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Guest Editorial, part of a Special Feature on [Understanding Adaptive Capacity in Forest Governance](#)

Understanding Adaptive Capacity in Forest Governance: Editorial

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Key Words: *adaptive capacity; boreal; forest; governance*

INTRODUCTION AND THEORETICAL FRAMEWORK: UNDERSTANDING ADAPTIVE CAPACITY

The term adaptive capacity has often been used to indicate the role that various factors may play in determining the extent to which adaptation to climate change - different actions to deal with the consequences of climate change - is possible. While the focus on adaptive capacity has been pronounced within climate change literature, this literature strongly acknowledges that adaptation will not take place with regard to climate change alone. Adaptation to climate change should rather be seen in the context of adaptation to all other coexisting stressors, or what has been called double or multiple impacts (O'Brien and Leichenko 2000). The social, economic and political situation thus plays a part in determining whether environmental impact or exposure will result in vulnerability and in consequences on the ground (Smit and Wandel 2006). For instance, a flood will only become a disaster if the preparedness needed to deal with the consequences of flooding does not exist. The adaptive capacity or resources to deal with the risk of flooding, such as the existence of emergency plans and the existence of funding and personnel, are crucial.

Regular descriptions of adaptive capacity in particular highlight knowledge, institutions, technology, infrastructure and equity as determinants of adaptive capacity and thereby results in a broad focus on social systems (Smit and Wandel 2006). Given the potentially large variety of factors that different systems need to adapt to, it has been shown that climate change may well be comparatively less emphasized than other factors in the development of broad adaptation strategies (Berrang-Ford et al. 2011, Keskitalo 2008). A focus amongst actors may thus be placed on developing general strategies to adapt, drawing upon adaptive capacity to deal with different stressors, in particular economic changes.

This increasingly broad understanding and use of the terms adaptive capacity and adaptation (which, in a social interpretation, may relate to approaches developed in the existing situation, including coping responses) has resulted in a large breadth of literature, and a large variety of case studies. It has been noted that the use of these broad concepts can be beneficial as they are applicable at multiple levels and within varying cases, thereby providing a focus on the broader context in which decisions are made. However, the approaches are also to some extent conceptually limited. For instance, the

relatively general determinants of adaptive capacity - such as institutional and economic determinants - do not necessarily indicate how these have been developed or interrelate, nor how these change over time or due to specific processes (e.g., Klenk et al. 2011).

A number of different related concepts exist, which may be used to help manage these limitations within the context of climate change-related literature, or help expand an understanding of adaptive capacity. With regard to its conceptual content, adaptive capacity can be related to social science conceptions that focus on institutional capacity or policy capacity, without relating these to the context of climate change. For instance, Press (1998) has attempted to define local environmental policy capacity as impacted by social norms, social capital and external impacts, "such as pre-existing environmental conditions, local private and public wealth or state and federal mandates, funding and locally available expertise" (Press 1998:40-41). Other examples are Healey's (1997 and 1998) institutional capacity framework which targets knowledge resources, relational resources and mobilization capacity (see e.g., Breukers and Wolsink 2007). These concepts and applications are, in some instances and applications, more specific and may include process characteristics of the type adaptive capacity has been criticized for lacking (cf. Klenk et al. 2011). However, they are similar to an adaptive capacity concept often used to target larger organizational or social contexts of change, and in some cases are also used to indicate general institutional or other limitations in a specific case.

Other concepts that may be related to adaptive capacity, with regard in particular to the environmental change context, include adaptive (co)management and adaptive governance, which highlight the organizational and social requirements that are considered necessary for developing ecologically and socially sound management (cf. Elbakidze et al. 2010). Such concepts are often specific in targeting governance or management, in particular when the concepts are combined with social learning or other theoretical frameworks. These concepts often also focus on social organization such as participation, and how cooperation between multiple interests can support natural resource management. Adaptive comanagement and adaptive governance concepts are also often utilized in relation to resilience frameworks, which may conceive of adaptations as actions that may increase resilience,

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or view adaptive capacity and resilience as related (for instance, Pinkerton and Benner 2013). The variation in how adaptive capacity and related concepts are understood is, however, substantial (see for instance Plummer et al. 2012 on the concept of adaptive comanagement).

