

Climate Change Adaptation Policy and Practice: The Swedish Experience

Paper for presentation at the annual XXI Nordic Municipal Research Conference (NORKOM), Oslo University, Norway, 22-24 of november, 2012

Mikael Granberg* & Leigh Glover**

*Associate professor, Department of Political and Historical Studies, Karlstad University, Sweden.
Email: mikael.granberg@kau.se

**Senior research fellow, Director, Australasian Centre for the Governance and Management of Urban Transport, University of Melbourne, Australia

(Work in progress, please do not quote!)

Introduction

Many societies in the past believed that they had a sustainable way of life only to find some time later that it was not so and that they were unable to make the social, economic and political changes necessary for survival.

(Ponting, 1991, p. 407)

Climate change is crucial to sustainable development in an ecological and in a wider sense, including economic, social as well as political considerations (Bulkeley & Betsill, 2003; Dessler & Parson, 2010; Glover, 2006; Hulme, 2009; Schneider, et al., 2010). Climate change is a multifaceted social problem embedded in uncertainty with substantial policy implications. In climate change activities there has been a significant differentiation between the three major streams of proposed and actual activity; *firstly*, those of mitigating greenhouse gas emissions, *secondly*, identifying the social, economic, and environmental impacts of climatic change now and in the future, and *thirdly*, adapting human and managed natural systems to current or future climate change impacts (Schneider, et al., 2010).

The focus in this paper is on policy and implementation of adaptation policies. The interest in adaptation policy in this text concerns the public policy dimension and not spontaneous social adaptations to changing climate or that undertaken independently by corporations or communities. The focus is on public policy and implementation that are planned, purposeful and intentional. The main issue in this text is how Swedish governance of climate change adaptation is organised and if this type of organising (or lack of organising) can lead to difficulties in reaching long term sustainable adaptation measures or even maladaptation at the local level?

Facing the challenge of adapting to climate change will involve considerable action from the state in its different manifestations, from industry, from organized interest and from ordinary citizens. Facing the challenge from climate change has clear political implications such as inherent value conflicts, power relations, governance, equity, resource allocation and competing interests. The context is complex where a multitude of factors, formal and informal actors representing different societal interests on multiple societal levels, are interacting and interfering both facilitating and hindering effective action. Within this broad swath of government, corporate, and community activity society has to build a coherent and institutionalised capacity to act (Schipper & Burton, 2009; Evans, 2012). Capacity to act is built upon the ability to pool resources and coordinate action from different actors in society creating a system for efficient problem solving (Dahl, 1961; Stone, 1989)

The approach to assessing climate change governance in this paper involves issues relating to the *vertical* (i.e., interactions between tiers, from local to global) and *horizontal* (i.e., structures and functions within tiers of governance) dimensions of climate change governance. In the paper we acknowledge the multilevel character of climate change challenges but stress the importance of the sub-national scale where most adaptation will be

required (cf. WCED, 1987; Satterthwaite, 1999; Bulkeley & Betsill, 2003; Lundqvist & Biel, 2007; Storbjörk, 2007; Schipper & Burton, 2009; IPCC, 2007; 2012).

This points us towards one central, and often neglected, aspect and that is that adaptation measures often requires integration of different tiers of government, different public sectors and policy areas in order to be efficient (cf. Smith, *et al.*, 2009). The governance structure of decision making bodies is sectorised but climate change adaptation demands integrating a diverse set of policy recommendations, strategies and policy implementation relevant to different policy participants and institutions often across multiple sectors. This entails the flow of policy ideas and decisions between different levels of government, scales and spheres of society. At the receiving end of national policies are often the municipalities.

This paper is empirically based on an integrated report on adaptation action in Sweden from the Swedish National Platform for Disaster Reduction coordinated by the Swedish Civil Contingencies Agency (MSB) (Rydell, *et al.*, 2010) and reports from the Swedish Association of Local Authorities and Regions (SALAR)(SKL, 2011a; 2011b; 2012). Before we get to the empirical part we will shortly discuss the concept of adaptation followed by its opposite, maladaptation. We continue with a discussion on the Swedish experience concerning climate change adaptation policy and practice and end the paper with some concluding remarks.

