

Chapter 26

Resilience—A Useful Approach for Climate Adaptation?

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Abstract This chapter reflects on the parallels between resilience and adaptation and discusses whether a measurable resilience concept is useful for adaptation to climate change. It argues that a focus on measurability and operationalization risks to overemphasize conservative resilience concepts focused on maintaining the status quo (resilience as robustness) while marginalizing more intangible aspects such as learning (resilience as transformation). We suggest that those aspects of resilience that can be operationalized in a meaningful way should be integrated in existing concepts of climate change adaptation such as vulnerability and adaptive capacity. The most promising value of resilience for climate adaptation, we argue, actually lies in its ability to articulate a vision for a positive future (“Leitbild”). This meaning of resilience emphasizes the relevance of vision-building and the use of participatory instruments to foster learning and innovation. It is with this vision of development that resilience is able to expand the realms of climate adaptation.

Keywords Resilience · Adaptation · Measurement · Learning · Vision

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26.1 Introduction

Conceptualizations of resilience vary significantly in both academia and practice. Two different streams of thinking can broadly be identified: conservative framings of resilience emphasize robustness and maintenance of the status quo, while more progressive readings conceptualize resilience as learning, change and transformational change (cf. Carpenter et al. 2012; Fisher 2015; Schneiderbauer et al. 2016; Wink 2016).

The fifth assessment report of the Intergovernmental Panel on Climate Change acknowledges both perspectives in its definition of resilience: “Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also *maintaining the capacity for adaptation, learning, and transformation*” (IPCC 2014: 40; italics by authors).

Both framings, resilience as robustness and resilience as transformation, have parallels in concepts related to adaptation to climate change. Resilience as robustness emphasizes the ability of a system (e.g. cities, regions) to withstand stresses or shocks such as climate change, particularly extreme events but also slow-onset changes. This meaning of resilience corresponds to the concept of “sensitivity” that is used in climate adaptation, for example, in the 2015 vulnerability analysis for the German government (adelphi/PRC/EURAC 2015). Resilience as transformation in the face of slow-going or rapid changes focuses on the capacity to learn and change. This understanding relates to the concept of “adaptive capacity”, which also emphasizes the ability of a system to change.

Against the background of these parallels between resilience and adaptation, this chapter reflects on whether a measurable resilience concept is useful for adaptation to climate change. It argues that a focus on measurability and operationalization risks to overemphasize conservative resilience concepts focused on maintaining the status quo. However, when considering likely severe and far-reaching impacts of future climate change, capacities for change and learning are crucial. Measuring these dynamic and often fuzzy aspects of social development would risk to significantly reduce the complexities of social systems such as informal networks and institutions that are at the heart of resilience.

Instead of attempting to develop a holistic, measurable resilience concept, we suggest that those aspects of resilience that can be operationalized in a meaningful way should be integrated in existing concepts of climate change adaptation such as vulnerability and adaptive capacity. Such a more narrowly defined agenda for operationalizing resilience frees capacity to focus on those aspects of the concept that can contribute to climate adaptation more substantially: the most promising value of resilience for climate adaptation, we argue, actually lies in its ability to articulate a vision for a positive future (“Leitbild”). This meaning of resilience carries a positive connotation and emphasizes the relevance of vision-building and the use of participatory instruments. It is in this ability to provide a hopeful and

emotional guiding principle that the concept of resilience is most useful for climate adaptation.

In the remainder of this chapter, we substantiate our argument in four interrelated steps: first, we discuss conceptually the parallels between resilience, vulnerability and climate adaptation. We show that due to its close relation to the idea of “sensitivity”, resilience as a measure for the robustness of a system is already captured in methods of vulnerability assessments. We argue that resilience relates to the concept of adaptive capacity if it is framed as a concept for social change. Second, we reflect on ways how such social dimensions of resilience could be integrated in existing tools for adaptation monitoring at the national level, but suggest that for national processes such as the implementation of the climate change adaptation strategy in Germany, appropriate monitoring or indicator systems are not available so far.

Third, empirical evidence from a case study on resilience to heatwaves in London, UK is used to demonstrate how such a focus on measurement and operationalization risks to undermine an acknowledgement of “soft factors” of resilience. In delivering heatwave risk management in London, informal institutions such as learning and social networks were integral. Fourth, we therefore suggest that the most promising value for adaptation might lie not in the operationalization of resilience, but in its ability to articulate a positive vision for development. Here, resilience goes beyond the somewhat technical idea of adaptive capacity and can have a substantial impact on development trajectories in climate adaptation.

