

Ökonomie der Anpassung an den Klimawandel

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Literaturübersicht zu Klimaanpassung und Institutionenökonomie

Arbeitspaket 2.1

Impressum

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Zitiervorschlag

Roggero, Matteo; Thiel, Andreas (2014): Ökonomie der Anpassung an den Klimawandel – Literaturübersicht zu Klimaanpassung und Institutionenökonomie (Arbeitspaket 2.1), Berlin, Download: www.oekonomie-klimawandel.de

Der vorliegende Beitrag entstand im Forschungsprojekt „Ökonomie der Anpassung an den Klimawandel – Integration ökonomischer Modellierungen und institutioneller Analyse auf verschiedenen Ebenen“. Das Projekt wird gefördert durch das Bundesministerium für Bildung und Forschung (BMBF) im Förderschwerpunkt "Ökonomie des Klimawandels" (Förderkennzeichen 01LA1137).

Für nähere Informationen zum Projekt: www.oekonomie-klimawandel.de

Berlin, November 2014

Zusammenfassung

Welchen Beitrag leistet die Institutionenökonomie für unser Verständnis von Klimawandelanpassung? Fraglos hat sich die Institutionenökonomie im Bereich der Anpassungsforschung fest etabliert: So sind Institutionen und soziale Praktiken anerkannte Determinanten der Anpassungskapazität, zugleich gibt es verschiedentlich Ansätze, wichtige Aspekte der Institutionenanalyse - wie etwa soziales Lernen und kollektives Handeln - in die Anpassungsforschung zu integrieren.

Wie die weiteren Ausführungen zeigen werden, sind Fragen der Koordination und Interaktion von Akteuren in der Literatur zur Klimawandelanpassung allgegenwärtig. Dies wirft die Frage auf, welche alternative Governanceformen sich eignen, um eine adäquate Organisationsstruktur zur Anpassung an den Klimawandel zu gestalten. Aus Perspektive der Institutionenökonomie implizieren verschiedene Governanceformen unterschiedliche Anreize für Akteure und beeinflussen deren Interaktion und Fähigkeit zur Kooperation, wie etwas das Lösen von gemeinsamen Problemen.

Vor diesem Hintergrund besteht für die Institutionenökonomie kein Zweifel daran, dass Institutionen eine wichtige Rolle bei der Gestaltung von Klimawandelanpassung spielen. Vielmehr kann die Institutionenökonomie einen Beitrag zur Frage leisten, welchen Einfluss verschiedene institutionelle Arrangements auf die Klimawandelanpassung haben. Bedenkt man die Vielfalt der Akteure und deren durch den Klimawandel beeinträchtigten Interessen, stellt sich die Frage, ob sich einen Zusammenhang zwischen unterschiedlichen Anreizstrukturen und unterschiedlichen Formen der Klimawandelanpassung beobachten lässt.

Mittels einer institutionenökonomischen Perspektive sollen wir im Folgenden die Bedingungen konzeptualisieren, unter denen Akteure eine Anpassung durch Veränderung ihrer Interaktion vornehmen. Von besonderem Interesse ist dabei die Forschung zu institutionellem Wandel. Hier wurden konzeptuelle Instrumente entwickelt, die es ermöglichen, den Nexus zwischen sich verändernden Umständen und sich verändernden institutionellen Arrangements zu untersuchen. Darüber hinaus erscheinen aber auch andere Strömungen innerhalb der institutionenökonomischen Forschung vielversprechend, so etwa Beiträge, bei denen die Rolle von Eigentumsrechten oder die von Kognition und der willentliche Dimension von Institutionen im Vordergrund steht.

Die InstitutionenökonomInnen haben dem Thema Klimawandelanpassung bemerkenswerter Weise bislang allerdings wenig Beachtung geschenkt. Ziel dieser Review ist es, einige vielversprechende Forschungsfelder zu skizzieren. Sie soll eine entsprechende Diskussion zwischen Forschern aus beiden Themenfelder stimulieren und die Lücke zwischen Institutionenökonomie und Klimawandelanpassung schließen. Nur so kann unserer Meinung nach eine fruchtbare Zusammenarbeit gelingen, die es möglich macht, zentrale Einblicke darüber zu erhalten, wie sich Gesellschaften in Erwartung des Klimawandels organisieren.

Abstract

What can institutional economics contribute to our present understanding of climate adaptation? Institutional economics has certainly made it into the landscape of scholarly work on adaptation: “institutions” and social practices are an acknowledged determinant of adaptive capacity and several works try to fit adaptation in the frame of social learning and collective action, which are important aspects of institutional analysis.

As we shall see, questions of coordination and interaction among actors are very present in the adaptation literature, raising the question of how alternative governance forms can constitute more or less suitable organisational structures for climate adaptation. From an institutional point of view, different governance forms imply different sets of incentives for the actors at stake, affecting their interplay and their ability to cooperate so as to address common problems.

Given the above, there’s certainly no need for institutional economics to provide evidence that institutions play a role in shaping adaptation. Rather than that, institutional economics can provide a contribution to the still outstanding analysis of the effects different institutional arrangements can have on adaptation. Given a plurality of actors holding diverse interests, some of which being affected by climate change, are different ways of organising the interplay of such interests reflected in the way adaptation comes about?

In the following, we leverage institutional economics in order to conceptualise under which conditions climate change leads actors to adapt by, first of all, altering the way they interact with one another. Contributions on institutional change, in particular, provide us with conceptual tools specifically tailored to explore the nexus between changing circumstances and changing arrangements. Furthermore, several other branches of the literature appear promising, such as those contributions focusing on property rights and those focusing on the cognition and volition dimension of institutions.

Remarkably, the institutional economics community has granted so far little attention to climate adaptation. With this review, it is our intention to highlight promising avenues for further research on this topic and stimulate discussion among scholars in both institutional economics and climate adaptation so as to fill such gap. We see this as a precondition for a fruitful cooperation between institutional and climate adaptation scholars — a cooperation which can deliver crucial insights on how society organises itself in preparation of a changing climate.

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1. Climate Adaptation

The literature addressing climate adaptation is vast and highly heterogeneous in terms of both approach and focus. Contributions range from purely argumentative and conceptual works to mathematical explorations, computational simulations and ethnographic accounts. The focus varies from the adaptation of individuals to international treaties, addressing adaptation both per se and as a component of a wider climate policy. With an eye on our purposes we identify four topics worth specific attention. We thereby refer to the literature addressing the nexus between adaptation and, respectively, decision-making processes, uncertainty, adaptive capacity and scalar organisation. We provide below a short summary of each of those branches. Before we do so, some insights on how climate adaptation is framed and defined will allow us to narrow down the topic.

1.1. Definitions and Basic Concepts

In an effort to capture the essence of climate adaptation, scholars have provided scores of different wordings and formulations. As Smit & Wandel (2006) put it, we are confronted with “variations on a common theme” (pg. 282): Fussler & Klein. (2007), for example, maintain that “Adaptation primarily aims at moderating the adverse effects of unavoided climate change through a wide range of actions that are targeted at the vulnerable system. (It may also include taking action to seize new opportunities brought about by climate change.)” (pg. 303).

Pielke (1998) distinguishes adaptation to climate from adaptation to climate change, while Smit & Pilifosova (2001) frame it in terms of “adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts” (pg. 879). By that, they do not only refer to an increased demand for particular infrastructure, such as dikes, retention basins, larger drainage channels, or green spaces, but rather to changes in those processes, practices, and structures that determine vulnerability.

Exposure, sensitivity, adaptive capacity and vulnerability constitute recurring terms in the literature on climate adaptation. They all belong to the same conceptual construct, which Smit and Pilifosova (2007) illustrate schematically (pg. 881) — see Figure 1 below. Keeping definitions at a minimum, we define exposure to climate change the projected change in climatic conditions in a specific area and thus for a specific socio-economic system. The crucial insight here is that climate change is expected to show a considerable spatial heterogeneity, implying that certain areas will be exposed to it more than other ones.

Exposure is however different from sensitivity. We best illustrate it with an example: intuitively, the same heavy rains do not have the same impact on a dense urban area than they would have in the countryside. The difference between the two settings lies in the amount of features directly or indirectly relevant to human well-being that can be lost or damaged by given weather events. All else being equal, the more “valuables” can be affected by climate change, the higher the sensitivity.

Yet, still quite intuitively, valuables are not all the same everywhere. One can imagine that the same, equally exposed, equally sensitive feature of a socio-economic system has a different “readiness” to adjust to projected climatic changes, based on different characteristics of the context in which it is embedded. Climate scholars address this aspect through the concept of “adaptive capacity”: they see therein the amount of “spontaneous adaptation” they can expect.