To postulate, a main aim of studies utilizing concepts related to adaptive capacity may be to place the focus on the social context and the complexity of this. While this may in itself include a broad range of social, political and economic aspects, a defining feature of many studies may be that they aim to a within environmental studies focus on the role of social systems: the 'socio' in social-ecological systems as defined by resilience literature. This is in contrast to traditional studies on environmental problems that have often been driven by an ecological reasoning. Conceiving of environmental problems as social problems, socially focused studies thus often highlight that environmental problems need to be managed within the social system, and may even be seen as the result of limitations in social organization. To put it in terms related to the adaptive capacity field, adaptive capacity is not about residual vulnerability - rather, it is about how we are vulnerable in the first place (which is the focus in social vulnerability literature, cf. Adger 2000).

This feature illustrates the variation in the use of terms relevant to adaptive capacity, but also has a common focus on the notion that environmental problems are social problems and that understanding adaptive capacity means utilizing various concepts based on what is most relevant in specific contexts. The feature draws upon qualitative, quantitative and combined studies to review the different ways in which adaptive capacity may be conceived of for cases mainly in the boreal forest belt. Most of these cases are relevant to adaptive capacity explicitly in a social context and in relation to the broad components which determine adaptive capacity. One article (Wellstead et al. 2013) focuses explicitly on adaptive capacity in relation to climate change.

The focus on the boreal forest belt could be seen as resulting in a focus on certain characteristics. Situated across advanced industrial states, the boreal forest is generally considered in terms of multi-use forests: subject to multiple land uses that range from industrial to local use and recreation, and so may include both industrial and post-industrial uses (such as tourism). The cases illustrate the multiple interests concerned with forests. Amongst these are for instance forestry (which may include interests from the forest industry, small-scale forest owners, forest owners' associations, and forest commons), reindeer husbandry, berry or mushroom picking (potentially organized on large scale), local recreation, tourism and also a number of non-renewable resource interests active in the forest areas, such as mining and other exploration, differing by area.

Given the location of the cases in advanced industrial states with this multiple interest structure, the cases almost by necessity illustrate the large role that multi-level governance plays in the utilization of forest resources. Multilevel governance can be described as the way in which not only the state, but also supranational organizations such as the EU, international norms, and decision making among companies and NGOs, may today constitute the decision making systems for instance in forest use (e.g., Hooghe and Marks 2001). This large complexity may make coordination difficult among the various forest organizations and impact the way in which local resources are, to a large extent, governed from outside the local context - not only that of the state but also broader groups of actors. As for instance Næss et al. (2005, 2006) have noted, it is not possible to determine and steer adaptations in relation to such complex processes on the local scale only. Therefore, studies in the feature include a focus on the impact from international norms on forest use, the large role of existing administration for specific issues within national government, as well as governance in forest-specific systems such as the Model Forest arena for cooperation.

A further complexity is the changing structural context of forest use, highlighted for instance by Lundmark et al. (2010) and Pinkerton and Benner (2013). In the Fennoscandian context, rural population is to an increasing extent an aging population. Forest owners increasingly live outside their holdings, often due to their employment in larger towns or cities and having inherited their properties, and are therefore often less dependent on the forest-related outcomes. Increased market competition and technological change has also resulted in employment being substituted with technology, with a more limited local role for employment e.g., in forestry. These large-scale structural changes, which have been highlighted as related to globalization in 'double impact' frameworks, may themselves increasingly result in shifts in the local adaptive capacity in forest areas. Given the changing composition of forest users and the population living in forest areas, as well as the changing and expanding context of the governance of forests, we may increasingly ask questions such as "who adapts to what" (cf. Smit et al. 2000). It is not only adaptation to climate change, not only multiple use, nor only globalizing market frameworks, but increasingly to multiple stressors and change, as these are impacting local areas and the structural composition of local areas as well as various other systems within a multi-level governance framework.

CONTRIBUTIONS TO THE SPECIAL FEATURE

The Special Feature is made up of eight articles that relate in different ways to the broad concepts of adaptive capacity in mainly boreal forest areas, and the ways in which social (including social, political and economic) organization in forest use create complex situations and increased complexity in forest governance.

