the amount of disturbance that is needed to push it out of its equilibrium state (Holling 1986). Resilience often includes adaptive capacity and robustness (a characteristic of a system to accommodate stress with adaptation, Perrings 2006). Others (e.g. Dalziel & McManus 2004) see resilience as the overarching concept, encompassing both vulnerability and adaptive capacity.

Unlike resilience and vulnerability that encompass both changeable and unchangeable characteristics of a system, adaptive capacity focuses on the changeable aspects and hence is seen as the most appropriate concept for assessing institutions in our view.

2.5 Assessing Adaptive Capacity

The next question is: what does adaptive capacity mean, when it is applied to institutions? Assessing adaptive capacity calls for understanding the extent to which institutions enable society to respond in time to moderate potential damages or benefit from opportunities of climate change. In identifying criteria for assessing adaptive capacity the literature provides some hints.

Earth system governance literature emphasise four criteria: credibility including the commitment of resources, stability of the governance framework, responsiveness to new situations and social learning, and inclusiveness or participatory governance (Biermann 2007).

The adaptation literature submits that the effectiveness of autonomous, reactive adaptation measures depends on institutional support, manpower, financial and technological resources (Ausubel 1991, Yohe *et al.* 1996, Mendelsohn & Nordhaus 1999; Mendelsohn & Neumann 1999). Autonomous adaptation is not easy to assess since humans react for a large part unpredictably and while they may be able to react to some types of impacts, they may not be able to react to other impacts (Barnett 2001). Sectors that have a history of adapting to changing circumstances may be better able to react to a changing climate (Mendelsohn 1999).

Folke *et al.* (2003: 355) argue that adaptive capacity has four dimensions: (a) learning to live with uncertainty (learning from crises, expecting the unexpected, evoking disturbance, recognizing the relationship between diversity and disturbance); (b) nurturing diversity for reorganisation and renewal (nurturing ecological memory, sustaining social memory and enhancing socio-ecological memory) (c) combining different types of knowledge for learning (combining experiential and experimental knowledge, integrating knowledge of structure and function, incorporating process knowledge into institutions, and encouraging complementarity of knowledge systems) and (d) creating opportunities for organization (dealing with cross-scale dynamics, matching scales of ecosystems and governance, and accounting for external drivers).

Smit *et al.* (2001) identify six determinants of adaptive capacity – economic resources, information and skills, infrastructure, technology, institutions (*possibly implying organizations*), and equity. Smit & Pilifosova (2001) focus on measures that reduce local vulnerability and anticipate future climatic changes taking into account local environmental conditions and human needs; and the responses and measures must be ‘mainstreamed’ into economic development and poverty eradication processes.

Yohe and Tol (2002) use criteria such as the range of technological options; availability of resources and their distribution; the structure of critical institutions, allocation of decision making authority and decision criteria; human capital, education and personal security; social capital, property rights and independency of judiciary; access to risk spreading processes; information management by decision makers; and awareness, attribution and significance of climate change.

Marlin and Olson (2007) present a “Measuring Adaptive Capacity Tool” which, *inter alia*, focuses on institutional issues and includes criteria such as (a) the ability of elected leaders in the community to make choices related to climate change; (b) the ability of community leaders to manage information ahead of time to decrease risks such as collecting information on flood plains; (c) the ability of community leaders to share the information they have about climate change and possible adaptation strategies; (d) the availability of a plan that is adaptive, forward thinking, and addressing the risk of sea level rise; and (e) the presence of environmental action groups or similar groups in the community.

The literature confirms that adaptive capacity is a useful concept to assess institutions, and offers ideas. The literature assessment did not provide a systematic conceptualization of adaptive capacity for institutions, instead there is considerable confusion about how institutions support the adaptive capacity of society.

3. A conceptual framework for adaptive capacity

3.1 Definition of adaptive capacity

This section elaborates on our definition of adaptive capacity and the criteria for assessing the inherent characteristics of institutions to stimulate society to adapt. We define adaptive capacity as the inherent characteristics of institutions that empower social actors to respond to short and long-term measures either through planned measures or through allowing and encouraging creative responses from society both *ex ante* and *ex post*. It encompasses:

- The characteristics of institutions (formal and informal; rules, norms and beliefs) that enables society (individuals, organizations and networks) to cope with climate change, and
- The degree to which such institutions allow and encourage actors to change these institutions to cope with climate change.

This implies that institutions should allow actors to learn from new insights and experiences in order to flexibly and creatively ‘manage’ the expected and the unexpected, while maintaining a degree of identity. Adaptive capacity is not a static concept, but one which calls on society to continuously respond; however, the adaptive capacity for short-term climatic events will be different from the adaptive capacity for medium-to long term climatic events.

3.2 Qualities integral to adaptive capacity

We argue that three basic qualities - Variety, Learning capacity and the Ability to adjust to change - can be seen as integral to adaptive capacity.