To the extent spontaneous adaptation is not able to fully offset the change in climate conditions, a residual "vulnerability" emerges. That is the object proper of climate policy in terms of planned adaptation. In these terms, climate policy is conceptualised as the overarching decision-making process that encompasses both climate adaptation and climate mitigation.

The loop closes then with the acknowledgement that climate mitigation today reduces the need for climate adaptation tomorrow, and with the implicit understanding that spontaneous adaptation (through adaptive capacity) reduces the need for planned adaptation. As Füssel (2008) points out, though, concepts are not as clear-cut as they seem. The distinction, in particular, between spontaneous and planned adaptation is in many ways problematic. Same holds true for the nexus between mitigation and adaptation.

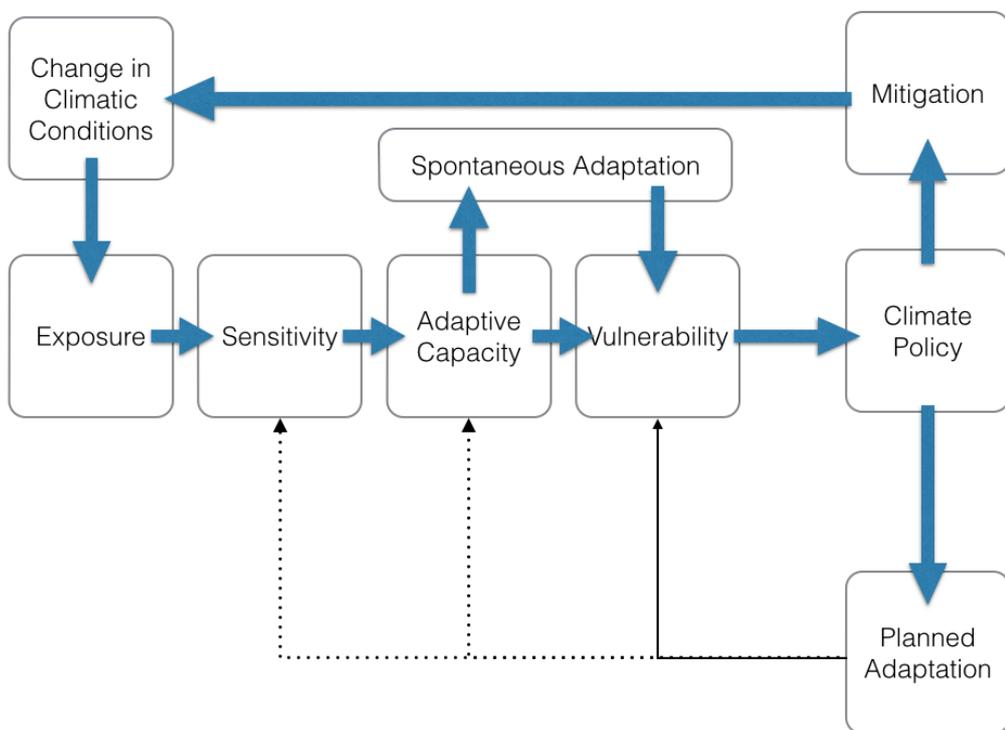


Abbildung 1: Main concepts in climate adaptation research.
Adapted from Smit and Pilifosova (2007)

Figure 1 provides an illustration of the link between the different concepts portrayed so far. Undoubtedly, we are confronted with a multi-faceted, complex study object, which hardly lends itself to disciplinary approaches and clear-cut, linear conceptualisations.

1.2. Adaptation in the Policy Process

The first strain of literature that we intend to address here encompasses those contributions focusing on the policy process surrounding adaptation. Scholars therein address those decision-making

processes climate information is fed into, ideally leading to adaptation. Scholars perceive the nexus in very critical terms. A good example in these regards is the analysis of adaptation in UK, Sweden, Norway and the Netherlands by Termeer et al. (2012). The authors detect a number of serious issues hampering the policy process pointing at: 1) lack of openness towards learning and variety; 2) strong one-sided reliance on scientific experts; 3) tension between top-down policy development and bottom-up implementation; 4) distrust in the problem-solving capacity of civil society; and 5) wickedness to reserve funding for long-term action.

At a more specific level, Westerhoff and Juhola (2010) focus on the gap between climate model predictions and adaptation-related decision-making. Relying on the analysis of policy documents and expert interviews from Finland and Italy, they were able to show that available climate knowledge is quite detached from the needs of local decision-makers. Similarly, Hinkel (2012) distinguishes several types of problems the literature generally addresses with vulnerability indicators and finds such approach mostly not appropriate.

On the other hand, Weaver et al. (2013), addressing the use of climate modelling in decision making, maintain that climate models can do more for adaptation (and climate policy more in general) than the current "predict-then-act" approach. This requires however a different understanding of climate models: the models and their outputs are seen more as a contribution to a deliberative process than as the best available and thus compelling projection of future conditions. Yohe (2009), Patt and Siebenhühner (2005) come to the same conclusion while addressing adaptation within, respectively, integrated modelling and agent based modelling: projections are often no basis for policy decisions, but can inform an iterative policy process and help decision-maker explore the complexity of the matter.

Further literature provides us with examples of such "deliberative" approach to climate and adaptation issues. Bryson et al. (2010) illustrate the use of scenario-based exercises by public officials as a tool to develop "imaginative thinking". Similarly, Yuen et al. (2012) find that climate risk assessments seldom lead to planning, but often lead to social learning among experts and decision-makers. They thus provide empirical support to an insight suggested decades earlier by Grubb (1993): fundamental uncertainties are too large for model-based policy advice, but expert judgment benefits by discussing such models nonetheless.

Other scholars take a more explicit stand on the nexus between decision-making processes and climate issues and introduce the dimension of learning into their analyses. Pahl-Wostl (2009) and Hinkel et al. (2010) explicitly spell out climate adaptation in terms of social learning. Hegger et al. (2012) develop a framework assessing joint knowledge production between science and policy and distinguish several "success conditions" leading to effective learning. However, evaluating adaptation in actual spatial planning projects in the Netherlands, Van Drunen et al. (2011) observe a number of procedural flaws in the way decisions are reached. Social learning is thus no guarantee of "future-proof" decisions and plans, they find.

Boyd and Osbahr (2010) explore learning and information flows within governmental and non-governmental organisations addressing climate change in the UK. Learning, in their view, takes place ad-hoc and requires informal networks. Relying on the analysis of Swiss and Austrian electric utilities, Busch (2011) stresses instead the distinction between operational flexibility and strategic integration as preconditions, within firm processes, for respectively short and long term adaptation – provided knowledge absorption takes place.

Berkhout et al. (2006), however, establish a link between adaptation within organisations and organisational learning. Similar perspectives have a twofold benefit, since they apply to both spontaneous adaptation carried out by private organisations (such as large companies and corporations)

and to planned adaptation carried out by state actors, often constituting large and complex organisations as well. The authors stress that organisational learning is a rather policy and market-driven process. Without a substantial push from market forces and/or political leaders, not much autonomous adaptation in organisations shall be expected. The authors draw their conclusions from interviews with nine UK organisations in the construction and water sectors.

Eisenack et al. (2012) confirm such view through a literature-based analysis of adaptation in the transport sector. They find that adaptation takes place indeed through top-down policies by public actors facilitating private adaptation. This matches well the perspective offered by Hallegatte et al. (2011), according to which adaptation goods are mostly private. Governments shall therefore focus on creating framework conditions rather than providing adaptation themselves. Private adaptation shall otherwise be underprovided, as Thompkins and Eakin (2012) also point out.

1.3. Adaptation and Uncertainty

The second strain of literature we address is concerned with the uncertain character of climate projections, forcing present decisions under uncertain future conditions. Setting aside those contributions with a more specific focus on the challenges uncertainty poses to computational modelling of future climate conditions, among the above mentioned (Weaver et al. (2013), Yohe (2009), Patt and Siebenhühner (2005) or Heal and Kriström (2002) and Patt et al. (2010), Aaheim et al. (2012)) we can distinguish two approaches within the literature. One branch focuses on the implications of uncertainty for individual decision-making, raising the question whether systematic biases shall be accounted for while addressing adaptation by individuals – citizens or firms alike. The other branch focuses instead on collective action, raising the question whether available decision-making structures can and do address uncertainty. Let us address them individually.

1.3.1. Perspectives on the Individual

Starting with the first branch, we move along a continuum between applied and experimental research. While the applied strand of contributions sketches the effects of climate-related uncertainty on the microeconomics of specific sectors (agriculture in particular, with a focus on adaptation by farms and rural households) the more experimental strand is focusing on human behaviour under uncertainty in lab settings.