The contribution 'Local Consequences of Applying International Norms: Differences in the Application of Forest Certification in Northern Sweden, Northern Finland, and Northwest Russia' (Keskitalo et al. 2009) describes how forest certification may impact local forestry practice. Forest certification (here viewed in the Forest Stewardship Council FSC and PEFC Programme for the Endorsement of Forest Certification systems) may be seen as a private, market-based governance system within which third party evaluators assess the social and ecological practice among forestry parties who have signed on to the specific certification system. Although the system is voluntary, market demand for certification has, in some areas, made it close to a market requirement. The article discusses forest certification in terms of an international norm, and analyzes how the implementation of this norm differs with the institutional, for instance national, context in which it is implemented. The paper suggests that the general requirements that are placed by this specific norm on how to act have impact locally, but that these requirements may at the same time to a large extent be modified by the domestic and local context for implementation. All of these features thereby impact the system of how social and ecological concerns are integrated in forestry, and in that construct the context for adaptive capacity in forestry. This may include, for instance, the structure of forest that may be created over time as a result of certification guidelines, but also the institutional framework of which actors are involved in forestry. As the study shows, the threat of boycotts by ENGOs have, in some cases, been vital for implementing forest certification as a way for the forest industry to show their adherence to specific environmental and social standards. The threat of boycotts may thereby also contribute to ways in which forest certification is motivated and implemented. Certification as a norm may therefore constitute one way in which environment requirements can be developed and implemented as long as parties support and maintain legitimacy of the certification systems (however, ENGOs have in some cases withdrawn, noting that the environmental requirements have not been developed sufficiently, cf. Johansson 2012).

In an Insight piece, 'Comparing Sustainable Forest Management Certifications Standards: A Meta-analysis', Clark and Kozar (2011) also focus on certification: they undertake a literature review to analyze three certification schemes. These schemes are the FSC as well as the two PEFC-endorsed initiatives the Canadian Standards Association Sustainable Forestry Management and the Sustainable Forestry Initiative. They are investigated with regards to their impact on sustainable forest management including social, economic and environmental criteria. The authors interpret these as including the participation of stakeholders in standard setting, public input, repeatability and consistency and transparency. The study shows that while each certification system can be seen as a way to approach sustainable forest

management (cf. Elbakidze et al. 2010), and the systems are loosely based on similar definitions of sustainability, there exists a large variation both in specific assessment criteria and amount of studies on different characteristics. The study thereby highlights that in order to "understand the actual impact of [sustainable forest management] SFM, social or ecological data must be collected in field studies" (Rawson and Kozar 2011:12). The study thereby illustrates the relatively recent and developing nature of forest certification. It also discusses the potential for certification to provide assessment systems for improving the implementation of social and ecological considerations in forestry.

The contribution 'National Parks and Protected Areas and the Role for Employment in Tourism and Forest Sectors: a Swedish Case' (Lundmark et al. 2010) illustrates how the development of national parks and other protected areas could support development of a tourism labor market, which may in turn support population growth. The authors are mainly concerned with the development in terms of social outcomes in forest areas, for instance discussing how the estimated population growth is seen as positively correlated with the number of people employed in forest sectors. The paper thereby directly highlights the issue of who the stakeholders in forest areas are, or "who is adapting to what" (cf. Smit et al. 2000). For instance, the authors discuss that although forestry provides significant contribution to GNP in countries such as Sweden and Finland, technological developments and increased international competition have resulted in fewer people employed in forestry. This in turn results in a lower contribution to local and regional economies in forest areas, with the possibility of less support for forestry in relation to other local forest use and in relation to roles for employment. A problem in many sparsely populated forest areas thus becomes trying to attain regional development and maintain population during the transformation from an industrial to a service economy. While the role of forestry for supporting regional development can be seen as separate from the more distinct conceptions of adaptive capacity, it is relevant with regards to the changing structure of habitation, employment and use in forest areas over long periods. These changes fundamentally impact the way in which adaptive capacity is structured, and what adaptations, and by whom, can be undertaken. From a viewpoint of institutional capacity, these are changes in structural factors that change the baseline for adaptations as well as whom the actors are in relation to specific changes.