3.2.1 Variety

Unstructured problems like climate change embedding diverse interests and perspectives can only be dealt with within a framework of multiple discourses and solutions, where multiple actors intervene at multiple levels of governance (Hisschemöller & Hoppe 1988). “Only variety can beat variety” (Buckley 1968: 495)

Variety implies the capability of a system to envisage future expected and unexpected climate impacts through having a range of adaptive or proactive strategies, measures and instruments at its disposition, “limiting lock-in into a development that precludes future adaptations” (Nooteboom 2006: 2-3). The ‘law’ of requisite variety states that the variety within the system must be at least as great as the environmental variety against which it is attempting to adjust itself (Conant & Ashby 1970). This suggests an optimum level of variety; however this is very difficult to operationalise in practice.

Variety calls for fostering diversity, understanding complication, resisting the tendency towards simplification, reductionism and redundancy. Redundancy implies ‘more of the same’, for example, a back up system for energy production or more than one emergency exit, while variety refers to a diversity of options.

Variety challenges mainstream policy approaches that focus on clarity, rationality, reductionism, efficiency and simplistic solutions and oppose free riding, multiple administrative levels and policy domains, different senses of urgency, fragmented and inert budgets, and so on. Requisite variety reacts against ‘performance oriented management’ (Pollitt & Bouckaert 2004), and the ‘audit society’ (Power 1999), because unstructured problems don’t fit to a world of one-dimensional measurement (Noordegraaf & Abma 2003).

Variety, similar to “clumsy solutions” (Verweij & Thomson 2006), includes the notion of multi-level governance (Winter 2006; Marks *et al.* 1996), and implies that there is no single appropriate ideological framework, no unique optimal policy strategy or set of mutually consistent solutions, but that there are many. The fittest will prevail, but it is not known in advance which one will be the fittest. Only by encouraging social ingenuity from many people will society continuously generate tailor-made solutions for complex problems in different economic, cultural and political settings.

However, complexity, redundancy and variety can also paralyze action (Weick 1979). Governance approaches face problems like inertia, syrupiness, suffocating consensus, and negotiated nonsense (Termeer 2007). Furthermore, multiple trade-offs may be made

by multiple actors, leading to inconsistent decisions that may or may not be desirable outcomes (Gupta 2004). Possibly the level of variety has an optimum. Variety is not only about the variety itself but also about the willingness and opportunity to organize in an environment that helps actors deal with complex problems.

We argue that an institution embeds variety when it allows for a (a) variety of problem frames and solutions; (b) variety of actors (multi-actor), levels (multi-level) and stakeholders (multi-sector) during policy formulation process; (c) promotes diversity and differentiation of policy to reach tailor-made policies; and (d) allows redundancy in the short-term in order to allow for the best solutions to emerge in the long-term.

3.2.2 Learning capacity

The concepts of human learning (Ormond 1999), social learning (Wenger 1998) and learning capacity are integral to adaptive capacity (Pahl-Wostl 2007). Some see adaptive capacity as learning and the ability to experiment (Walker *et al.* 2002); as coping with change while still maintaining all critical functions and feedback mechanisms (Olsson *et al.* 2004) or accommodating perturbations (Adger 2003). Social learning is sometimes seen as an overarching concept synonymous with adaptive capacity. In our framework, learning capacity is one quality of adaptive capacity, leading to enhanced trust between social actors and greater understanding of the situation.

Learning generally results from observing changes in the environment, but does not necessarily lead to a change in behaviour. Learning capacities can be studied at the individual, organizational and societal level. Behaviourist learning theories (how people learn) and cognitive learning theories (how cognition influences learning) merge in social learning theories. Clinical psychology theory states that people learn through close contact, imitation of superiors, understanding of concepts and role model behaviour. Such learning focuses on the role of actors.

In our framework, we study how institutions encourage actors to learn or discourage actors from learning; how institutions permit society to question the underlying assumptions, ideologies and frames that dominate current modes of governing or problem solving; how flexible institutions are in allowing actors to critically investigate socially embedded meanings, assumptions, knowledge, claims, roles, rules, procedures and identities that are normally taken for granted. This includes double loop learning when social actors challenge basic assumptions leading to new patterns of problem solving that become institutionalised (Argyris & Schon 1978).

Mechanisms that inhibit genuine learning include defensive routines (actions, policies or practices) in organizations that prevent participants from experiencing embarrassment or threat, and overprotect current frames (Argyris 1990). Redesigning institutions often calls for 'unlearning' past insights, routines, fears and reflexes.

Criteria to assess the ability of an institution to demonstrate learning capacity include allowing and encouraging actors (a) to trust and mutually respect each other and to be willing to learn from each other; (b) to engage in double loop learning via learning across boundaries; (c) to explicitly consider doubts and uncertainties; (d) to continuously learn through an organized process, (e) stimulates institutional memory.

3.2.3 Ability to adjust to change (autonomous and planned)

A third quality of adaptive capacity is the ability of an institution to permit social actors to explicitly or implicitly adjust their behaviour in response to an existing or potential stimulus. While learning does not actually include behavioural changes, this quality focuses on the ability of institutions to enable social actors to adjust to changing circumstances. Actual adjustments can be a measurement of whether this ability exists, but we are not focusing on adjustments themselves.