Adaptation

It is clear that a changing climate leads to extreme weather and to changes in climatic conditions impacting society and that this development drives demands for society to adjust and adapt (IPCC, 2001; 2007; 2012; Schipper & Burton, 2009; Thomkins, *et al.*, 2010). Adaptation is nothing new to society. Rather, the development of human life on earth has been a story of constant adaptation not least to changing weather conditions. Adaptation to

climate change, however, poses risks outside the range of experience (i.e. ‘crazy weather’) (cf. Adger *et al.*, 2007). Its scale can range from the local to the large, its time horizon can range from the short to the long terms, it can be tactical or strategic, it can seek immediate, delayed, or cumulative effects, and it can encompass widely differing outcomes (such as retreat, accommodation, protection, prevention, toleration, change, and restoration) (cf. IPCC, 2012; Schipper & Burton, 2009). Adaptation also includes building the capacity to make changes in the future (Patt, *et al.*, 2010, p. 384) and is, accordingly, an ongoing process. The Intergovernmental Panel on Climate Change (IPCC) defines climate change adaptation as something involving

... adjustments to reduce vulnerability or enhance resilience in response to observed or expected changes in climate and associated extreme weather events. Adaptation occurs in physical, ecological and human systems. It involves changes in social and environmental processes, perceptions of climate risk, practices and functions to reduce potential damages or to realise new opportunities” (IPCC, 2007, p. 720).

When we look at adaptation, several characteristics stand out (Schipper & Burton, 2009; Glover & Granberg, 2011; Granberg & Glover, 2011). Vulnerability of social-ecological systems to climate change impacts is potentially enormous, as is the range of such impacts and the potential scale (particularly as might result from severe climate- and sea level rise-related hazards), covering such features as buildings, transport, water and wastewater systems. Adaptation options and potential actions are therefore of a great magnitude, differentiated by a wide range of factors, including location, stakeholders, timeframe, impact type, cost of responses, cost of potential losses, and likelihood of future impacts. Yet anticipating such impacts and evaluating their likelihood and levels of risk will require

forecasts of climate change at all scales and detailed studies of these interdependent systems. In isolation, adaptation responses for individual items of infrastructure or for relatively small locations are feasible and have been completed in examples from around the world. Considering adaptation to climate change in integrated systems, extensive settlements, and complex institutional settings is considerably more difficult.

In addition, climate change adaptation is only one issue among others on the political agenda that consists of competing priorities and goals that may only be possible to satisfy at the expense of each other (Granberg, 2006; Bulkeley & Betsill, 2005, cf. Fischer, 1995). Some issues reinforce climate change adaptation when this adaptation becomes part of other prioritised planning or political endeavours (Adger *et al.*, 2007; Granberg & Elander, 2007, Granberg, 2009). Potentially, adaptation policies can be in conflict with other goals and values. Accordingly, society must prioritize among a vast variety of problems and challenges facing it at every given moment and it is in this political context adaptation to climate change takes place (cf. Luhmann, 1989). We are not aspiring to resolve such tensions here. However, the point being that in practice adaptation policies are unlikely to be ‘stand alone’ and must, therefore, be understood in context.

To sum up, formulating adaptation responses is a challenging issue for public policy for a number of reasons (Glover & Granberg, 2011; Granberg & Glover, 2011). *Firstly*, there is the large range of possible climate change impacts across social and natural systems. *Secondly*, there is an insufficient knowledge base to identify many of the needed adaptation responses. *Thirdly*, there is no consensus about where responsibility for action should reside; even within government, climate change impacts will be the responsibility of a wide range of portfolios. *Fourthly*, there is the usual set of problems facing public policy of this sort, such as procuring sufficient and available public funding and resources, creating sufficient institutional

capacity, training and education, and so on. A growing concern in contemporary research is maladaptation, i.e, when adaptation produces negative consequences (Barnett & O’Neil, 2010) and we shall now continue to look at the concept of maladaptation before we go on to look at the policy implementation of adaptation in Sweden.

Maladaptation

As described above avoiding or ameliorating climate change impacts requires adaptive actions, both responding to existing impacts and/or in anticipation of future circumstances.