26.2 Resilience and Vulnerability: Parallels to Sensitivity and Adaptive Capacity

Resilience and vulnerability are related concepts (Martin-Breen and Anderies 2011). In general, vulnerability and resilience are seen as opposites: a vulnerable system is not resilient; a resilient system is not vulnerable. Other authors argue that a resilient system is more than not vulnerable (c.f. Schneiderbauer et al. 2016; Welle and Birkmann 2016) and suggest that both are complementary concepts with different focuses: vulnerability—in the framework of climate change adaptation—focuses on potential damages due to sensitivity and adaptive capacity of an exposed system (IPCC 2007, 2014); resilience focuses on the capacities of a system to react to stresses or shocks (IPCC 2014; UNISDR 2007). Thus, both concepts seem to be synergistic: a reduction of the vulnerability of a system will likely—but not necessarily—increase its resilience.

Vulnerability assessments focus on the potential damages of (climate related) hazards and the structural weakness of a system with the aim of developing adaptation measures for improving the system. Resilience assessments, on the other hand, look at the strength and chances of a system, seeking to increase the motivation for change by offering a common vision, which may enable completely new

solutions (Labaka and Sarriegi 2016; Sharifi and Yamagata 2016). To allow both (theoretical) concepts to influence policy, it is crucial that they are operable. Here, it is argued that the vulnerability concept in the context of climate change is already applicable, because it has been operationalized and extensively applied at different spatial scales in the past decade (see, e.g., adelphi/PRC/EURAC 2015; Harrison et al. 2015; Schuchard and Wittig 2012).

The concepts of resilience and vulnerability have in common their fuzzy definitions. There is no common methodological framework to operationalize them, which is partly due to the fact that their definitions are based on other vague and ambiguous terms such as adaptive capacity, sensitivity, flexibility or creativity. Both concepts depend on many variables which are themselves scale-dependent and changing over time and context. An assessment of both concepts will always include normative choices to decide which of the influencing factors need to be considered and are seen as critical.

Often the resilience of a system is analyzed with the aim of increasing its robustness by strengthening its coping capacity, mostly with the present conditions in focus. In a vulnerability assessment, these capabilities are seen as aspects of the sensitivity of a system. These capabilities can be operationalized by generic or context-specific information. However, because vulnerability assessments in the context of climate change are more interested in the future than in the present, the (present) coping capacity is often very much simplified or neglected. Still, it can be argued that due to this parallel to the concept of sensitivity, resilience as a measure for the robustness of a system to climate change is already included in vulnerability assessments.

Resilience—when understood as concept to deal with changes in a transformative way towards a new (future) status of the system—includes as core building stone its resourcefulness, including the capacity to learn and to progress. Vulnerability includes the capacity to adapt in the 2007 and the 2014 definition of the IPCC, and this also incorporates learning and development in the short and long term. Learning in technical systems may lead to a substitution of old systems and therefore to a neglect of old situations and solutions. Learning in social systems is based on balancing of different experiences with similar problems and on the creation of new solutions. This sheds light on the importance of memory.

Adaptive capacity and resilience are very similar concepts. Both incorporate similar capacities which enable a system to be robust up to a certain limit of stress and to adapt or to transform itself in the face of a stronger or continuing stress. The overarching goal is to maintain the operability and key functions of the system. Following this argument—resilience as similar to adaptive capacity—a resilience assessment as a measure for the capacity to adapt and to transform could be part of a vulnerability assessment. However, the capacity to learn is more prominent in resilience concepts than in most proposals for measuring adaptive capacity in vulnerability assessments.

26.3 Resilience in Adaptation Monitoring Approaches

A first step towards a systematic operationalization of social dimensions of resilience could be to explore ways of how learning can be incorporated in existing adaptation monitoring systems. As shown in our case study below, incremental adaptation and learning are crucial for building resilience. In the face of possibly severe climatic changes, supplemental transformative adaptation approaches may be required for the enhancement phase of the German Adaptation Strategy. These transformative approaches generally include creative and innovative solutions and behavioural changes (Mahrenholz et al. 2016) and require learning processes. Therefore, the feasibility of a robust monitoring of such aspects of resilience on a national level by indicators could support policy-making substantially.

Scientifically consistent as well as politically approved methods for monitoring of climate impacts and response measures (UBA 2015) on the one hand and an assessment of vulnerability including adaptive capacity (adelphi/PRC/EURAC 2015) on the other hand informed the establishment of the second German Adaptation Action Plan (Bundesregierung 2015). The method for the vulnerability assessment which has been successfully applied in this national context is published in a guideline to assist actors on the federal and regional level (Buth et al. 2017). The Adaptation Action Plan itself follows an incremental approach as it focuses on stepwise adaptation with short-term solutions, low- and no-regret measures (Vetter et al. 2016).