Such adjustment can respond to long term prediction and prevention. This calls for institutions to enable social actors to anticipate possible futures, to take planned preventive measures against important threats and to seize opportunities when they present themselves. But it can also focus on autonomous adjustment to take into account that an institution should allow actors at all, but particularly lower levels of governance, the opportunity to change behaviour especially during a crisis or disaster; since studies reveal that immediate relief efforts are undertaken by other 'victims' and not by the government or aid organizations (Tierney 2006). Institutions should enhance this self-help function of individuals and communities by encouraging experimentation with and responding to everyday contingencies, breakdowns, and opportunities (Orlikowski 1996); continuously improvising in short feedback loops to promote a continual update of social practices. Yet, in a complex multi-actor, multi-level, multi-sector and multi-domain setting, short feedback loops between all interdependent units may make cooperation difficult.

Sub-criteria for evaluating this include understanding whether institutions encourage social actors to adapt to the potential impacts of climate change when it creates mechanisms that ensure that actors have (a) access to information, (b) are capable of acting according to plan and (c) have the capability to improvise.

3.3 Contextual variables enhancing adaptive capacity

Three contextual variables, namely leadership, resources, and fair governance also contribute to adaptive capacity indirectly and can be seen as key features of institutions in general.

3.3.1 Leadership

Without leadership society is often unable to respond to the long-term, large scale challenges that affect humanity and institutions stagnate. Leadership is a driver for change, showing a direction, motivating others to follow voluntarily and/or using coercive measures to promote conformity to a certain development path. Leadership may sometimes conflict with variety. Different types of leadership can be distinguished. The management literature refers to autonomous leaders (Wallis & Dollery 1997); entrepreneurial leadership (Andersson & Mol 2002); reformist leadership (Goldfinch & 't Hart, 2003); institutional entrepreneurs (DiMaggio 1988) or policy entrepreneurs (Kingdon 1984). The institutions literature refers to structural, entrepreneurial and intellectual leadership (Young 1991), coercive, instrumental and unilateral leadership (Underdal 1994), sticks and carrots, problem solving and directional leadership (Malnes 1995) and structural, instrumental and directional leadership (Grubb & Gupta 2000).

While much of the leadership refers to actors in society, our focus is on how institutions encourage leaders to emerge and reshape the very institutions themselves. Since institutions are contextual in nature, they need to promote appropriate forms of leadership to deal with different social problems. For unstructured problems, institutions need to encourage leadership that promotes variety and creativity; dialogue and understanding. Such leadership should be willing to confront uncertainty and be willing to deal with it.

Criteria to evaluate leadership include whether institutions encourage the rise of (a) visionary (or intellectual, directional) leadership; (b) entrepreneurial leadership and (c) collaborative (instrumental) leadership.

3.3.2 Resources

The effectiveness of institutions often depends on its ability to generate resources (Ausubel 1991, Yohe *et al.* 1996 Mendelsohn & Nordhaus 1999, Mendelsohn & Neumann 1999). Institutional norms and rules should call for the generation of resources in order that social actors implementing these rules are able to do so. Clearly, the context within which institutions exist will also have a major influence on whether such institutions are able to raise resources and the success of institutions in being able to do so will be relative. Such resources can include financial, social, human, legal, and technological resources. Sub criteria include whether institutions (a) have authority (mandate), involvement of actors with decision power; (b) human resources; and (c) economic resources.

3.3.3 Fair governance

Lastly, the nature of governance will determine the room given to social actors to participate creatively in the problem solving process. Such governance may have differing levels of legality, legitimacy, equity and accountability which are important preconditions for many of the other criteria. Since we do not emphasise cost-effectiveness, we have chosen fair governance to the dominant phrase of good governance. Of course, fairness also implies that resources should not be squandered indiscriminately and that an appropriate balance needs to be found between effectiveness and efficiency, as innovation processes are notoriously inefficient (Mintzberg 1989) and should be allowed to be inefficient in order to take place at all. Maximum efficiency is only possible in a stable and certain environment and, therefore, it cannot be a first priority when dealing with climate change. Sub criteria include: (a) legitimate policy processes; (b) participatory public policy processes; (c) protection of basic rights and equity; (d) responsiveness and transparency; (e) accountability.

3.4 Assessing the criteria

The above set of criteria is comprehensive and well-documented in the literature. However, it also has some weaknesses. First, there is a danger of overlap between the different criteria and may pose challenges in actual implementation. Second, the framework includes some paradoxes, for example, between variety and leadership. Such paradoxes are reflective of social reality itself and understanding adaptive capacity may call for ex-

pert judgements regarding how to deal with the overlaps and seeming contradictions. Third, the criteria are broad, vague and complicated reflecting complex systems.

3.5 The adaptive capacity score card

Based on the different criteria specified above, an adaptive capacity score card has been generated which would allow for communication with social actors (see Figure 2). The Score Card presents the criteria and sub-criteria in a clock-wise manner. Using three colours to distinguish between high (green), medium (orange) and poor (yellow) adaptive capacity, this card may be used as a simple communication means. The purpose of identifying these criteria and the Score Card for Adaptive Capacity is to both assess and inform social actors about how their institutions score on adaptive capacity and where there may be room for reform.