At the one end of the spectrum, Olesen et al. (2011) focus on perceived climate risks for agriculture and find that farmers are adapting to climate change by adjusting timing and crop selection. Antle and Capalbo (2010) focus on food systems and conceptualise adaptation as an investment under uncertainty. Lack of information, they posit, impedes both public and private actors to invest in adaptation.

At the other, more interesting end of the spectrum, Grothmann and Patt (2005) focus on psychological determinants of individual adaptation. They find that individual adaptation choices can be explained through "socio-cognitive" variables. Missing adaptation, they imply, may be explained by lacking perception of adaptive capacity, "objective" capacity being equal. Similarly, Osberghaus et al. (2010) rely on "Protection Motivation Theory" in order to address the effects of personal threats on individual adaptation. Their results suggest that the mere information on impacts increases the

general willingness to adapt. Being exposed to global, remote threats as opposed to immediate and direct climate impacts has no significant effect on the response by individuals, though.

Similar approaches are rooted in the work of Tversky and Kahneman (1974, 1986, 1992, see also Kahneman and Tversky 1979). They provide a critique of "expected utility" as commonly referred to in economics, and propose a more articulated approach to the way individuals address uncertain future gains and losses. According to such scholars, individuals evaluate gains and losses independently rather than assessing their sum total. While factoring in the risk connected to uncertain future events, individuals weigh potential gains and losses through respectively convex and concave curves, which lead to underestimating gains while overestimating losses. On top of that, high probabilities are generally overestimated, while small probabilities are underestimated. Such insights explain phenomena such as risk aversion but also unfair games such as lotteries. More importantly, though, Kahneman and Tversky show that individuals confronted with uncertainty rely on heuristics (representativeness, availability of scenarios, and deviation from an anchor) which greatly lower the overall complexity of decision-making, but introduce systematic biases in decisions.

A crucial implication of the above is that individuals are exposed to framing effects: the same problem, understood as the same set of possible, alternative consequences to an individual choice will be evaluated differently according to the way such choice is presented. Extending such line of reasoning to matters of individual adaptation, we quickly understand that the simple input of information concerning future climate impacts is hardly likely, alone, to trigger adaptation. It may or may not do so based on how individuals' perceptions frame the corresponding consequences – with serious implications for climate policy. Relying on a linear understanding of human behaviour may seem convenient, but may also present serious pitfalls as Shove (2010), for example, concludes in her analysis of UK environmental policy.

1.3.2. Perspective on Cooperation and Collective Action

Let us now consider those contributions that address the effects of uncertainty on the cooperative dimension of climate adaptation. We can distinguish two types of approaches. On one hand we have game-theoretic, formal treatments, mostly focusing on mitigation questions, sometimes with reference to the nexus between mitigation and adaptation. On the other hand we observe a large body of literature with a more conceptual and less mathematic approach. Goal is thereby to explore the nature of uncertainty and the corresponding implications for embedding it into adaptation-related decision-making processes. They thus complement and extend the literature on the nexus between climate adaptation and the policy process through an explicit treatment of the uncertainty variable.

Recent game-theoretical treatments of the collective dimension of climate policy are provided by Barrett and Dannenberg (2012), Barrett (2013), Brown et al. (2009), Finus and Pintassilgo (2013) and Shadmehr and Bernhardt (2011). Barrett and Dannenberg (2012) and Barrett (2013) focus on climate treaties as a means of avoiding climate catastrophes. They find that the corresponding uncertainty reduces the ability of states to enter in mutual agreements. Brown et al. (2009) reach similar conclusions while exploring contracting under uncertainty. Uncertainty, in their view, creates collective action dilemmas. As Shadmehr and Bernhardt (2011) point out, uncertainty affects the monotonicity of several variables for collective action, transforming them into barriers to collective action. Finus, Pintassilgo (2013) deliver however a more articulated and to an extent opposite finding: under certain conditions, a "veil of uncertainty" can foster, not hamper, cooperation.

Let us now turn to less formal and more conceptual approaches to the nexus between uncertainty and collective action for adaptation. Adger and Vincent (2005) address vulnerability indexes for Africa and stress their pervasively uncertain and contested nature. A similar perspective was acknowledged earlier by Thompson and Rayner (1998) while introducing a constructivist point of view on the public perception of risk. Allowing for a pluralist take on those narratives underlying risks perceptions has implications for those institutions determining which and how many different perspectives are allowed to interact within decision making. Indeed Dunlap (2010) stresses a "political" use of uncertainty, implicitly questioning the nexus between plural narratives on risk and their uptake in the policy process.

Uncertainty and contestedness are also at the hearth of the risk classification proposed by Zhang et al. (2008). They adapt a risk classification by Renn to climate impacts and distinguish simple, complex, uncertain and ambiguous risks. Most importantly, they rely on the level of agreement between scientists and on the amount of evidence available as a basis for classification. Similarly, Brugnach et al. (2011) distinguish uncertainty from ambiguity and stress the need for new approaches while dealing with such risks. In these respects, earlier contributions were more critical: according to Rittel and Webber (1973), for example, problems fraught with complexity and uncertainty fundamentally question the suitability of scientific approaches to real-life problems.

Bassett and Fogelmann (2013) provide an analysis of IPCC reports and relevant journals in the climate scholarship and find that the concepts and approaches provided therein are not qualitatively different from the prior literature on vulnerability and adaptation to natural hazards. The opposite view can be found in May and Plummer (2011), pointing at new challenges to traditional risk management when dealing with adaptation. The authors maintain, though, that such new challenges can be overcome by integrating elements from adaptive management.

Similarly, Hallegatte (2009) shows that climate uncertainty is best dealt with by moving away from a more traditional optimisation to forecasted conditions towards a new focus on robustness to variation. This implies simultaneously adapting to a plurality of possible scenarios rather than focusing on an uncertain but most-likely-to-come-about one. Key, in these regards, is the flexibility and no-regret character of any investments in adaptation (Fankhauser et al. 1999).

Oels (2013) does detect new approaches in the way governments deal with climate-related risks. These are however characterized by a shift from the minimization of adverse consequences towards contingency planning, therefore from an anticipatory and proactive approach to reactive emergency strategies. Heyvaert (2011) comes to very similar conclusions with regards to risk regulations in the EU: new approaches are necessary, but the new EU approach to risk has implications for legitimacy and distribution of risks.

This resonates well with two kinds of contributions: on the one hand, contributions such as Barnett and Adger (2007) stressing the link between adaptation and human security and warning that, by threatening the ability of states to provide for human security and livelihoods, climate change may trigger violent conflicts. On the other hand, Swyngedouw's (2010) suggests a deliberate portrayal of climate impacts as catastrophic events, with the aim of eroding civil liberties and political rights. Indeed, Eriksen and Brown (2011) find that present adaptation tends to undermine social and environmental sustainability. The building of adaptive capacity can be, they maintain, asymmetric if not rival. This may support the "political" use of uncertainty mentioned above.

Grossman et al. (2006) address the nexus between uncertainty and precaution. They concentrate on the minimum amount of precaution to be expected by individuals below which negligence and thus liability apply within the juridical system. In their analysis of court cases, the authors argue that uncertainty makes probability-based approaches to hazards invalid, but that insurance markets

provide the proxy information for determining the "appropriate" amount of investments in precaution under uncertainty. Although not explicitly stressed in the contribution, the question is clearly relevant for the role of individual adaptation within collective efforts. Indeed, the findings of Kunreuther (1996) go in the very same direction.

Summarising, the nexus between adaptation and uncertainty plays both at individual and at collective level. At individual level, it makes decision-making problematic, forcing individuals to economise on decision-making and employ heuristics, together with the biases they imply. At a collective level, cooperation becomes difficult and new ways of dealing with risk become necessary. A crucial point in doing so is the acknowledgement and integration in decision structures of plural narratives about an uncertain future. This seems to take place quite insufficiently or even to be exploited by the powerful. Figure 2 below provides an illustration.