But as Scheraga and Grambsch state:

Adaptive responses can also have adverse effects ... an adaptive response that is made without consideration for interdependent systems may, inadvertently, increase risks to other systems that are sensitive to climate change. (1998, p. 92)

Potentially, this applies also to social systems such as the governance processes of adaptation. Accordingly, maladaptation, or unsustainable adaptation, can increase vulnerability and risk (IPCC, 2012). Maladaptation has now become a mainstream term (Scheraga & Grambsch, 1998; IPCC, 2001; 2007; 2012; Birkmann, 2011; Barnett & O’Neil, 2010). Identifying the occurrence of maladaptation, however, is difficult, for there are no widely accepted criteria, no suitable yardsticks against which to adjudge the adaptation measures, local circumstances vary considerably, the passage of time can alter the extent of success or failure, and there are the usual problems of subjective judgements. Despite these difficulties, there have been some attempts to define maladaptation in practice. Following Scheraga and Grambsch (1998), IPCC (2012), and Barnett and O’Neil (2010), maladaptation embraces those adaptation responses that increase vulnerability to climatic impacts to the feature to which they are being applied,

to other features, and worsen impacts in some other way, including causing GHG emissions to increase. IPCC (2012) lists economic resources, technology, information and skills, infrastructure, institutions, and equity as determinants of adaptive capacity.

As stated above, maladaptation can have a number of sources but here the interest is directed towards institutional path dependency (Barnett & O'Neil, 2010; Granberg & Glover, 2011). From this perspective maladaptation can be the results of how society organises its adaptation governance and if and how this governance is coordinated and steered. Modern western society has through the maturation of the welfare state constructed forms for creating policy and their consequent implementation (Rugge, 2003). This has taken the form of compartmentalisation within the welfare state, as well as in the highly specialised business sector (cf. Rothstein & Steinmo, 2002). These departments, authorities and branches are to a great extent geared towards identified and demarcated challenges to society and manned with experts within a given field. They are also often regulated by standard operating procedures (SOPs) that are formal and institutionalised procedures for handling identified problems aimed at simplifying choices for administrators (DiMaggio & Powell, 1972; Rugge, 2003; Schafritz et al., 2009). Problems suitable for handling by such existing –‘prefabricated’ – institutions are sometimes called ‘tame’ problems, which refer to problems that enjoy relative consensus in society on both problem definition and solution. Within such a system risk and uncertainty is treated by “...technocratic institutions as a discrete entity quite separate from the social and political factors that underlie it” (Handmer & Dovers, 2009, p. 193). This may also entail creating the image for the public and for decision makers that the incumbent system know the risks, handle the uncertainty and, accordingly, has the capacity to deal with the threats even when this is not the case increasing future vulnerability and the risk of maladaptation.

The stability of the state-centred public system is considerable but compartmentalisation can be at odds with adaptive ability. Specialisation through compartmentalisation is especially weak in handling uncertainty and uncertainty is inherent to climate change (Wynne, 1992; Handmer & Dovers, 2009). Complex problems, sometimes called ‘wicked problems’ (Rittel & Webber, 1973; Conklin, 2005; Granberg, et al., 2008), that do not fit neatly into predefined policy areas and regulatory arrangements challenge these types of structures. Potentially, this drives demands for more adaptive approaches of policy making and governance in order to enhance the adaptive capacity avoiding maladaptation. The demand is further reinforced when society faces issues characterized by fragmentation of perspectives, understanding, knowledge and interests, or when the issue at stake is given different priority by the involved actors (Granberg, et al., 2008).

An adaptive system is geared towards accommodating (at least some) uncertainty (Handmer & Dovers, 2009). Accordingly, creating a system of adaptive governance is important as such a system can influence the degree to which climate events or pressures translate into impacts and disasters. That is, an adaptive governance system with the capacity to handle pressing events in a way that reduces impacts and the occurrence of disasters will reduce vulnerability (compare the discussion below on resilience). Effective adaptation addresses the factors contributing to exposure and vulnerability and, accordingly, vulnerability can be mitigated through institutional capacity building (cf. Dovers & Hezri, 2010). Failure to do so will inevitably lead to severely reduced adaptive capacity and increased risks of maladaptation.

Context of adaptation in Sweden

Sweden has a national climate strategy that primarily focusing on mitigation. Mitigation at the local level is guided by the strategy and by national objectives of reduced climate impact (Granberg & Elander, 2007; MoE, 2003). In contrast to mitigation there is no comprehensive

national strategy guiding sub-national actors', such as regions and municipalities, efforts to adapt to climate change (Uggla & Lidskog, 2006; Granberg & Elander, 2007; Rydell et al., 2010).