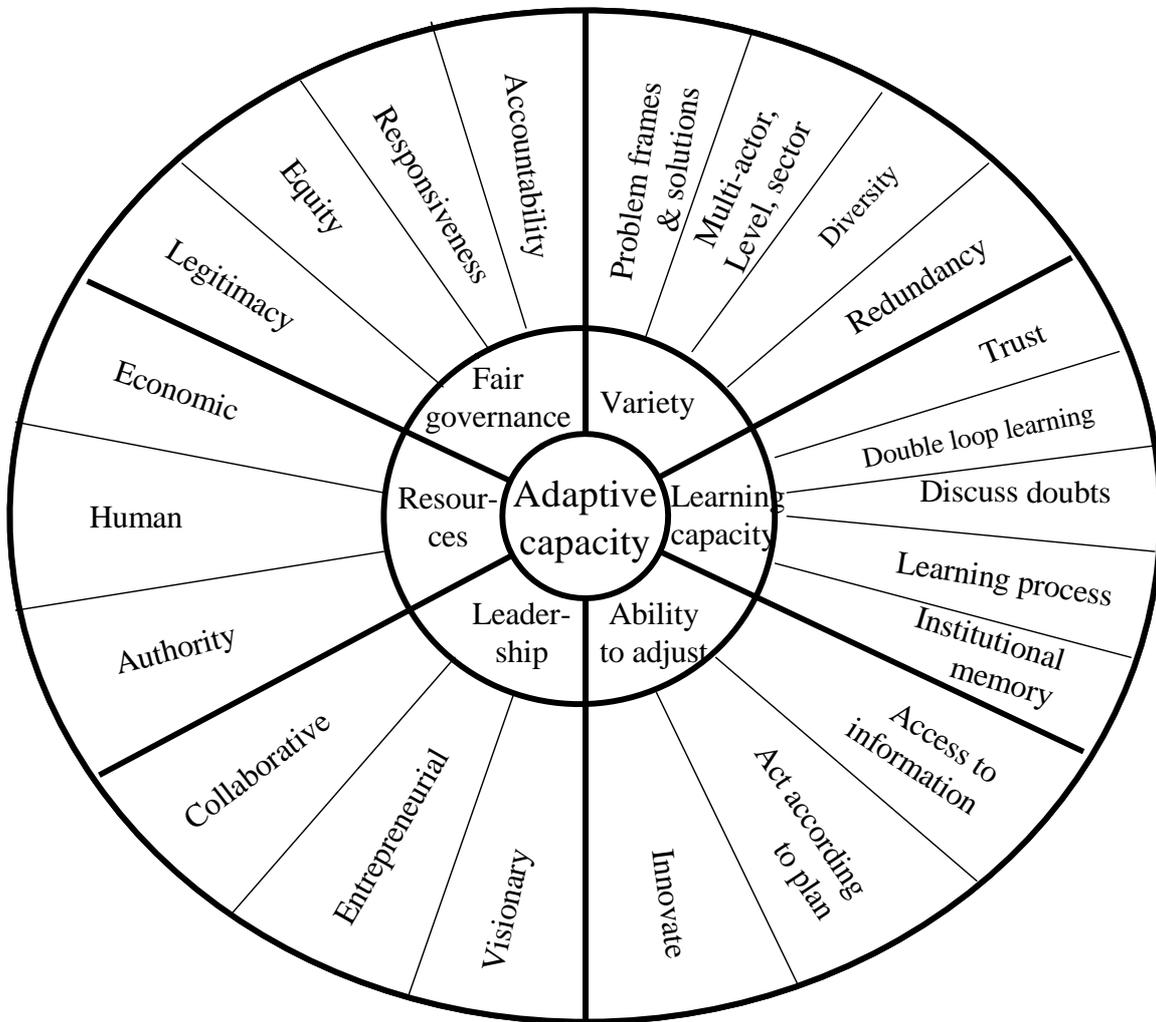


Figure 2. The Adaptive Capacity Score Card

4. Conclusion

This paper set out to elaborate on a method to assess the inherent characteristics of institutions to promote the adaptive capacity of society to climate change. Institutions are not actors; but they both constrain and empower social actors. They are both the result of human interaction and they in turn shape human action.

Social actors have always gradually adapted their institutions to changing circumstances. The question is do our institutions constrain social actors from modifying their institutions fast enough to cope with the rapidly changing environmental conditions that emerge as a consequence of climate change; given also that social infrastructural investments and related planning tend to be large-scale and long-term in nature and tend to lock society into specific types of production and consumption patterns. Although the institutions and adaptation literature is, in itself, rich and provides considerable information regarding how societies can adapt there is very little information about how one can assess the inherent characteristics of institutions to cherish the adaptive capacity of actors.

Based on the literature, field experiences and brainstorming, this paper has generated a list of six criteria, each with its own sub criteria to assess the inherent capacity of institutions to stimulate the adaptive capacity of society. However, there are three tensions in the proposal - the first is the emphasis on variety and multiple solutions at multiple levels which may not in the long term be able to rapidly cope with such a complex, challenging problem such as climate change, which may in the final analysis call for a dictatorial approach. This is something we hope to test out through follow-up content analysis and case studies.

Second, it is very difficult to actually quantify the results. These criteria are not easily measurable such as criteria like GDP per capita; and they may also appear fuzzy and naïve to those from the rational actor school. Nevertheless, the literature in vastly different fields tends to suggest similar criteria and we believe that there is potential in assessing these criteria. We played with the notion of using fixed criteria, i.e. that the variety of solutions should match the variety in the problem (i.e. the notion of requisite variety) but ultimately concluded that at this stage we should keep an open mind and focus mostly on whether solutions are being shut out since they do not fit into existing dominant paradigms. We believe the criteria will give room for qualitative assessments and expert judgment.