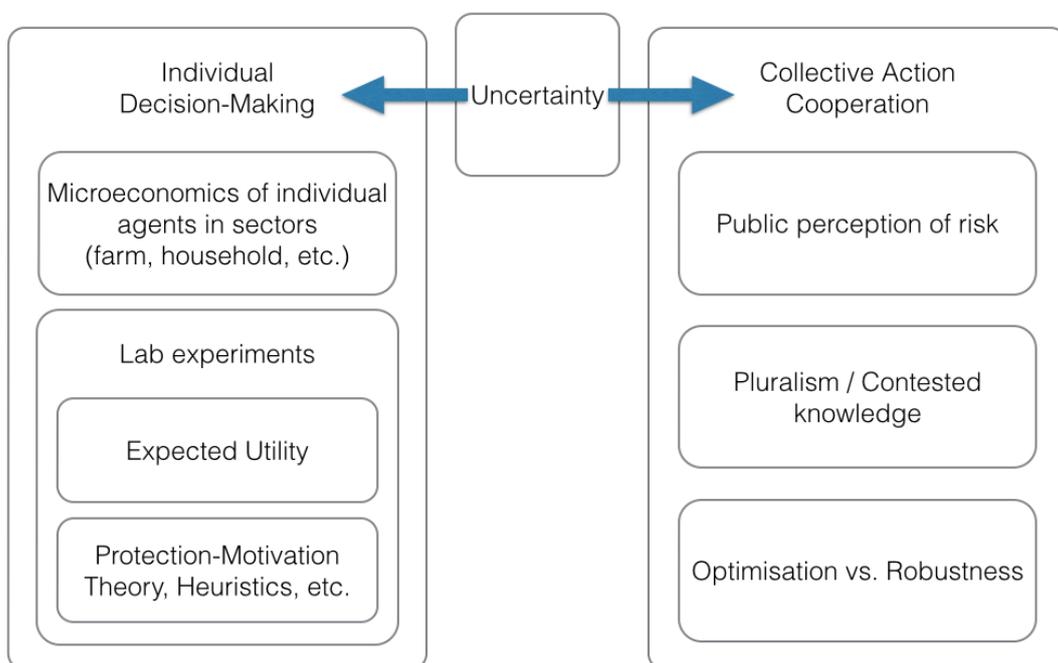


Abbildung 2: Uncertainty and adaptation at individual and collective level

1.4. Adaptive Capacity

As a third branch of the adaptation literature, we focus on those contributions addressing adaptive capacity and focusing on those ideally necessary conditions for adaptation. Scholars addressing the ability of individuals and groups to adapt to climate change refer to a rather heterogeneous set of factors, ranging from specific characteristics of the politico-administrative system to the availability of given physical or immaterial resources. An exhaustive review of all the specific factors determining whether individuals and groups can adapt (whether they would is a different matter, as rightly stressed by Burch 2010) exceeds the scope of this review. We can however provide an overview of the spread of such theses.

Brooks (2003) stresses the importance of cross-scale linkages at the nexus between adaptation and vulnerability. Lemieux et al. (2013) and Runhaar et al. (2012) address perceptions by officials

as a determinant of the capacity of public agencies to integrate adaptation in their own decision-making. Armitage et al. (2011) point at co-management arrangements as a way to increase adaptiveness. Gupta et al. (2010) assess adaptive capacity through 22 individual criteria grouped into six classes: variety, learning capacity, room for autonomous change, leadership, availability of resources and fair governance. Iglesias et al. (2011) use a very similar set of criteria for addressing the adaptive capacity of agriculture in the Mediterranean basin, while Holman and Travick (2011) stress the need for wider horizontal and vertical coordination of management practices.

Against such contributions, the approach of Brooks et al. (2005) sticks out: rather than providing arguments in support or against the inclusion of specific determinants of adaptive capacity, they try to establish a statistical link between death tolls by climate disasters and various structural socio-economic data, complementing their findings through expert judgment in a second phase. They support the general view of adaptive capacity only partially: literacy, civic and political rights and good governance correlate indeed with low vulnerability and thus high adaptive capacity (similar results can be found in Beelow et al. 2012). Against intuition, Brooks et al. (2005) show that wealth does not correlate with higher adaptive capacity: the availability of resources doesn't seem to affect vulnerability. Their role as a determinant of adaptive capacity is therefore questionable.

A further tension in the literature emerges between those contributions that stress the diffuse, and socially embedded character of adaptation, and those relying rather on active leadership from public officials and authoritative actors. One such contribution is Burch (2010), stressing the need for leadership and institutionalisation of climate responses – at a rather conceptual level, though. Hobson and Niemeyer (2011) support such conclusions while addressing the link between deliberation and adaptive capacity empirically. Moving from the analysis of participants' discourses from an actual deliberative process in Australia, they stress that low affinity of citizen to adaptation topics, highlighting a need for leadership from the side of public officials for adaptation to come about. Further support can be found in Lee and Koski (2012).

On the other side, Brown (2010) distinguishes human, social, natural, physical and financial capital as determinants of adaptive capacity. Similarly, Crane et al. (2011) express a critique towards a purely technological approach to adaptation as it may underestimate or misjudge the socially embedded character of individual adaptive capacity. Indeed, Eriksen and Selboe (2012), by studying a mountain community in Norway, show how demographic changes have indeed undermined its adaptive capacity by disrupting the underlying social capital. Adger (2003) goes as far as to suggest that "bridging" social capital may compensate for lacking government support on adaptation. Such contributions shall be treated carefully. Seemingly opposite conclusions can be found however in Jones et al. (2012) and Wolf et al. (2010): risk perceptions increase with lower institutional trust, and lower social capital, thus reducing adaptive capacity.

Egle & Lemos (2009) test adaptive capacity against a set of process characteristics (participation, information, flexibility, commitment, networks, experience) in several river basin management structures in Brazil. Their analysis proves inconclusive, showing how difficult it is to pinpoint what exactly makes up adaptive capacity. It is therefore safe to say that adaptive capacity represents at the same time the most crucial node and yet the weakest link in the conceptualisation of climate adaptation. The literature expresses a certain confidence that the tighter the social fabric of a community is and the greater its endowments, the more adaptation we can automatically expect from it. Empirical analyses cannot fully support such view though, while other scholars rather choose to put emphasis on leadership.

1.5. Adaptation at (and across) Different Levels

The fourth and last branch of literature is the one dealing with questions of scalar organisation for climate change adaptation. Such contributions address those interdependencies between and the relative weight of climate responses taking place on the continuum between local and national administrations. They deal, in short, with the differences in adaptation taking place at different levels of politico-administrative organisations. We refer, in these respects to "levels" or "scales" interchangeably.

The nexus between adaptations and levels has both a substantial and a legacy dimension. From a substantial point of view, levels are directly connected with matters of adaptive capacity and effectiveness/performance. The issue, briefly put, is whether climate adaptation is best dealt with by local administrations, by national governments or by a mix of the two, implying a certain mode of coordination. From a legacy point of view, the adaptation scholarship draws from the literature on climate mitigation which, given the "global public good" character of the matter, has intensively focused on scalar issues. Let us address that first.

1.5.1. The Legacy of the Levels/Mitigation Nexus

The case of the US is very illustrative: as Selin and van DeVeer (2011) point out, the US has no climate mitigation policy. Many US states and cities, however, do act on climate mitigation. Against such background, authors address the commitment of local governments to various mitigation efforts, be it through individual action, though sponsored programs or through voluntary networks, as Bulkeley (2012) points out. Rootes et al. (2012) address the variation of climate mitigation efforts across nations and link it to political action at lower levels, while Dolsak (2009) successfully links it with poor domestic air quality. This would suggest that local, "private" benefits drive the commitment to investing in a global "public" good.

Along a similar line of reasoning, Hsueh and Prakash (2012) present evidence that mitigation sponsorship schemes by individual US states have greater odds of inducing commitments to mitigation by local governments than compared to programs at the federal level. In their interpretation, the cause of such higher odds lies in the greater ability of state-sponsorship to capture "excludable benefits" and leverage a municipality's self-interest. If, following the above, private benefits constitute a core driver of mitigation, the local level is better suited to leverage them than the national one. This would support the claim by Bulkeley and Kern (2006) that climate mitigation shall give attention to local authorities, but also highlights the need of a coordination mechanism between levels — in this case a funding scheme from the meso to the local level.

Zahran et al. (2008) provide however a more articulated picture as they find that climate vulnerability, catastrophic events, voting preferences, the presence of environmental NGOs all increase the odds of municipal commitments to mitigation. Rationales for engaging with climate mitigation at lower levels than the national one constitute therefore a rather heterogeneous set. Selin and van DeVeer (2011) suggest advantages in terms of policy learning, economic efficiency, adaptation and global leadership. As Ostrom (2012) puts it, the necessity of arrangements at global level doesn't imply that nested, lower-level arrangements are not valuable. Indeed Nilsson and Persson (2012) maintain that governance across sub-systems and levels is necessary.

Further contributions stress the multi-level dimension of climate policy, focusing on the interplay of interests and competences both across levels and across public/private divide. Examples here in-

clude Lidskog and Elander's (2010) contribution on the democratic implications of climate change or Bulkeley and Schroeder's (2011) focus on the nexus between the public and the private dimension of climate governance. In order to better understand climate governance, Blok (2010) suggest to address "relational-scalar networks". Brown (2012) does so by addressing federalism in EU, US, Canada and Australia in terms of intergovernmental coordination for climate mitigation. EU and Australia's federal arrangements seem better equipped than US and Canada in these respects.