There are, however, a multitude of national specialist authorities responsible for adaptation measures within their area of expertise such as the Swedish Transport Administration (Trafikverket), the Swedish Transport Agency (Transportstyrelsen), the Swedish Maritime Administration (Sjöfartsverket), the Swedish Post and Telecom Authority (Post och Telestyrelsen), the Swedish Energy Agency (Energimyndigheten), the Swedish National Grid (Svenska Kraftnät), the National Food Agency (Livsmedelsverket), the Geological Survey of Sweden (Sveriges geologiska undersökning), the Swedish National Board of Housing, Building and Planning (Boverket), the Swedish Environmental Protection Agency (Naturvårdsverket), the Swedish Meteorological and Hydrological Institute (Sveriges meteorologiska och hydrologiska institut), the Swedish Geotechnical Institute (Statens geotekniska institut), the Swedish Institute for Communicable Disease Control (Smittskyddsinstitutet), the National Board of Health and Welfare (Socialstyrelsen), the Swedish Board of Agriculture (Statens jordbruksverk), etc.

These authorities interact with the 21 County Administrative Boards (Länsstyrelsen), that represent the state at the regional level, with the 21 County Councils (Landsting), other regional institutions and with the 290 municipalities. The County Administrative Boards have a coordinative responsibility, as stated above, and the state allocated 25 million crowns for the period 2009-2011 for this to be divided upon on the 21 councils (Rydell et al., 2010). Some of the national authorities have coordination responsibilities within their specific areas of expertise but no authority has the responsibility for a comprehensive coordination of adaptation policy and responses at the national level. In addition the national authorities lies under

different government departments but there is no formal coordination in place within the national government (Rydell et al., 2010). It is doubtful if the coordinative efforts in place met the demands for coordination at the regional scale including the adaptive efforts of County Councils and municipalities?

To this wealth of public actors in the national setting EU-agencies (cf. EU, 2009) and policies plays an important role as does UN policies and frameworks (cf. UN, 1992; 2005; IPCC, 2012). If we add enterprises, individual citizens and their associations a considerable complexity of actors involved is evident and the need for coordination is obvious.

The ability of sub-national public actors to address risk is connected to the institutional capacity of the specific setting. Since January 2008 Swedish municipalities have to take flooding and erosion potentially caused by climate change into consideration in general and detailed planning and in decisions of building permits (Rydell et al., 2010; SKL, 2011a; 2011c; Länsstyrelserna, 2012). The Swedish local governance system is characterised by a high degree of local responsibility for public sector activities: Swedish municipalities have important competences that can be used with considerable degrees of autonomy and they have the right to collect taxes within their territory giving them a significant financial basis (cf. Bäck, 2003; Rose & Ståhlberg, 2005). This, of course, means that environmental issues competes with a number of other high priority issues, e.g. unemployment, segregation and city growth, on the local political agenda.

Looking at eco-governance at large, including sewerage, waste-treatment, recycling, 'green' public purchase, 'green' consumption and 'green' accounts, Swedish municipalities are crucial actors with a great potential for climate change mitigation and adaptation (Granberg & Elander, 2007). One important tool is, of course, the planning monopoly the state has granted

the municipalities within their territory as established in the Swedish Planning and Building act of 1947. This includes planning of land-use, infrastructure for transport and road use.

Although there are signs of a growing sub-national consciousness of risk related to climate change reports from national authorities evaluating municipal capacities have presented a somewhat disturbing picture. In January 2006 the Swedish Geotechnical Institute (SGI) published a report saying that municipalities are *not* aware of risks connected to climate change, especially risks connected to landslides caused by deteriorated ground-stability and contamination when repositories of environmental waste are flooded (SGI, 2006). In another report published by the Swedish Meteorological and Hydrological Institute (SMHI) the authors conclude that municipalities do not take the effects of climate change enough under consideration in physical planning, e.g. by allowing housing located too close to areas subject to flooding (Rummukainen, et al., 2005). Both national authorities find municipalities lacking in considering climate change in physical planning and, accordingly, not going far enough in their adaptation to climate change.