Third, the simple colour range of the score card (red, yellow, green) may not be universally applicable. If it is to be universally applicable, we may need to develop a more complex colouring system. For the present, this score card will be tested out for the Dutch context, before further development for use in a global context.

In the actual assessment process, we believe that three levels of assessment will be needed. First, we need social actors to grapple with these concepts and to try and apply them to the institutions in their context and make their best possible assessments. Second, we will engage with social actors to understand what the challenges are in applying such criteria. Third, we will try to assess whether they agree or disagree with the use of

such criteria for assessing the inherent characteristics of institutions to promote the adaptive capacity of society. In doing so, we will assess if there is any causal relationship between the individual criteria – i.e. does variety stimulate learning? Does learning stimulate adjustments to change? Do leadership, resources and good governance stimulate variety, learning and adjustments to change? Such assessments will help refine the criteria and sub-criteria.

These criteria are integrated into a Score Card for Adaptive Capacity which aims to both assess and inform social actors about how their institutions score on adaptive capacity and where there may be room for reform. This Score Card is a modest contribution to the growing literature on adaptive capacity.

Acknowledgements

This paper is part of ongoing research entitled: ‘IC12: Institutions for Adaptation: The Capacity and Ability of the Dutch Institutional Framework to Adapt to Climate Change’, which is a part of the Netherlands BSIK-Programme Climate *changes* Spatial Planning (CcSP)¹. This project aims to evaluate whether Dutch institutes are climate proof and how they can improve their adaptive capacity.

References:

- Adger, N. (2003) Social aspects of adaptive capacity, in: J. Smith, J. Klein, S. Huq. *Climate change, adaptive capacity and development*, Imperial College Press: London, pp. 29–49.
- Adger, W. N. and P.M. Kelly (1999) Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change*, 4, pp. 53–266.
- Andersson, M. and A.P.J. Mol (2002) The Netherlands in the UNFCCC Process - Leadership between Ambition and Reality, *International Environmental Agreements*, 2, pp. 49–68.
- Argyris, C. (1990) *Overcoming organizational defences: Facilitating organizational learning*. Allyn and Bacon: Boston.
- Argyris, C. and D.A. Schön (1978) *Organizational Learning*. Addison Wesley: Reading, MA.
- Arts, B. (2006) *Forests, institutions, discourses*. Wageningen Universiteit: Wageningen.
- Arts, B. and J. van Tatenhove (2005) Policy and power – A conceptual framework between the ‘old’ and ‘new’ policy idioms. *Policy Sciences*, 37(3/4), pp. 339–356.
- Ausubel, J. (1991) A second look at the impacts of climate change. *American Scientist*, 79, pp. 210–221.
- Barnett J. (2001) Adapting to climate change in Pacific Island countries: The problem of uncertainty. *World Development*, 29, pp. 977–993.
- Biermann, F. (2007) ‘Earth system governance’ as a crosscutting theme of global change research. *Global Environmental Change* 17, pp. 326–337.
- Blatter J. K (2003) Debordering the world of states: toward a multi-level system in Europe and a multi-polity system in North America? Insights from border regions, in: Brenner, N., B Jessop, M. Jones, G. MacLeod (eds.), *State/Space: A Reader*, Blackwell: Malden, MA, pp. 185 – 207.

¹ www.climatechangesspatialplanning.nl

- Botchway, F.N. (2001) Good Governance: the Old, the New, the Principle, and the Elements. *Florida Journal of International Law*, 13(2), pp. 159-210.
- Bryant, C. R. et al. (2001) Adaptation in Canadian agriculture to climate variability and change. *Climatic Change*, 45, pp. 181–201.
- Buckley, W. (ed.) (1968), *Modern Systems research for the behavioural sciences*. Chigago: Aldine.
- Burton, I. (1996) The Growth of Adaptation Capacity: Practice and Policy, in: Smith, J.B. and S. Guill (eds.) *Adapting to Climate Change: An International Perspective*. Springer: New York, pp. 55–67.
- Castells, M. (1996) *The Information Age: economy, society and culture. Vol 1: The rise of the network society*, Blackwell: Oxford.
- cial learning and water resources management. *Ecology and Society* 12(2): 5.
- Commission on Global Governance (1995) *Our Global Neighbourhood: the Report of the Commission on Global Governance*. Oxford University Press: Oxford.
- Conant, R.C. and R.W. Ashby (1970) Every good regulator of a system must be a model of that system. *International Journal of Systems Science*, 1(2), pp. 89-97.
- Dalziell, E. P., S. T. McManus (2004) *Resilience, Vulnerability, and Adaptive Capacity: Implications for System Performance*, paper of the Dept of Civil Engineering. University of Canterbury: New Zealand
- Dalziell, E. P., S. T. McManus (2004): Resilience, Vulnerability, and Adaptive Capacity: Implications for System Performance, paper of the Dept of Civil Engineering, University of Canterbury: New Zealand
- Dellapenna, J. and J. Gupta (2008) The Evolving Legal Framework for Global Water Governance, *Global Governance*, in press.
- Diamond, J.M. (2005) *Collapse: How Societies Choose to Fail or Succeed*. Viking Press: New York.
- Duit A and V. Galaz (2008) Governance and complexity – emerging issues for governance theory, in: *Governance: an international journal of policy, administration and institutions*, 21(3), pp. 311 – 335.
- EEA (2006) *Vulnerability and adaptation to climate change in Europe*, EEA Technical report 7 / 2005. European Environmental Agency: Copenhagen
- European Commission (2007) *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - Limiting Global Climate Change to 2 degrees Celsius: The way ahead for 2020 and beyond*. COM(2007) 2 final: Brussels.
- Fankhauser, S., J.B. Smith and R.S.J. Tol (1999) Weathering climate change: some simple rules to guide adaptation decisions, *Ecological economics*, 30, pp. 67-78.
- Fischer, F. (2003) *Reframing Public Policy: Discursive Politics and Deliberative Practices*. Oxford University Press: Oxford and New York.
- Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social- ecological systems. *Annual Review of Environment and Resources*, 30(1), 441-473.
- Frischetti (2005) "They Saw It Coming," *New York Times*, Sept. 2, 2005, p. A23
- Garud, R., C. Hardy and S. Maguire (2007) Institutional Entrepreneurship as Embedded Agency: An Introduction to the Special Issue, *Organization Studies*, 28(7), pp. 957-969.
- Giddens, A. (1984) *The Constitution of Society*. Polity Press: Cambridge.
- Gilbert, A.J. (2006). *Coevolution in complex networks. An analysis of socio-natural interactions for wetlands management*. VU Vrije Universiteit. Print Partners Ipskamp B.V.: Enschede.