1.5.2. Levels and Adaptation

Let us now turn to those contributions addressing climate adaptation specifically. As for the mitigation literature, contributions can be distinguished between those addressing adaptation and adaptive capacity with a view on specific levels, and those contributions addressing adaptation as a cross-level task.

The literature focusing on specific levels generally focuses on local adaptation – adaptation at intermediate or national level do not seem to enjoy a comparable degree of scholarly attention. Focusing on local adaptation, Dodman & Satterthwaite (2008) grant a critical role for urban governments in light of their responsibility for most of the interventions reducing their constituency's vulnerability. Amundsen et al. (2010) report on a 2007 survey of all municipalities in Norway and find that the experience of extreme events explains the sort of measures observed in the different municipalities. Measham et al. (2011) focus on constraints for municipal adaptation and show that municipalities acknowledge but do not yet integrate adaptation in their planning practice. Interestingly, Wamsler and Lawson (2012) find that poor adaptation is a matter of poor integration.

Baker et al. (2012), instead, point at the lack of adaptive capacity in order to explain why, despite available information on climate impacts, local adaptation plans do not come about. Naess et al. (2005) find that a certain degree of devolution of powers and resources to the local level seems a precondition for adaptation to take place locally at all. Even more critically, Few et. al (2011) see central governments as more suitable entities leading climate adaptation. Indeed, Keskitalo and Kulyasova (2009) can show through several local case studies that purely local adaptation cannot provide much more than the most immediate adjustments. It is larger policy networks that cater for adaptive capacity, making local adaptation a product of concerted efforts beyond the local level. This allows us to move to cross-level contributions.

Juhola and Westerhoff (2011) address the integration of national and local responses and find that integration across scales is lacking. Rainer et al. (2013) perform a similar analysis with specific reference to the Canadian forestry sector. Their conclusion is also similar: the expansion of mandates to address climate change was not matched with increased coordination across scales. Osbahr et al. (2008) focus on cross-scale dynamics and find that cross-scale initiatives involving government, NGOs and local communities can indeed create conditions for local adaptation. On the other hand, negative spillovers may occur at other scales, as in Osbahr et al. (2010). As Urwin and Jordan (2008) find in their analysis of policy documents and interviews with UK policy makers, the identification of relevant interdependencies is often difficult.

Overall, the picture emerging at the nexus between scalar organisation and climate adaptation is one of poor adaptation due to lacking capacities and insufficient coordination across scales. We thus may be dealing with what the literature on institutions calls a "misfit": an issue society deals with at a level that doesn't match the biophysical extent of the problem. The idea of a "fit" (and "misfit", respectively) between societal responses and biophysical problems was proposed by Young (2002) and, although popular, was subject to strong criticism – see Vatn and Vedeld (2012) for an overview. We shall therefore restrain from drawing the conclusion that level at which adapta-

tion takes place (the local one) is wrong and rather enter the specifics of the coordination issues involved therein. To that we turn while introducing the approach of institutional economics.

2. Institutions and Institutional Economics

Institutions are the topic of a vast body of literature linking established social practices with economic questions of provision, allocation and distribution. The literature addresses social practices at different levels of aggregation, formalisation and complexity: habits and customs; laws and treaties; the workings of parliaments and courts. Such practices emerge as coordination devices providing meaning to situations, determining logics for action, and processing conflicts. They do so by both 1) shaping individual interests ("Actor Motivation" in Figure 3 below) and 2) acting upon them through sanctions and rewards ("Enforcement"), by 3) channeling and filtering information flows ("Actor Beliefs"), and by 4) distributing entitlements and obligations to resources ("Endowments"). Below we provide an overview of the basic tenets and most relevant topics within the institutional economics scholarship. Figure 3 provides a first, general orientation.

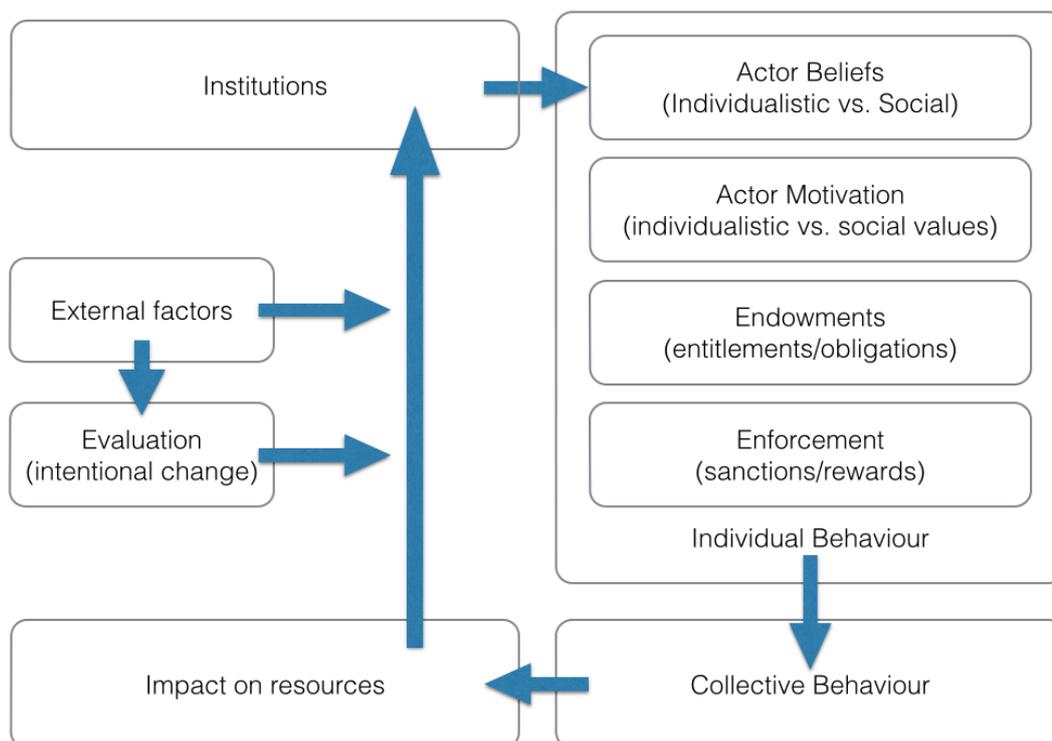


Abbildung 3: Overarching mechanism in institutional economics

2.1. Definitions and Basic Concepts

North (1991) moves from the observation that many nations through history have failed to achieve the cooperation necessary for markets to run efficiently. In this context, he points at institutions as

the factor explaining the different performance of economies over time: institutions define the "choice set" for individual actors and thus determine production and transaction costs, profitability and feasibility of economic activities. Denzau and North (1992) maintain that the institutional structure of a polity is what generates the incentives structures that determine economic performance, while North (1995) identifies the crucial step for the definition of opportunity sets in an economy through institutions in the process of setting constraints on human interaction.

Crawford, Ostrom (1995) see institutions as enduring regularities of human action in situations structured by rules, norms, and shared strategies. They represent complex rule systems as in Ostrom and Basurto (2011), distributing entitlements and obligations among economic actors in instrumental ways, as of in Bromley (1989) and Bromley (2012). As a product, institutions liberate and restrain individual domains of choice, as Bromley (2008) puts it. Knight and North (1997) add, however, that institutions also provide the contents of our beliefs. Individuals do not simply look up at those rule systems to find out which sanctions they shall expect if they violate those "constraints" set by institutions. They rely on institutions to find out how to look at certain (choice) situations.

According to Boland (1979) institutions exist to address social problems caused by diverging expectations. Ostrom (1998) characterises such problems as "social dilemmas" occurring whenever interdependent individuals face the temptation to seize short-run self-interest pay-offs, leaving, however, everybody worse off from an aggregate perspective. Individuals, she stresses, overcome social dilemma by building rules that foster reciprocity, reputation and trust. Indeed, Hodgson (2006) sees the central role of institutions in creating expectations on the behaviour of others. Institutions "constitute" those individuals exposed to them, as in Hodgson (1998). As Vatn (2005) puts it, they provide meaning and order to choice situations. Also Williamson (1998) explicitly refers to accomplishing order, settling conflicts and realising mutual gains.

Paavola and Adger (2005) look at institutions in connection with environmental issues and see their role in addressing interdependencies among actors. They find that environmental conflicts can be resolved by making collective choices that are implemented by establishing, changing, or reaffirming governance institutions. In this context, Vatn (2007) points out that institutions determine whether individuals will act individualistically or cooperatively. This has strong implications for the choice of (policy) instruments meant to deal with specific issues.