The Swedish Association of Local Authorities and Regions (SALAR) has conducted three surveys to the municipalities 2007, 2009 and 2011 and the results from these surveys indicates that a positive development has taken place since the studies referred above (SKL, 2011a; 2011b; 2011c). The surveys shows that 90 percent of the Swedish local authorities to some extent includes adaptation to climate change into comprehensive and detailed planning in 2011 (SKL, 2011c). This is an increase from 87 percent in 2007 but a decrease from 94 percent in 2009. 28 percent state that they work extensively with adaptation within their competence on spatial planning (an increase from 15 percent in 2007 and the same level as 2009) and 70 percent has implemented adaptation issues into their guidelines for building. 55 percent has located the responsibility for adaptation to the municipal board and this clear

indication of centralisation indicates that the efforts are considered important and also that the municipalities take the issue of coordination seriously (SKL, 2011c). In 2001 around 25 percent of the responding municipalities stated that they have an cross sector comprehensive municipal policy for adaptation and 25 percent answered that work on such a policy was initiated but not completed in the municipality (SKL, 2011c). 20 percent on the municipalities has given the responsibility to the planning and building department. Somewhat worrying is that around 12 percent of the responding municipalities has no explicit function or department responsible for the issues of adaptation to climate change.

In 2011 39 percent of the responding municipalities stated that they had policies in place that lay down the principles for land planning and building permits with regards to risks connected to erosion, landslides and flooding (SKL, 2011c). This is an increase from around 29 percent in 2009. Just over 20 percent state that work on such a policy is initiated in the municipality. Still, around 35 percent has not such policy instrument in place. Just under 20 percent of the municipal analysis of risks and vulnerability includes adaptations issues to a high degree. The main documents used to include the issues of climate change adaptation in the municipalities are the comprehensive plan (around 38 percent to a high degree) and the detailed plans (around 35 percent to a high degree).

From surveys and case studies it's clear that many types of adaptation responses takes place in Swedish municipalities and that we can see increased activity during later years (SKL, 2011a; 2011b; 2011c) and. Focus is on developing new processes of physical planning that can accommodate the demands from a changing climate. In several municipalities this is considered as driving green growth when new technological solutions is developed by industry and implemented by the municipalities. Many of the municipalities also perceive a sustainable development, of which adaptation responses is a part, as a way of profiling the

municipal identity in a positive way strengthening its ability to compete with other municipalities for industry and resources from the state etc.

There are some clear deficiencies however and they are focused on the issue of uncertainty (SKL, 2011a; 2011b; 2011c). Only one percent of the respondents state that they have all the knowledge needed for the creation of relevant local climate scenarios that can function as a basis for planning. 50 percent of the respondents state that they have very little of none of the needed knowledge enabling them to include risks of flooding into their planning decisions. There is a great demand for tools for planning, analyses and decision making. 70 percent state that they lack the tools needed for creating relevant and reliable local climate scenarios in support of a future adaptation measures (SKL, 2011c). The scenarios available is not detailed enough at this stage to support efficient adaption through spatial planning.

It is clear from the surveys discussed above that municipal respondents look for readily available, up to date and reliable knowledge reducing uncertainty and guiding decisions on relevant and efficient adaptation measures. What needed is analyses of future climate change, mapping of risks of flooding, mapping of risks of landslides improved and detail topographic maps etc (SKL, 2011c). This kind of material is produced by the specialised national authorities shortly described above. One problem here seems to be deficient adjustment of the material to municipal competences and needs. The respondents acknowledge that the foundation for adaptive planning responses has to be radically improved. Many of the respondents state that the material available is difficult to come by, it's on a macro level and it's often contradictory.

Conclusion

Clearly, modern industrialised societies and their institutions are particularly good at resisting fundamental change ... The strength of such societies lie in the maintenance of their basic assumptions and institutional structure: they are successful in their search for stability and fulfil their desire to perpetuate themselves. (Handmer & Dovers, 2009, pp. 204-205)

This quotation puts the finger on a central challenge observed in this study: that the fragmented governance of climate change adaptation is clearly organised along the lines of more traditional welfare state compartmentalisation but without the more strict state control associated with more traditional forms of government. Instead the coordination of the relevant actors on all levels and from all spheres of society are expected to be handled by informal networks that emerge more or less spontaneously. This gives us an interesting mixture of governance with consequences that need further study.