- Goldfinch, S. and P. 't Hart (2003) Leadership and institutional reform: engineering macroeconomic policy change in Australia, *Governance*, 6(2), pp. 235-270.
- Grubb, M. and J. Gupta (2000) Towards a Theoretical Analysis of Leadership, in: Gupta, J. and M. Grubb (eds.) *Climate Change and European Leadership: A Sustainable Role for Europe*, Kluwer Academic Publishers: Dordrecht, pp. 15-24.
- Gunsteren, H.R. van (1976) *The Quest for Control: A Critique of the Rational-Central-Rule approach in Public Affairs*. John Wiley: London.
- Gupta, J. (2004) *(Inter)national Water Law and Governance: Paradigm Lost or Gained?*, Inaugural Address as Professor of Policy and Law on Water Resources and the Environment, Department of Management and Institutions at the UNESCO-IHE Institute for Water Education in Delft, The Netherlands, 22 March 2004; ISBN: 90-73445-11-6.
- Hajer, M. A. and H. Wagenaar (eds.) (2003) *Deliberative Policy Analysis: Understanding Governance in the Network Society*. Cambridge University Press: Cambridge.
- Hanf, K. and F.W. Scharpf (eds.) (1978) *Interorganizational Policy Making*. Sage: London.
- Hargadon, A. B. and J. Y. Douglas (2001) When Innovations meet Institutions: Edison and the Design of the Electric Light, *Administrative Science Quarterly*, 46, pp. 476-501
- Hemerijck, A. (2001) De institutionele beleidsanalyse: naar een intentionele verklaring van beleidsverandering, in: T. Abma en R. in 't Veld, *Handboek Beleidswetenschap*, Boom: Mepel, pp. 83-95.
- Hisschemöller, M. & Hoppe, R. (1998) Weerbarstige beleidscontroverses: een pleidooi voor probleemstructurering in beleidsontwerp en analyse, in: Hoppe, R. en A. Peterse (red): *In Bouwstenen voor argumentatieve beleidsanalyse*, Den Haag, Elsevier, pp. 53-75.
- Holling, C. S. 1986. The resilience of terrestrial ecosystems: local surprise and global change, in: W. C. Clark and R. E. Munn (eds.) *Sustainable development of the biosphere*, Cambridge University Press: Cambridge, pp. 292-317.
- IDGEC Scientific Planning Committee (1999) *Institutional Dimensions of Global Environmental Change*. IHDP Report No. 9: Bonn.
- IPCC (2001) *Climate Change 2001: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, J.J. McCarthy, O. F. Canziani, N. A. Leary, D. J. Dokken, K. S. White (eds.). Cambridge University Press: Cambridge.
- IPCC WGII (2007) *Climate Change 2007: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Forth Assessment Report of the Intergovernmental Panel on Climate Change, J.J. McCarthy, O.F. Canziani, N.A. Leary, D.J. Dokken, and K.S.White (eds). Cambridge University Press: Cambridge.
- Kessener, B. & C.J.A.M. Termeer, (2007) Organizing In-Depth Learning: Change as Reflective Sensemaking, in: Boonstra, J. & L. de Caluwe (eds.), *Intervening and Changing, Looking for Meaning in Interactions*, Wiley: West-Sussex, pp. 229-243.
- Kickert, W.J.M., E.H. Klijn and J.F.M. Koppenjan (eds.) (1997) *Managing Complex Networks: Strategies for the Public Sector*. Sage: London.
- Kingdon, J. W. (1984) *Agendas, Alternatives, and Public Policies*. Harper Collins: New York.
- Klijn, E.H. & J.F.M. Koppenjan (2006) Governing Policy Networks: a Network Perspective on Decision Making in Network Society, in: G. Morcol (Ed.) *Handbook of decision-making*, CRC Press: New York, pp. 169-187.
- Kooiman, J. (1997) Governance and Governability: Using Complexity, Dynamics and Diversity, in J. Kooiman (ed.) *Modern Governance – New Government-Society Interactions*, Sage: London, pp. 35-50.