The German Environment Agency systematically gathers information on a household level regarding people's attitudes, behaviours and provisions pertaining to adaptation, especially to climate extremes. Data is gathered every two years and periodically published in the study "Environmental Consciousness in Germany" (UBA/BMUB 2017). Exemplified statements include "*I change my planning for spare time and holiday, e.g. I avoid especially exhausting activities during heat-waves or give up on hot holiday destinations.*", "*I change my winter sports activities.*" or "*I ensure my property against risks of flooding, flash floods and landslides*". Resulting conclusions on learning processes have been drawn by the authors of the study, providing valuable additional information on resilience that should be used to further develop existing methods. We propose, for example, to interview adaptation actors or acting institutions (including municipalities, businesses, NGOs) not only about technical or financial capabilities but also about their potential to innovate and their diversity and flexibility in regard to structures and adaptation solutions. If this was surveyed regularly, such a monitoring itself would constitute a learning system, as respondents—in reflecting on the questionnaire—would be urged to identify innovative solutions of handling stress situations themselves.

However, such a potential for operationalization in a permanent impact-oriented policy process bears the risk of using inappropriate proxies for soft factors of resilience that are difficult to measure, such as learning, cultural traditions and their changes, existing values and their modification (for factors see Martinez et al. 2014;

Sharifi and Yamagata 2016). Operationalization therefore bears the risk of underestimating the social dimensions of resilience. Cultural traditions, for example, are difficult to measure because they depend on specific spatiotemporal conditions, and their changes vary on long timescales. Existing values differ individually so that it is a methodical challenge to derive constraints which allow valid conclusions for social groups or societies. Attempts to develop metrics and measurements for resilience should carefully bear this risk in mind. In practice, this could mean devoting sufficient resources and time to the development of “soft factor indicators”, as budget constraints often force researchers into applying (quantitative) proxies that are readily available.

26.4 Intangible—Informal Networks and Resilience to Heatwaves in London, UK

Results from a case study on social learning in heatwave risk management in London, UK, demonstrate how a focus on measurable resilience concepts risks to undermine an acknowledgement of adaptation and learning as essential aspects of resilience (Abeling 2015a, b). The aim of the study was to understand how resilience to heatwaves is shaped by local-level behaviour and decision-making. Empirical evidence stemmed from 49 semi-structured expert interviews with risk planning officials from local authorities and National Health Service (NHS) organizations in London, conducted over the course of six months between 2013 and 2014. The study explored opportunities for learning and change within the networks of heatwave risk management institutions in London.

London is particularly vulnerable to the adverse effects of extreme temperatures. The city was adversely affected by several heatwaves in the last decade, including the 2003 heatwave which is estimated to have caused 2000 excess deaths, the 2006 heatwave (estimated: 680 excess deaths) and the 2009 heatwave (estimated: 300 excess deaths) (PHE 2014). London’s urban area is subject to the urban heat island effect (GLA 2006). Heatwave risk management in London is delivered through local government organizations as well as organizations from the NHS and the voluntary sector. Local heatwave planning approaches are shaped by the National Heatwave Plan for England. The National Heatwave Plan was first developed by the Health Protection Agency in 2004, following the 2003 European heatwave. At the heart of the plan is the “Heat-Health Watch alert system”, an early warning system for heatwaves in England. Heatwave alerts are disseminated to local authorities as well as to organizations from the NHS and from the voluntary sector. The London Resilience Forum, a multi-agency coordination platform for disaster risk management in London, provides the framework for heatwave planning in the city. It is here where resilience is articulated as a guiding principle for incremental changes to risk management in London.

Results show that informal networks were crucial for resilience because they supported formal risk management arrangements to function when the heatwave plan was activated. It was then when shortcomings of planning arrangements were revealed and where informal networks stepped in and compensated dysfunctional formal response arrangements. This was observed, for example, during the July 2013 heatwave in London, when trust relationships between risk managers allowed them to circumvent bureaucratic regulations that constrained an effective organizational response to the heat. A senior representative from a London Clinical Commissioning Group (CCG) reported that according to formal rules, they would not have been allowed to reach out to local General Practitioners (GPs) during the heatwave. To prevent overcrowding in the local hospital, the respondent aimed to advise local GPs to treat incoming patients with heat-related symptoms directly, rather than referring them to the hospital. The respondent suggested that they knew from past working relationships colleagues at the NHS England responsible for authorizing a direct communication between the CCG and GPs. The respondent was confident that these colleagues would trust in the appropriateness of local response measures, even if these were not authorized in advance and thus broke the formal rules and responsibilities of the risk planning regime. Here, trust relationships and informal networks helped to deliver disaster response at the local level in a way that would have not been possible if local planners would have followed the formal rules.