Scholars, summarising, seem to view institutions as durable social devices providing coordination and regularity in complex and uncertain choice situations by fixing beliefs about the terms of such decisions and by providing codes of conduct for those individuals directly and indirectly involved. If, on one hand, durability and regularity are quite prominent in the argumentations provided in the literature, the issue of change over time similarly drew scholarly attention. Boland (1979) rightly frames the issue in terms of a tension between static and dynamic concepts of institutions.

Paavola and Adger (2005) hint at factors such as population growth, technological innovation, changes in relative prices or scarcity, power structures, and changes in preferences as phenomena to be accounted for while addressing changing institutions. Vatn (2005), instead, stresses how different concepts of institutions require different approaches to change. If one understands institutions as spontaneous phenomena, institutional change can be framed in terms of "deviation" and addressed in evolutionary terms through the mechanisms of variation, inheritance and selection, as in Knight (1992).

If, however, institutions are understood as designed phenomena, institutional change needs to be framed as purposeful endeavour. Vatn (2005) proposes a typology of goals that can explain why (better: what for) institutions change. We can expect institutional change to be invoked in order 1)

to reduce transaction costs; 2) to implement technological breakthroughs; 3) to protect specific interest; 4) and to react to unintended effects and abrupt crises.

Following North (1995), we could simplify the above by stressing that institutional change takes place whenever new opportunities come by. Path-dependency through prior investments would instead represent a likely barrier. Bromley (2008) would however counterargue that the real trigger is given by surprise concerning the available imaginings of the future. Institutional change comes about whenever those beliefs underpinning particular institutions prove wrong.

2.2. Types of Institutions

As we have shown above, institutional economics focuses on those regularities of human action that give order and meaning to individual choice, determining the aggregated economic performance of whole groups and communities. Confronted with a study object of that broadness and heterogeneity, it comes to no surprise that scholars have put much effort in narrowing down their analysis. They did so by detailing out different types of institutions for more detailed exploration.

Most central in these regards is the distinction between institutions as equilibria as opposed to institutions as (conscious) norms and rules – see Crawford and Ostrom (1995) or Vatn (2007). Institutions as equilibria identify the emergence of those regularities in human behaviour as a spontaneous, emergent property of interaction across individuals. Knight (1995) provides an overview in his treatment of rational choice approaches to institutions.

He distinguishes three sub-approaches dealing respectively with conventions, contracts and bargains. Common to all of them is that they generally conceptualise institutions as emerging from the individual choice to cooperate or not under certain, exogenously set circumstances. The equilibrium referred to here is the solution of the formal game-theoretic treatment of the matter: basically, what individual choices add up to in the formal model, whenever the result foresees stable, enduring cooperation.

On the other side, scholars dealing with institutions as rules and norms refer to them as something conscious: institutions are not the emergent, spontaneous property of repeated interaction but rather the instrumental product of social exchange. The first distinction here is that between norms and rules. Ostrom and Basurto (2011) see both of them as prescriptions shaping individual behaviour. Norms, however, are fully internalised, so that no immediate pay-off or sanction is necessary to ensure compliance. Alternatively, one can see compliance to norm as a reward per se – an immaterial one. Rules, instead, are tied to specific pay-offs and/or sanctions: compliance is functional to avoiding such sanctions and/or achieving the pay-offs thus promised.

Crawford and Ostrom (1995) highlight the constitutive elements of institutions. These are: attributes, "deontic", aim, conditions and sanctions. Attributes describe the addressees of the prescription. The (type of) deontic determines instead whether the prescription entails something addressees can, may, must or must not do. The aim is the target of the prescription, while conditions and sanctions respectively describe the type of situation at stake and what follows from non compliance. In these terms, norms distinguish themselves from rules through the absence of a direct sanction. Rules can differ from one another through specific combinations of conditions and deontic. A number of "shared strategies", furthermore, can miss the deontic entirely and leave open the extent to which the prescription is compelling.

An otherwise popular distinction is that between formal and informal institutions, which can be found for example in Vatn (2007) or North (1995). The distinction here is between those institutions that are codified in formal laws and those that are not. While the former rely to an extent on the state for their enforcement, the latter do not. Hodgson (2006) considers such distinction problematic as it conflates the legal, the codification and the enforcement dimensions. A better characterisation should rather consider explicitly whether the analysis deals with the legal realm or not, whether it addresses codified prescriptions or not, and whether the institutions is self-enforced or it requires external enforcement.

From a different perspective, Paavola (2007) distinguishes rules of exclusion, entitlement rules, monitoring rules and decision-making rules, while Hagedorn (2008) proposes the distinction between integrative and segregative institutions. The two types of institutions differ in terms of requiring decision-makers to internalise transaction costs or not. Hagedorn distinguishes therein the costs of embedding decisions in social relations (integration costs) from the costs of neglecting interdependencies (segregation costs). Figure 4 below provides an illustration.

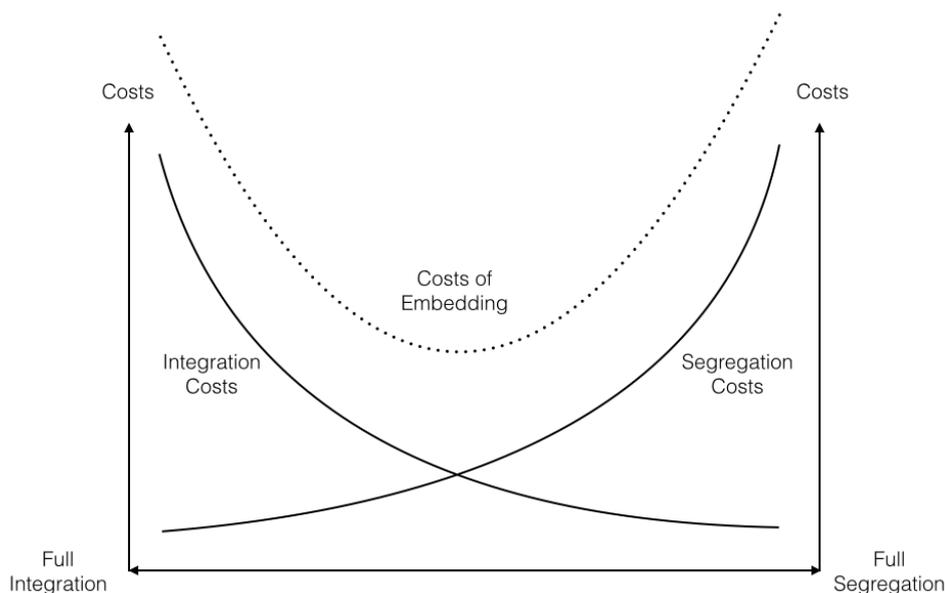


Abbildung 4: Costs of segregation and Costs of integration as in Hagedorn (2008)

Hagedorn provides us this way with an analytical background for an intuitively very obvious insight: that there are limits to integration. Scores of scholarly work on environmental conflicts rightly stress the need for more integration, but hardly define "how much" of that is needed. The merit of Hagedorn's contribution do not allow for a quantification either, but rather links the question of internalising costs and benefits of a given decision to the property of the transaction at stake.

More specifically, if one distinguishes "nature-related transactions" from those taking place within engineered systems, the sum of integration and segregation costs should be lower for integrative institutions in the former realm, while segregative institutions shall perform better in the latter. Reason for that is the different role of interdependencies in either realm: engineered systems are characterised by well understood interdependencies among different activities. To the contrary, natural

resources and ecosystems are generally poorly understood and show their mutual interdependencies only ex-post. In our interpretation, this leads to higher segregation costs for nature related transactions than for engineered systems, shifting the costs of embedding curve towards greater integration. Figure 5 provides an illustration.