- Koppenjan, J.F.M. and E.H. Klijn (2004) *Managing uncertainties in networks*. Routledge: London.
- Krahmann, E. (2003) National, Regional, and Global Governance: One Phenomenon or Many? *Global Governance*, 9(3), pp. 323-357.
- Leary, N.A. (1999): A framework for benefit-cost analysis of adaptation to climate change and climate variability, *Mitigation and Adaptation Strategies for Global Change*, 4(3-4), pp. 307-318.
- Lengnick-Hall, C. A., & T. E. Beck. (2005) Adaptive Fit Versus Robust Transformation: How Organizations Respond to Environmental Change, *Journal of Management*, 31(5), pp. 738-757.
- Lewandrowski, J.K. and R. J. Brazee (1993) Farm Programs and Climate Change, *Climatic Change*, 23(1), pp. 1-20.
- Malnes R (1995) 'Leader' and 'Entrepreneur' in International Negotiations: a conceptual analysis', *European Journal of International Relations*, 1(1), pp. 87-112.
- March, J.G. and J.P. Olsen (1989) *Rediscovering Institutions*. New York: Free Press.
- Marks, G., L. Hooghe and K. Blank (1996) European Integration from the 1980s: State-centric v. Multi-Level Governance, *Journal of Common Market Studies*, 34(3), pp. 341-378.
- Marlin, A., L. Olsen, D. Bruce, J. Ollerhead, K. Singh, J. Heckman, B. Walters, D. Meadus, and A. Hanson (2007) Examining Community Adaptive Capacity to Address Climate Change, Sea Level Rise, and Salt Marsh Restoration in Maritime Canada. Submitted to the Climate Change Impacts and Adaptations Program, Sackville, NB, Mount Allison Coastal Wetlands Institute and the Rural and Small Town Programme, Mount Allison University.
- McEvoy, D., K. Lonsdale and P. Matczak (2008) Adaptation and Mainstreaming of European Climate Change Policy: an Actor-Based Perspective, *CEPS Policy Brief No. 149*, www.ceps.eu
- McEvoy, D., K. Lonsdale and P. Matczak (2008): Adaptation and Mainstreaming of European Climate Change Policy: an Actor-Based Perspective, CEPS Policy Brief No. 149, www.ceps.eu
- Mendelsohn, R. and J. E. Neumann (eds.) (1999) *The Economic Impact of Climate Change on the Economy of the United States*, Cambridge University Press: Cambridge.
- Mendelsohn, R. and W. Nordhaus (1999) The Impact of Global Warming on Agriculture: A Ricardian Analysis: Reply, *American Economic Review* 89(4), pp. 1046-48.
- Mendelsohn, R., W. Nordhaus and D. Shaw (1999) The Impact of Climate Variation on U.S. Agriculture, in: R. Mendelsohn and J. E. Neumann (eds.) *The Economic Impact of Climate Change on the Economy of the United States*, Cambridge University Press: Cambridge, pp. 55-74.
- Millennium Ecosystem Assessment (2006) *Ecosystems and Human Well-Being*, Working Group Assessment Reports, five volumes. Island Press: Washington, D.C. Online available at www.maweb.org.
- Mintzberg, H. (1989) *Mintzberg on management: inside our strange world of organizations*. The Free Press: New York/Collier Macmillan: London.
- Noordegraaf, M. & T. Abma (2003) Management by Measurement? Public Management Practices amidst Ambiguity, *Public Administration*, 81(4), pp. 853-871.
- Nooteboom, S.G. (2006) *Adaptive Networks. The governance for Sustainable Development*. Eburon: Delft.
- North, D. C. (1994) Economic Performance Through Time, *The American Economic Review*, 84, pp. 359-368.