The contribution 'Multi-Stakeholder Collaboration in Russian and Swedish Model Forest Initiatives: Adaptive Governance toward Sustainable Forest Management?' (Elbakidze et al. 2010) explicitly focuses on the role of different stakeholders. This article starts from the assumption that building the adaptive capacity of social-ecological systems will contribute to sustainable forest management. It suggests that concepts

such as adaptive management and landscape approaches implicitly or explicitly acknowledge the "complexity of ecosystems and social systems and seek to address the challenges of accommodating multiple users' claims and interests" (Elbakidze et al. 2010:2). The article thereby takes a relatively broad but socially focused approach, targeting cooperation as one method to support adaptive capacity. The authors further suggest that adaptive capacity can be used to provide appropriate knowledge and facilitate resilience with regards to the concept of adaptive governance as involving "nested quasi-autonomous decision-making units operating at multiple scales" (Folke et al. 2005:449).

With regard to case, Elbakidze et al. (2010) specifically suggest a Model Forest framework as a potential arena for encouraging learning and cooperation. The Model Forest concept, initially developed in Canada but now implemented in a number of areas worldwide (including in the boreal forest belt), is defined as being aimed at developing cooperation between different interests in a forest landscape. The concept targets the development of representative, transparent and accountable systems that target knowledge sharing, capacity building, and sustainability aims. The article examines four Model Forest developments, two each in Sweden and Russia, and focuses on a number of factors of development and organization in each case. With regards to the motivations for a Model Forest development and stakeholder structure and process, the paper notes the value of local cooperation in the initiatives. However, the paper also suggests that the Model Forests framework differs in "their potential to develop and realize their adaptive capacity", largely limited by what the authors define as relatively fragile or rigid governance systems at a national level. In this relation, the article explicitly places the focus on issues of governance and ask whether "sustainable landscapes as complex social-ecological systems [are] able to be developed only in countries with the appropriate combination of governance systems at the national and local levels?" (Elbakidze et al. 2010:15). Thus, the article draws attention to the multilevel governance context of forest management and the difficulties of developing sustainable forest management initiatives purely on the local level: it illustrates how forest management and adaptive capacity is influenced by multiple factors and levels.

The contribution 'Interlocking Panarchies in Multi-use Boreal Forests in Sweden' (Moen and Keskitalo 2010) draws on resilience theory to identify the periodic changes or adaptive cycles in the boreal forest system in Sweden over time. A particular focus is placed on forestry and reindeer husbandry as two subsystems of forest use in Sweden. The paper discusses the risks of what has been called vulnerability transfer: that adaptations to stresses in one system may result in increased vulnerabilities in another. For instance, the authors note that increasingly optimized forestry limits the capacity within reindeer husbandry to cope with disturbances. They note that

the development of path dependence - or established ways of acting and thinking - within key political decisions has formed the development in resource use systems towards increasing intensity, which produces high optimization at the cost of low flexibility and limited resilience to unexpected events and changes. As a result, any type of "disturbance, such as climate change, market failures, or financial crises, may cause a release and reorganization of the current forestry system in Sweden, and perhaps elsewhere. However, this system is difficult to predict given its large dependence on external market conditions" (Moen and Keskitalo 2010:7). Coordination between sectors is also limited by the separation and sectoral division of the governance of forestry and reindeer husbandry, which could otherwise have supported the development of "incentive structures for coordination at the local level where conflicts arise" (Moen and Keskitalo 2010:10).

This paper thus highlights the role of existing governmental as well as broader decision making systems and how they may determine the possibilities for change in land use systems, both within the national context (including its path dependencies) as well as within that of larger international developments. Highlighting the historical development in both sectors of forestry and reindeer husbandry, the paper shows that the local adaptation to changes is very much dependent on organization at higher levels. While it agrees with discussions of vulnerability transfer that optimization in one sector may lead to limitations or increased vulnerability in other sectors, the paper also illustrates that optimization - an adaptation to economic and political changes - in this case may constitute maladaptation in the longer term. That is, it may serve to lock forestry into developments that are only optimal as long as the broader system itself (such as the economic context or the ecological production situation) does not change. The focus on optimization in the present situation may thus limit the potential for adaptation in changing situations, for instance, changes in production conditions due to climate change.