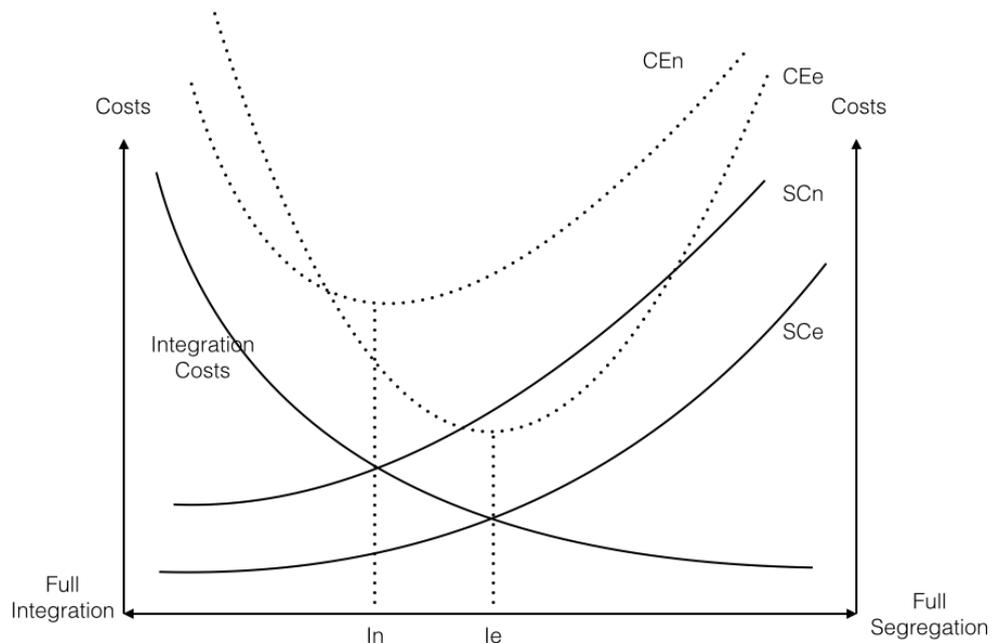


Abbildung 5: Costs of embedding for nature related transactions and for engineered systems

adapted from Hagedorn (2008)

In Figure 5, SC_e and CE_e indicate respectively the segregation costs and the costs of embedding for hypothetical engineered systems and SC_n and CE_n show the same for nature related ones, keeping integration constant. We can see that the same amount of integration does not necessarily represent a least-cost arrangement in both situations. Different governance forms are therefore best suited for nature related transactions than those best suited for engineered systems, implying different distributions of entitlements and obligations so as to determine a different level of internalisation of those costs and benefits inherent to a specific institutional arrangement.

2.3. Property Rights

The literature on institutions portrayed above links the availability of institutions with the distribution of entitlements and obligations across communities and plurality of individuals. In line with the idea that institutions constrain and liberate individual action, the distribution of entitlements and obligations has a clear link with the nexus between property rights and resource use. Contributions focusing on property rights attempt to explain performance in resource use on the basis of the diffusion of property rights.

Such nexus has been of crucial importance in the development of institutional theory. The most influential book of the Nobel laureate Elinor Ostrom (1990) was in fact an extremely successful critique (we may even say: rebuttal) of the popular statement by Garret Hardin (1968) that in the absence of clear property rights, common pool resources are bound to be underprovided and/or depleted – an important conceptual question both per se and with reference to environmental governance.

For long time, the privatisation and commodification of goods was presumptively considered the only valid solution to management issues. Scholars addressing property rights from an institutional point of view question exactly that presumption. Bromley and Hodge (1990) address those compensations farmers receive for restraining from socially harmful practices. While they acknowledge the historical background of such institutional arrangement, they question its presumption of "optimality": alternative property regimes can indeed be thought of – with no guarantee that simple observation of widespread full ownership shall be taken as evidence of its superiority. Landowners with full ownership over their land, need therefore to realise that it's the overall institutional setting granting them the corresponding rights.

While it is important to realise that property rights are a product of institutions, there is certainly more in the analysis of property rights from an institutional point of view. As we can read in Ostrom (2003) "full ownership" actually corresponds to a bundle of distinct rights: right of access, withdrawal, management, exclusion and alienation. It's their combination that determines the incentives actors face and thus their performance in terms of resource use. This implies that such rights need not to be transferred together: specific resource use problems may be dealt with by simply transferring e.g. use rights, or access rights, without necessarily requiring full ownership to be cast upon previously common or open-access resources.

Expanding the thought one step further, scholars show that it is not even necessary to install individual rights for resources to be managed successfully. Indeed, Larson and Bromley (1990) detect a widespread conceptual confusion in the literature between common property and open access. They point out that common property is different from open access, but conflating them defines away the very possibility of coordination among users. Once this is amended, it is possible to show that, under particular circumstances, common property is superior to private property against resource degradation. The attribution of common rights may therefore suffice for resource depletion issue to be addressed.

Further contributions distinguish common property, private property, state property and open access more in detail. Bromley (1992) points out that all such property regimes are human creations that embody (some of) the rules of use of natural resources. Seeing them as institutional products of the legal system, Bromley links them to a system of authority for their enforcement. On the same issue, Vatn (2007) points at those problematic aspects of assigning private property rights as a solution to collective action dilemmas. Resource regimes relying on private property do not foster cooperation and may impair the ability of a community to cooperate on specific issues or more in general. The experimental literature shows that, once such capacity is lost, it is very costly to win it back.

2.4. Institutions, Cognition and Value Formation

The last aspect we intend to highlight with reference to the institutional economics literature is the nexus between institutions and the mental constructs driving the actions of the individual. In these

regards, institutional economists attempt to establish a link between the micro-perspective of the individual and the macro-perspective of the group as reflected in the institutional arrangements in place. Taking for granted the distinction between human cognition (beliefs, expectations, imaginings of causal connections) and volition (desires, preferences, ranking of alternative sets of consequences), we can read in the contributions above that neither of them is independent of the institutions individuals are exposed to.

North (1995) and Knight and North (1997) agree that the interpretation of given circumstances affects the way actors act upon the available institutions by defining the choice set individuals are confronted with. Taking that for granted, Boland (1979) stresses that false knowledge exists, creating room for institutional change. Institutions can change simply because based on wrong expectations and/or erroneous understandings of the circumstances they are set to address. Indeed, Knight and North (1997) distinguish "certain beliefs", "probabilistic beliefs" and "real uncertainty", making erroneous institutions most probable.

Denzau and North (1994) acknowledge that individuals take decisions on the basis of the learning that they have experienced, encompassing cultural background and institutions they were exposed to. They produce "mental models" as cognitive representations of particular circumstances in the outside world. Knight and North (1997) as well as Hodgson (2007) remind us that psychologists have started considering human cognition as determined by interaction with the social and physical environment. Human reasoning capacity are linked to evolving social and physical contexts. This is a radical departure from a traditional economics perspective where values and beliefs are purely individual and mostly exogenous.

Paavola and Adger (2005) go one step further with the acknowledgment of pluralism in decision-making. Bromley (2008) points out that individuals do not know what they want until they are able to figure out what they can have. They do so through collective reasoning, but this shall not fully rule out heterogeneous views of the future across individuals. Other than individuals, groups need to reconcile their diverging views before they can act. Collective action requires therefore alternative, contending views of the future to confront one another. Some will by necessity be discarded.

3. Implications for the study of adaptation

3.1. Standard Economics Approaches

In order to assess the "case" for a treatment of climate adaptation questions by institutional economics, it is helpful to briefly introduce those insights on the topic standard economics has achieved so far. We will then be able to address the value added of an institutional approach for those specific questions standard economics has so far left open.

Concerning the interface between adaptation and economics questions, Heuson et al. (2012) and Gawel et al. (2012) provide a systematic and far reaching overview. It is not in our interest to duplicate their effort: instead we will focus on their most salient insights for our purposes. The authors distinguish between those approaches oriented towards efficiency and those that aren't. Such dis-

tion is crucial as it shapes, in economic terms, the core rationale for government intervention and, with it, for adaptation policy.

The underlying logic is that markets are generally superior to direct government intervention in bringing about the efficient allocation of goods and services. The authors remind us, though, that goals such as equity and justice can be brought about by markets only by chance and require a deviation from otherwise efficient approaches (Heuson et al. 2012, pg. 35). If efficiency is acknowledged as a goal for adaptation, markets shall be granted a leading role as they are expected to lead to optimal (adaptation) outcomes.

The above reasoning does not apply if market failures of different sorts appear. In these respects, the authors address the many "barriers to adaptation" affecting the policy and learning process – as we have seen above. In economics terms, such approaches postulate the existence of an intrinsically desirable degree of adaptation (axiomatically set as the one a perfect functioning market would lead to), the achievement of which is hampered by a wide array of factors, ranging from cognitive and motivational issues at the level of the individual – as in Grothmann & Patt (2005) or Fischer & Glenk (2011) – or to the intrinsic characteristics of public decision-making and governance structures portrayed above.

The review by Heuson et al. is not limited to positive economics, and expands to normative questions concerning the design of economic instruments for adaptation and the tools for assessment and advice. On this topic, the authors stress the so far rather discursive and argumentative nature of present approaches, together with the strong reliance on the cost-benefit paradigm. They thus witness a certain lack of analytical and conceptual underpinning within the scholarship providing recommendations on how to best go about adaptation, while the often relied-upon (and politically sensitive) issue of costs and benefits from adaptation appears riddled with methodological pitfalls and drawbacks, in light of the complexity and uncertainty of the matter.