This lack of coherent action from the nation state within the policy area leaves public policy action without any functional coordination. When other public actors on supranational, national, regional and local scales are included it becomes evident that we are observing a very complex institutional setting. Institutional diversity without coordinating mediation is very likely to lead to endless discussions and compromises between sectors protecting their vested interests (path dependency). Lack of institutions able to act with speed and flexibility tend to put off needed changes to a time when options have narrowed.

The reliance on public institutions such as the specialised authorities that are at the centre of national adaptation action or the institutions of spatial planning that the municipalities are utilising is problematic as these types of structure are geared towards handling well defined

challenges to society. This entails that they are less able to be flexible in a way that new issues like climate change adaptation demands. The rapid, and sometimes dramatic and unanticipated, change connected to climate change challenge the basic assumptions underlying our public institutions.

In addition, there is a clear risk that this utilisation of less flexible, but also legitimate, public institutions gives signals to other actors and citizens that things are under control and well at hand. If this is paired with a lacking capacity to actual handling of threats and challenges this will increase rather than decrease future vulnerability and there is an imminent risk of maladaptation in the longer term.

A technological and rational planning perspective in measures is clearly observable. This is evident in the reports from the specialised national authorities but also in the document “The Municipalities Work with Climate Change Adaptation” from the Swedish Association of Local Authorities and Regions (SKL, 2011c). Municipal spatial planning is very likely one important tool in municipal adaptation measures but as this study shows the institution of municipal spatial planning has great difficulties handling high levels of uncertainty as indicated by the calls for reduced uncertainty of future developments through, for instance, regional and local climate change scenarios.

An ecological modernisation perspective is evident on all levels as the strive for “green growth” is imbedded in both policy and implementation

Lack of coordination and focused national response that can aid the municipalities.

Evident that there is no real concept of the political dimension climate change adaptation in the studied documents!

Uncertainty, as discussed earlier, encourages viewing policy as an ongoing exploration with many possible changes of direction rather than an optimization exercise based upon detailed assumptions about the lay of the land ahead and a clear and explicit goal about where the journey is to end. Accordingly, flexible and proactive policy making that is formulated at scales appropriate for decision makers and citizens is greatly needed for maladaptation to be avoided (cf. Urwin & Jordan, 2008; Grin, et al., 2010).

References

- Adger, W. Neil, et al. (2007) Assessment of adaptation practices, options, constraints and capacity, in Parry, Martin L., et al. (Eds.) *Climate Change 2007: Impacts, Adaptation and Vulnerability* (Cambridge, Cambridge University Press)
- Albrechts, Louis & Mandelbaum, Seymour J. (Eds)(2005) *The Network Society: A New Context for Planning* (London & New York, Routledge)
- Barnett, Jon & O'Neil, Saffron (2010) "Maladaptation". *Global Environmental Change*, 20, pp. 211—213
- Birkmann, Joern (2011), "First and second-order adaptation to natural hazards and extreme events in the context of climate change". *Natural Hazards*, 58(2), 811-840
- Bulkeley, Harriet & Betsill, Michele .M., (2003) *Cities and Climate Change* (London & New York, Routledge)
- Bulkeley, Harriet & Betsill, Michele .M., (2005) Rethinking Sustainable Cities: Multi Level Governance and the 'Urban' Politics of Climate Change, *Environmental Politics*, 14(1), pp. 42-63
- Bäck, Henry (2003) Party Politics and the Common Good in Swedish Local Government, *Scandinavian Political Studies*, 26(2), pp. 93-123
- Conklin, Jeff (2005) *Dialogue Mapping: Building Shared Understanding of Wicked Problems* (Chichester, John Wiley & Sons)
- Dahl, Robert (1961) *Who Governs? Democracy and Power in an American City* (New Haven, Yale University Press)
- Dessler, Andrew & Parson, Edward A. (2010) *The Science and Politics of Global Climate Change: A Guide to the Debate*. 2nd ed (Cambridge, Cambridge University Press)
- DiMaggio, Paul J. & Powell, Walter W. (1972) "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields", *American Sociological Review*, 48(2), pp. 147—160
- Dovers, Stephen R. & Hezri, Adnan A. (2010) "Institutions and policy processes: The means to the ends of adaptation." *Wiley Interdisciplinary Reviews: Climate Change*, 1(1), pp. 212—231
- EU (2009) White Paper: Adapting to Climate Change. Towards a European Framework for Action. 1.4. 147 final (Brussels, Commission of the European Communities)
- Evans, J. P. (2012), *Environmental Governance* (London, Routledge)
- Fischer, Frank (1995) *Evaluating Public Policy* (Chicago, Nelson-Hall Publishers)
- Glover, Leigh (2006) *Postmodern Climate Change* (London, Routledge)
- Glover, Leigh & Granberg, Mikael (2011) "Adaptation to Climate Change as Ecological Modernisation: Australian Experience", paper presented at 2011 European Conference Political Research, Section (ID 92): Green Politics: Panel: Adaptation to Climate Change on National, Regional and Local Levels Conference, Reykjavik, Iceland, 25 – 27 August.
- Granberg, Mikael (2006) Alla talar om vädret: Svenska kommuner, klimatförändring och samarbete, *Kommunal Ekonomi och Politik*, 10(1), 9-35
- Granberg, Mikael (2009) Almost like government..., *Urban Policy and Research*, 27(4), 333-336
- Granberg, Mikael & Elander, Ingemar (2007) Local governance and climate change: reflections on the Swedish experience, *Local Environment*, 12(5), pp. 537-548
- Granberg, Mikael, Lidskog, Rolf & Larsson, Stig (2008) "Dealing with uncertainty. A case study of controlling insect populations in natural ecosystems". *Local Environment*, 13(7), pp. 641-652