- Olmos, S. (2001) *Vulnerability and Adaptation to Climate Change: Concepts, Issues, Assessment Methods*, Climate Change Knowledge Network: <<<http://www.cckn.net>>>.
- Olsson, P., C. Folke and F. Berkes (2004) Adaptive Co-Management for Building Resilience in Social-Ecological Systems, *Environmental Management*, 34, pp.75-90.
- Orlikowski, W.J. (1996), Improvising organizational transformation overtime: a situated change perspective. *Information Systems research*, 7(1), 63-92.
- Ormond, J.E. (1999) *Human learning* (3rd ed.). Upper Saddle River: NJ, Prentice-Hall
- Pahl-Wostl, C., M. Craps, A. Dewulf, E. Mostert, D. Tabara, and T. Taillieu. (2007). So
- Perrings, C. (2006): Resilience and sustainable development, *Environment and Development Economics*, 11, pp. 417-427.
- Pielke, R. A. Jr. (1998) Rethinking the role of adaptation in climate policy, *Global Environmental Change*, 8, pp. 159-170.
- Pierre, J. (ed.) (2000) *Debating Governance*. Oxford University Press: Oxford.
- Pimm, S. L. (1984) The complexity and stability of ecosystems, *Nature*, 307, pp. 322-326.
- Pollit C. and G. Bouckaert. (2000) *Public Management Reform: A Comparative Analysis*. Oxford University Press: Oxford.
- Power, M. (1999) *The Audit Society: Rituals of Verification*. Oxford University Press: Oxford.
- Process in the Direction of a Policy Quest, *Governance*, 10(1), pp.1-22.
- Rhodes, R.A.W. (1997) *Understanding Governanc.*, Open University Press: Buckingham.
- Ridley, M. (1996) *The Origins of Virtue: Human Instincts and the Evolution of Cooperation*. Viking: New York.
- Scharpf, F.W. (1997) *Games Real Actors Play. Actor-centered Institutionalism in Policy Research*. Westview Press: Boulder CO.
- Scharpf, F.W. (1998) *Interdependence and Democratic Legitimation*, MPIfG Working Paper 98/2. Cologne: Max Planck Institute for the Study of Societies.
- Smit, B. and O. Pilifosova (2001) Adaptation to Climate Change in the Context of Sustainable Development and Equity, in: McCarthy, J.J., O.F. Canzianni, N.A. Leary, D.J. Dokken, and K.S. White (eds.) *Climate Change 2001: Impacts, Adaptation, and Vulnerability - Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press: Cambridge, pp. 876-912.
- Smit, B., I. Burton, R. Kleinand and J. Wandel (2000) An anatomy of adaptation to climate change and variability, *Climate change*, 45, pp. 223-251.
- Smith, J. (1997) Setting Priorities for Adapting to Climate Change, *Global Environmental Change*, 7, pp. 251-264.
- Smithers, J. and B. Smit (1997) Human adaptation to climate variability and change, *Global Environmental Change*, 7, pp. 129-146.
- Stern, N. et al. (2006) *STERN REVIEW: The economics of climate change*. HM Treasury, London.
- Termeer, C.J.A.M. (2007) *Vital Differences. On public Leadership and societal innovation*, Inaugural Speech, Wageningen University.
- Tierney, K., C. Bevc and E. Kuligowski (2006) Metaphors Matter: Disaster Myths, Media Frames, and Their Consequences in Hurricane Katrina, *The ANNALS of the American Academy of Political and Social Science*, 604, pp. 57-81.
- Underdal A. (1994) Leadership theory: rediscovering the arts of management, in: IIASA, *International Multilateral Negotiating: approaches to the management of complexity*, Jossey-Bass: San Francisco, pp.178-197.

- UNEP (1998) *Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies*. UNEP, Nairobi.
- Verweij, M. and M. Thompson (2006) *Clumsy solutions for a Complex World. Governance, Politics and Plural Perceptions*. Palgrave Macmillan: Basingstoke UK.
- Walker, B., S. Carpenter, J. Anderies, N. Abel, G. Cumming, M. Janssen, L. Lebel, J. Norberg, G. Peterson and R. Pritchard (2002) Resilience management in socio-ecological systems: A working hypothesis for a participatory approach, *Conservation Ecology*, 6(1), pp. 14 [online]. Available at [http:// www.consecol.org/vol16/iss1/art14](http://www.consecol.org/vol16/iss1/art14).
- Wallis, J. and B. Dollery (1997) *Autonomous Policy Leadership: Steering a Policy*
- Walsum, P.E.V. van, J. Runhaar and J.F.M. Helming (2005) Spatial Planning for Adapting to Climate Change, *Water Science and Technology*, Vol 51(5), pp 45-52.
- Weick, K.E. (1979) *The social Psychology of Organizing*. Random House: New York.
- Weick, K.E. (1988) Enacted sensemaking in crisis situations, *Journal of Management Studies*, 25(4), pp. 305–17.
- Weick, K.E. and K.M. Sutcliffe (2001) *Managing the Unexpected: Assuring High Performance in an Age of Complexity*. Jossey-Bass: San Francisco.
- Wenger E. (1998) *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press: Cambridge.
- Wildavsky, A. (1988) *Searching For Safety*. Transaction Books, New Brunswick: NJ.
- Winter, G. (ed.) (2006) *Multilateral Governance of Global Environmental Change*. Cambridge University Press: Cambridge.
- WRR (2006) *Klimaatstrategie – tussen ambitie en realisme*. Amsterdam University Press: Amsterdam.
- Yohe G, J. Neumann, P. Marshall and A. Ameden (1996) The economic costs of sea-level rise on developed property in the United States, *Climate Change*, 32, pp. 387– 410.
- Yohe, G. and R.S.J. Tol (2002) Indicators for social and economic coping capacity - moving toward a working definition of adaptive capacity, *Global Environmental Change*, 12, pp. 25-40.
- Young O.R. (1991) Political leadership and regime formation: on the development of institutions in international society, *International Organisation*, 45, pp. 3.
- Young, O. R. (1989) *International Cooperation; Building regimes for natural resources and the environment*. Cornell University Press: Ithaca.
- Zijderveld, A. C. (2000) *The Institutional Imperative - The Interface of Institutions and Networks*. Amsterdam University Press: Amsterdam.