In relation to the focus on long term viability of systems, the contribution 'Factors Influencing Adaptive Capacity in the Reorganization of Forest Management in Alaska' (Beier 2011) reviews the changes in governance that led to the collapse of the forest management system in the Tongass National Forest in Alaska in the 1990s. The study focuses on identifying institutional adaptive capacity, viewing "evidence of adaptation to change as a positive proxy of adaptive capacity, i.e., as an indicator of a better institutional fit" (Beier 2011:2). Institutional adaptive capacity is here seen as defined by both the factors that limit institutional change (inertia) and those that enable progress toward reorganization (adaptation). Inertia was seen as produced by the continuous focus on industrial large-scale harvesting entrenched in legislation - although in the face of large opposition - which was limiting the possibilities to take advantage of emergent economic opportunities (such as the possibilities for yellow cedar

salvage sales). Adaptation was seen as flexibility in harvest methods and an increased focus and cooperation on the local level and with environmental organizations which helped limit conflict. In the study (Beier 2011), institutional adaptive capacity is thus seen as related to concepts akin to adaptive governance, with a focus on the ways in which the ecological, economic and social cooperation aims can be achieved with regard to the management of a natural resource. The author notes that the future development in the case study region will partially depend on whether the political and ideological differences which lead to the litigious environment can be changed, for instance through building trust among those involved. The author targets issues related to the historical development of path dependency, and how this may continue to steer how systems work in the future. However, the author also identifies the need to aim towards trust building with a focus on participation, which is in this context suggested to improve management in the case: "the Tongass [case] should continue to implement adaptive management principles for maintaining key flows of ecosystem services to residents and stakeholders and improve the level of a priori stakeholder involvement in its planning process" (Beier 2011:17).

A focus on organization that highlights economic consequences is found in the contribution 'Small Sawmills Keep Trucking While the Majors Close: Evaluating Resilience and Desirable Timber Allocation in British Columbia, Canada' (Pinkerton and Benner 2013). This article reviews the resilience to economic shock depending on flexibility, diversity, and location, among small and large scale sawmills in British Columbia. The paper highlights a number of factors that may impact governmental policy goals as well as resilience within the forest products sector. Amongst these the authors identify that more allocation of timber access should be given to specialty mills or the open market in order to retain operational function of the sector and also support employment in forest-dependent communities. The paper illustrates that resilience, here perceived in terms of both the sector and its role in employment, may in this case be supported by providing timber access to smaller-scale companies. However, the paper also notes the focus on large-scale mills within the sector, and thereby highlights the changing and increasingly large-scale structures within forest industry, similar to papers by Lundmark et al. (2010), Moen and Keskitalo (2010) and Beier (2011). The paper thereby illustrates the changing and increasingly large-scale system conditions for both resilience and adaptation within the forest sector, as well as impacts locally in the case.

Finally, the contribution on 'The Neglect of Governance in Forest Sector Vulnerability Assessments: Structural-Functionalism and "Black Box" Problems in Climate Change Adaptation Planning' (Wellstead et al. 2013) explicitly highlights the issue of the social focus and in particular the location of problem solving for environmental issues, with a

focus on climate change. The authors argue that climate change vulnerability assessments in forest areas, such as the development of vulnerability assessments in broader resource management, have not sufficiently included the governance and policy factors that may limit adaptation to climate change. Based on studying vulnerability assessments in Australia, Canada and the US, the authors argue that these cases suffer from a structural functionalist understanding of society, wherein governance is only treated on a macro level and not in terms of specific process factors or a deeper problematization and understanding of the concept. The authors argue that a focus on the role of policy has to be included in vulnerability assessments, with particular focus on the structure and pervasiveness of policy networks, the formal and informal nature of governance, and the policy process in terms of policy making and policy change. Explicitly targeting the role of social systems, they argue for the need to "overcome ... the unrealistic assumption that governance will simply 'get done' as a kind of system maintenance activity" (Wellstead et al. 2013:9).