- Grin, John, Rotmans, Jan & Schot, Johan (in collaboration with Geels, Frank & Loorbach, Derk) (eds.) (2010) *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change* (London, Routledge)
- Handmer, John & Dovers, Stephen (2009) "A Typology of Resilience: Rethinking Institutions for Sustainable Development", in Schipper, E. Lisa F. & Burton, Ian (eds.), *The Earthscan Reader on Adaptation to Climate Change* (London, Earthscan)
- Hulme, Mike (2009) *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity* (Cambridge, Cambridge University Press)
- IPCC (Intergovernmental Panel on Climate Change) (2001) *Climate Change 2001: Impacts, Adaptation and Vulnerability* (Cambridge, Cambridge University Press)
- IPCC (Intergovernmental Panel on Climate Change) (2007) *Climate Change 2007: Mitigation of Climate Change* (Cambridge, Cambridge University Press)
- IPCC (Intergovernmental Panel on Climate Change) (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Cambridge, Cambridge University Press.
- Luhmann, Niklas (1989) *Ecological Communication* (Cambridge, Polity Press)
- Lundqvist, Lennart & Biel, Anders (Eds) (2007) *From Kyoto to Town Hall* (London, Earthscan)
- Länsstyrelserna (2012) *Klimatanpassning i fysisk planering – Vägledning från Länsstyrelserna* (Länsstyrelsen)
- MoE (2003) *The Swedish Climate Strategy* (Stockholm, Ministry of the Environment)
- Patt, Anthony G., et al. (2010) Adaptation in integrated assessment modeling: where do we stand? *Climate Change*, 99, pp. 383–402
- Ponting, Clive (1991) *A Green History of the World* (New York, Penguin)
- Rittel, Horst W.J. & Webber, Melvin M. (1973) Dilemmas in a general theory of planning, *Policy Sciences*, 4, pp. 155-169
- Rose, Lawrence E. & Ståhlberg, Krister (2005) The Nordic countries: still the 'promised land'?, in Denters, Bas and Rose, Lawrence E. (Eds) *Comparing Local Governance. Trends and Developments* (Houndmills, Palgrave Macmillan)
- Rothstein, Bo & Steinmo, Stein (2002) "Restructuring Politics: Institutional Analysis and the Challenges of Modern Welfare States", in Rothstein, Bo & Steinmo, Stein (eds.) *Restructuring the Welfare State: Political Institutions and Policy Change* (New York, Palgrave Macmillan)
- Rugge, Fabio (2003), "Administrative Traditions in Western Europe", in Peters, B. Guy & Pierre, Jon (eds.) *Handbook of Public Administration* (London and Thousand Oaks, Sage)
- Rummukainen, Markku, et al. (2005) Anpassning till klimatförändringar, No 106, Feb 2005 (Norrköping, SMHI)
- Rydell, Bengt, Nilsson, Carina, Alfredsson, Cecilia & Lind, Erika (2010) Klimatanpassning i Sverige – en översikt. (Karlstad, Myndigheten för samhällsskydd och beredskap (MSB))
- Satterthwaite, David (ed.) (1999) *The Earthscan Reader in Sustainable Cities* (London, Earthscan)
- Scheraga, Joel D. & Grambsch, Anne E. (1998) "Risk, Opportunities, and Adaptation to Climate Change," *Climate Research*, 10, pp. 85—95
- Schipper, E. Lisa F. & Burton, Ian (eds.) (2009) *The Earthscan Reader in Adaptation to Climate Change*. (London, Earthscan)
- Schneider, Stephen H., Rosencranz, Armin, Mastrandrea, Michael D. & Kuntz-Duriseti, Kristin (eds.) (2010) *Climate Change Science and Policy* (Washington, Island Press)
- SGI (2006) *På säker grund för hållbar utveckling*. (Linköping, Statens Geologiska Institut (SIG))
- Shafritz, Jay M., Russell, E. W. & Borick, Christopher P. (2009) *Introducing Public Administration*. 6th ed. (New York, Pearson)
- SKL (2011a) *Läget i landet: En enkätundersökning om klimatanpassning i den fysiska planeringen* (Stockholm, Avdelningen för tillväxt och samhällsbyggnad, Sveriges Kommuner och Landsting (SKL))
- SKL (2011b) *Samhällsbyggande och klimatet. Kommuner och landsting som visar vägen* (Stockholm, Avdelningen för tillväxt och samhällsbyggnad, Sveriges Kommuner och Landsting (SKL))
- SKL (2011c) *Kommunernas arbete med klimatanpassning* (Stockholm, Avdelningen för tillväxt och samhällsbyggnad, Sveriges Kommuner och Landsting (SKL))
- SKL (2012) *Fysisk planering i kommunerna för minskad klimatpåverkan* (Stockholm, Avdelningen för tillväxt och samhällsbyggnad, Sveriges Kommuner och Landsting (SKL))
- Smith, Joel B., Vogel, Jason M. & Cromwell III, John E. (2009) "An Architecture for Government Action on Adaptation to Climate Change. An Editorial Comment", *Climate Change*, 25, pp.53-61
- Stone, Clarence N. (1989) *Regime Politics. Governing Atlanta 1946-1988* (Lawrence, University Press of Kansas)
- Storbjörk, Sofie (2007) Governing Climate Adaptation in the Local Arena: Challenges of Risk Management and Planning in Sweden, *Local Environment*, 12(5), pp. 457-469