In local authorities, intangible aspects of resilience were of critical importance because learning in local government relied heavily on experiences with improvised responses to problems. Trial and error and reactive problem-solving were distinctive characteristics of learning processes in disaster risk management in London. A Resilience Officer from a pan-London emergency planning body suggested that risk planning arrangements in their organization were changed only after events revealed their inappropriateness. At the local level, a Director of Public Health from a London local authority reported that constraints in capacities and resources overburdened their organization, putting it constantly in a position to react, rather than to plan.

These “cultures of firefighting” suggest that incremental adaptation and learning through informal networks were crucial for heatwave resilience at the local level in London. The geographical proximity of London’s 33 local authorities means that social networks, both formal and informal, cut across hierarchies and boundaries of the formal organizational system of risk management. Diversity of the network of social relationships that links together risk managers from across the city can facilitate the dissemination of knowledge, supports sharing of best practice examples and thus shapes capacity to learn in a way that is particular to the organizational architecture of disaster risk management in London. Tracing these aspects of resilience requires context-specific and in-depth engagement with the risk management community of practice. Attempts to measure and operationalize informal networks as part of a broader resilience assessment risk to elevate these networks from the hidden “shadow spaces” (Stacey 1996) in which they operate and into the spotlight of formality. This

might undermine the very nature of informal networks and could threaten their functionality and their pivotal contribution to learning with the organization. The alternative of using as proxies available metrics, however, might fail to fully grasp the complexity of informal networks and their role for adaptation and learning as important aspects of resilience.

26.5 Resilience as a Vision and Guiding Principle

Against the background of increasing efforts in implementing adaptation strategies to reduce vulnerability and enhance climate resilience, there is a growing need for approaches to assess and monitor progress in decreasing vulnerability and to build adaptive capacity and resilience to climate change. Describing and assessing trends for impacts and adaptation responses aim at raising actors' awareness of challenges for climate policy. Moreover, monitoring informs strategy development by surveying the effectiveness as well as the efficiency of implemented adaptation measures and may legitimate the allocation of resources.

How can resilience be useful for this? We argue that resilience—in the context of climate change adaptation—is best used as a guiding principle (“Leitbild”) and positive vision. It has the capacity to articulate a picture of a desirable future. As a target state or—by a transient process—permanent claim to strengthen a system's capabilities to deal with changes, resilience articulates a normative agenda. This claim could also include unknown future stresses, which would lead not only to an adaptation to known stresses but also to a complete transformation of a system. Such a transformation would need high flexibility, learning and innovative capacities, which can enable proactive changes. It is with this vision that resilience is able to expand the realms of climate adaptation. Vulnerability assessments have been used as tools to investigate and decrease system fragilities, whereas resilience assessments could be used as tools to investigate social development.

A few case studies so far have demonstrated that the use of resilience as a positive vision is useful as a normative foundation of learning and transformative processes. For example, Kegler (2014) describes strategies and perspectives of resilient and learning cities in Germany and emphasizes the participatory and experimental design of building a vision to transform regions under stress. Against the background of a well-grounded problem analysis, the first step was to develop positive goals or visions of resilient cities and regions. Other case studies, e.g. in the Greater Cairo region, depicted the necessity for participatory programmes for community-based engagement implementing the resilience vision for the region (ICLEI 2015). More generally, Lukesch et al. (2010) highlight the cyclical character of the resilience approach as well as the crucial first step: the region Voralberg in Austria developed a so-called Vision Rheintal to lay the foundation for a long-term socio-economic development.

Whether such approaches of framing of resilience to include learning and change and to serve as a guiding principle for future development are successfully

transferable on a municipal, regional or national level remains unclear at this point. The described resilience approach might lead to challenging debates about competing visions or guiding principles of resilience. From our point of view, however, these debates are necessary to reveal, address and potentially mediate nested interests of key actors in resilience. Such dialogues, we argue, should best be organized as open and inclusive participatory processes at the local level. Further investigation is needed to assess how transformative capacities can be operationalized and integrated in adaptation monitoring. Hence, it remains a main challenge for science and practice to identify ways of consequently integrating social dimensions of resilience into the implementation of adaptation strategies.

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