DISCUSSION AND CONCLUSION

Taken together, these studies illustrate the extent and variety of understandings which are relevant to adaptive capacity as well as the multiple impacts on forest use. International developments on sustainable forest management through certification as a market-based governance system are illustrated by Keskitalo et al. (2009) and Clark and Kozar (2011). Lundmark et al. (2010) and Pinkerton and Benner (2013) illustrate the structural changes that may impact forestry and employment in forest areas. Elbakidze et al. (2010), Moen and Keskitalo (2010), Beier (2011), and Pinkerton and Benner (2013) then illustrate the role of both of large-scale competitors and higher governance levels, in particular with a focus on the national level, for forest management in a variety of cases. Finally, Wellstead et al. (2013) argues that vulnerability assessments need to do more to take into account different governance and policy-oriented factors, akin to those treated in the previous articles in this special feature. All of these studies hold implications for the study of adaptation and adaptive capacities, while also relevant to climate change adaptation in a more restricted sense.

With regard to the two studies of certification, adaptation to climate change has not been mainstreamed into certification standards in forestry so far, even if certification includes certain ecological requirements in forestry which, to some extent, support adaptation. However, certification standards, given their impact on forestry in some areas, could potentially be a relevant venue for including and mainstreaming adaptation concerns. The potential for including new requirements in certification, however, is largely a result of negotiation between the different parties who revise certification standards nationally (for instance for the FSC system). This system currently includes input from ENGOS,

the forest industry and other parties. In other systems such as PEFC, the forest industry plays a larger role, but are impacted by market requirements and broader public discourse. In itself, this makes forest certification an inherently stakeholder-based social system, and also an issue of interests: one may suggest that this system may potentially be subject to changes in what demands are put forward if issues such as climate change adaptation would rise on the political and stakeholder agenda.

Articles on the structural changes that impact the forest industry can be seen as including a focus on the role of double or multiple impact in determining forest use. Structural change impacts adaptive capacity including the institutional context of who is adapting, and to what. Long-term structural changes are fundamentally changing the composition of stakeholders in forest areas as well as the use of forest areas, potentially impacting on local investment in forest issues and the potential for developing local solutions as well as any local comanagement or cooperation around forest use.

Similarly, but focused specifically on the multilevel context of governance that is increasingly emerging, rather than on structural change in general, a number of articles take into account the role of larger interests and higher government levels. These both illustrate the broad understanding of multilevel governance which is relevant for the development of adaptation and the multiple frameworks that need to be managed to integrate mainstream adaptation - amongst which, frameworks that are not perfectly adapted in the present and are subject to multiple interests and existing conflicts. This issue of the complexity of forest governance and adaptation is highlighted e.g., in the article by Wellstead et al. (2013), which argues for the need to include these kinds of complex real-life situations in vulnerability assessment, with an increased focus on the role of policy processes. As they argue, vulnerability assessments, and perhaps natural resource-focused studies, increasingly need to understand the functioning and limitations of different socio-economic and political systems. Returning to what has been a theme in many of the contributions, environmental problems are thereby conceived of as social problems - they are socially developed and need to be managed socially, which includes real-life assessments that take into account the messy socio-economic and political realities of each situation.

To some extent, interpretations of resilience and adaptive capacity within these articles are akin to a focus on sustainability: they focus on factors that support sectoral, institutional, or larger social as well as environmental resource use. Constraints to such sustainability aims, such as aims of sustainable forest management, can often be seen in the increasing requirements for competition in the international market and the related optimization to present conditions, which may also be seen as limiting the possibilities of integrating local aims and building trust (for instance in the

case described by Beier 2011). This may impact the potential for long term sectoral benefits and coordination with other sectors: prioritizing short term optimization before long term resilience in the face of diverse risks and structural change (Moen and Kesitalo 2010). With regards to adaptation options, optimizing systems towards present conditions only may limit both adaptation and sustainable forest management. A stronger understanding of the social, political and economic considerations and situations that fundamentally determine adaptive capacity could potentially support designing adaptation options that are practically viable within the specific systems - as well as support an understanding of the factors that are required to change for other adaptation options to become viable.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/5924>

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