- Thomkins Emma L., Adger, W. Neil, Boyd, Emily, Nicholson-Cole, Sophie, Weatherhead, Keith & Arnell, Nigel (2010) "Observed Adaptation to Climate Change: UK Evidence of Transition to a Well-Adapting Society". *Global Environmental Change*, 20, pp. 627—635.
- Uggla, Ylva & Lidskog, Rolf (2006) Att planera för en osäker framtid. Kommuners arbete inför hotet om ett förändrat klimat, Rapport nummer 60, Centre for Urban and Regional Studies, Örebro University
- UN (1992) United Nations Framework Convention of Climate Change (New York, United Nations)
- UN (2005) Hyogo Framework for Action 2005-2015. Building the Resilience of Nations and Communities to Disasters (Geneva, United Nations, International Strategy for Disaster Reduction (ISDR))
- Urwin, Kate & Jordan, Andrew (2008) "Does Public Policy Support or Undermine Climate Change Adaptation? Exploring the Interplay across Different Scales of Governance", *Global Environmental Change*, 18, pp. 180-191
- WCED (World Commission on Environment and Development) (1987) *Our Common Future* (Oxford, Oxford University Press)
- Wynne, Bryan (1992) "Uncertainty and Environmental Learning: Reconceiving Science in the Preventive Paradigm". *Global Environmental Change*, 2(2), pp. 111-127