Against this background, Heuson et al. (2012) see public choice as a promising field for a re-conceptualisation. Gawel et al. (2012) provide a public choice approach to barriers to efficient public adaptation. They model the interplay between politicians, public bureaucracies, voters/interest groups and media in the framework of a representative democracy in a developed country. Each of this actor type is conceptualised as maximising a particular type of payoff, such as votes, budget or utility. The question posed is, then, how the self-interest driven behaviour of the various actor groups creates barriers to efficient public adaptation. The latter is captured in three terms: for matters of extent (how much to adapt); for matters of form or mix of adaptive measures (anticipatory vs. reactive and technical vs. societal); and for matters of vertical and horizontal organisation.

From there, the authors proceed by conceptualising the adaptation produced by a political process as deviation from the ideal-typical adaptation a market outcome would lead to and explore what incentives are there for actors to respectively underprovide and overprovide adaptation as well as to support an anticipatory vs. reactive type of adaptation and a technically driven vs. societally driven one. The analysis that follows is admittedly inconclusive, though, since "the total effect of barriers within these three groups of actors, it is impossible to assess the total overall outcome with regard to extent-related efficiency of public adaptation" (Gawel et al. 2012, pg. 14).

In the authors' view, it is basically impossible to predict whether the sort of actor dynamics public choice theory is concerned with are biased, in their sum-total, towards an excess or a lack of adaptation, and to an anticipatory vs. reactive type of adaptation. A mild tendency towards technically driven adaptation seems to emerge, though. A more clear picture emerges concerning the likely distribution of adaptation throughout the structures of politico-administrative organisation: the au-

thors detect incentives towards a centralised and mainstreamed type of adaptation, as opposed to the localised and horizontally autonomous approach.

3.2. The Institutional Approach: an Outlook

What can institutional economics contribute to knowledge of adaptation that emerges from the above? A few remarks are due before we approach this question. First, institutional economics has already made it into the landscape of scholarly work on adaptation: “institutions” and social practices are an acknowledged determinant of adaptive capacity and several works try to fit adaptation in the frame of social learning and collective action, which are important aspects of institutional analysis.

Second, questions of coordination and interaction among actors are very present in the literature: even the focus on spontaneous adaptation is not free of links on the interdependencies in which such adaptations takes place and on the way these are dealt with.

Third, the standard economics literature rightly locates the adaptation question as one of interplay between political leadership, administration and consumers/citizen, searching for counterintuitive and non self-evident products of such interactions. The analysis it provides, though, hardly articulates the interaction between these actors – that very same interaction the adaptation literature strongly points at.

If we consider the three points above jointly, a niche emerges where to locate the contribution of institutional economics. There’s certainly no need for institutional economics to provide evidence that institutions play a role in shaping adaptation. Analyses of the effects the characteristics of institutional arrangements have on adaptation, are still outstanding, though. Here is where institutional economics can add to present knowledge.

To put it more bluntly, the governance literature made it sufficiently clear that institutions are important, while the economics literature have stressed that the interplay of the different interests at stake is the crucial nexus. Let us now use institutional economics so as to find out how different characteristics of the institutions at play, constituting different ways of organising that very same interplay of interests, lead to different adaptation approaches.

More specifically, we can leverage institutional economics in order to conceptualise under which conditions climate change leads actors to adapt by, first of all, altering the way they interact with one another. Institutional economics offers us a toolkit to characterise the interactions and interdependencies among the actors involved in adaptation and to assess their interplay. Contributions on institutional change, in particular, provide us with approaches specifically tailored to explore the nexus between changing circumstances and changing arrangements.

In very concrete terms, institutional economics allows us to capture the distribution of entitlements and obligations which is inherent in any given governance arrangement. We shall thus characterise both those arrangements for resource use prior to climate change and those new arrangements stemming from individual and collective responses to climate change in terms of the distribution of entitlements and obligations that they entail. From there, institutional economics allows us to structure expectations towards the sets of values and beliefs actors hold, and how these in turn affect the compliance to either old or new institutions, be it in absence or in presence of climate adaptation.

Institutional economics provides us with clues on whether more or less performing institutional arrangements trigger the emergence of new (adapted, climate-proof) ones, and in which terms the latter shall be expected to differ. In particular, the distribution of entitlements and obligations is expected to establish a new balance between those costs incurring due to the internalisation of costs and benefits from given decisions and those costs expected to incur if interdependencies are neglected.

We have furthermore distinguished three branches of the literature that appear promising for an analysis of climate adaptation. Those contributions addressing different types of institutions and different types of property rights, for example, may help clarify the nexus between planned and spontaneous adaptation, since we deal with formal administrative acts in the former and uncoordinated changes in social practices in the latter. Insights from the analysis of property rights can shed lights on the implications of present resource regimes for adaptive capacity, possibly informing proposals for alternative, "climate proof" resource regimes.

Finally, those contributions of institutional economics focusing on the cognition and volition dimension of institutions have an evident link with the branch of the adaptation literature focusing on its cognitive determinants. There is great potential for cross-fertilization along that nexus as the "psychology" of adaptation can reach out for complementary insights at a level above the single individual. Symmetrically, inquiries into those cognitive components stemming from institutions can help contextualize those psychological drivers determining individual adaptation.

Concluding, this review has highlighted and connected emerging themes in the recent scholarly work on climate adaptation and institutional economics. While many works from the adaptation side refer to institutions and institutional economics, institutional analysis has not dealt yet with climate adaptation. Several promising avenues have been highlighted. It remains to be seen whether the institutional economics community will develop substantial interest in the topic to thoroughly engage with this new field and deliver results relevant to the academia, to policy and to society at large.

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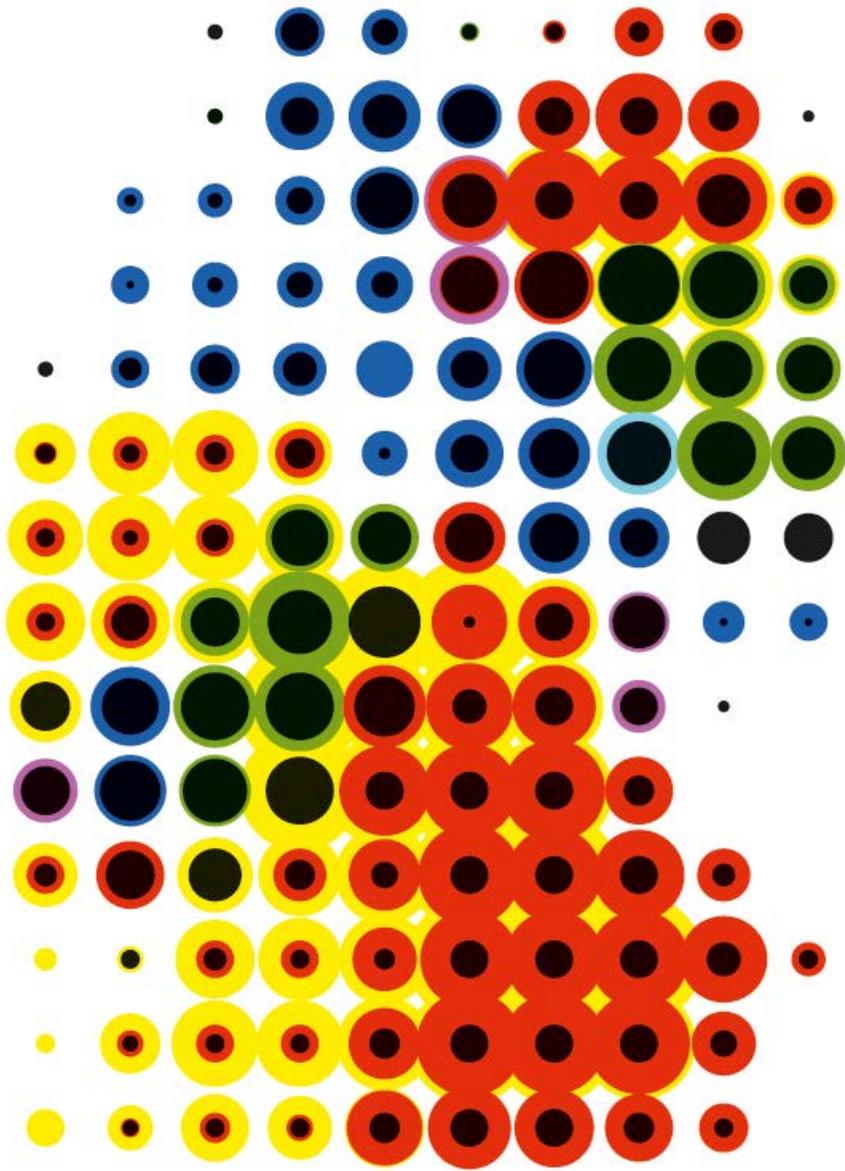
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