

CLIMATE CHANGE ADAPTATION AND SCENARIO PLANNING: FRAMING ISSUES AND TOOLS

LAUREN RICKARDS

Melbourne Sustainable Society Institute, Ground Floor Annex, Alice Hoy Building,
The University of Melbourne, Victoria 3010, Australia.

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Correspondence: lauren.rickards@unimelb.edu.au

Climate change adaptation means that not only do we have difficult decisions to make, but we also need improved ways of making them. Although not new, scenario planning is one tool increasingly being used to improve thinking about climate change and adaptation, reflecting the way it usefully accommodates the mix of certainty and uncertainty, as well as realism and constructivism, which characterise the climate change issue. This paper provides an overview of climate change adaptation and scenario planning, emphasising the existence of conservative and radical approaches to each and the context of multiple epistemological ideals in modern governance. Overall, the paper highlights the framed, or socially constructed, nature of both adaptation and scenario planning and the implications of their intersection.

Key words: climate change adaptation, scenario planning.

ADAPTING to climate change is an increasingly well-recognised need; it also remains deeply ambiguous and challenging. There are diverse definitions and types of adaptation, with a recent definition from Moser and Ekstrom (2010, p. 22 026) highlighting the many considerations involved:

Adaptation involves changes in social–ecological systems in response to actual and expected impacts of climate change in the context of interacting nonclimatic changes. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations, aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities.

Evident in this definition are the many questions that climate change adaptation raises. For example, to what extent is adaptation possible? What are the goals of adaptation? What is adaptation needed in response to? How does adaptation relate to other issues and processes? What are the adaptation options at different scales? How are different groups involved? How can adaptation be best implemented? What obstacles exist? How should success be assessed? The result is that climate change adaptation policy and practice is about making decisions that are

highly complex technically, socially and politically. Such decisions are all the more difficult because not only are the consequences potentially far-reaching and constraining of future options, but they also have to be made in the context of highly uncertain knowledge about future climate change impacts.

The challenges faced by climate change adaptation mean that not only are improved decisions needed, but that improved decision-making tools are also needed. For this reason, much interest is being shown in scenario planning. As the ‘central “keystone” methodology’ of the expanding field of futures studies (Slaughter 2002), scenario planning is characterised by the same sort of diversity in definition and approach as climate change adaptation. For example, to some it is a technique and tool, whereas to others it is an attitude to the future. In general, scenario planning can be described as an approach to medium- to long-term planning that aims to improve our understanding of the future through systematic analysis of available information and ideas while highlighting, through the presentation of multiple possible outcomes or scenarios, how open the future is and how limited our knowledge of it remains.

Scenarios are becoming embedded in climate change adaptation on account of their role in climate science and their apparent usefulness in adaptation

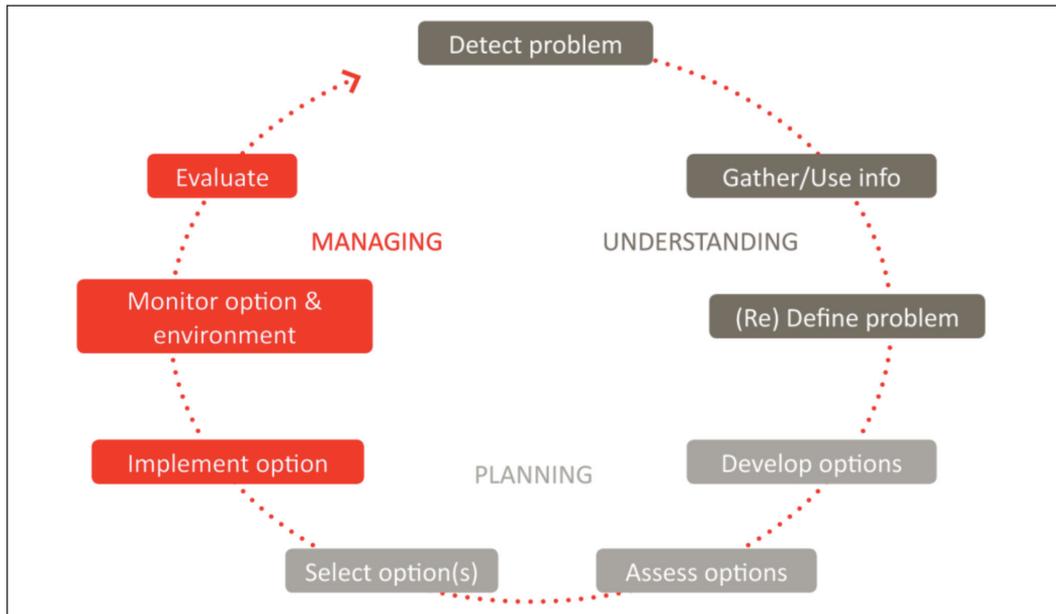


Fig. 1. Phases and subprocesses throughout the adaptation process. Reproduced with permission from Moser and Ekstrom (2010).

planning. According to the Intergovernmental Panel on Climate Change (2007), a scenario is:

...a plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships.

Although highly valuable, scenarios are not an 'innocent', uncomplicated or infallible adaptation tool. Rather, they are a value-laden process with a potentially powerful but unacknowledged influence over how climate change adaptation is perceived and implemented. This paper briefly discusses the character and challenges of both climate change adaptation and scenario planning before discussing the relationship between them.

CLIMATE CHANGE ADAPTATION

Moser and Ekstrom (2010) propose an idealised model of climate change adaptation as an iterative process of 'understanding, planning and managing' (i.e. look, think, do; Fig. 1). The importance of 'understanding' in climate change adaptation is underlined by the growing literature on the various

ways in which adaptation, climate change impacts and climate change more generally are framed (e.g. Boykoff et al. 2010; Dirikx & Gelders 2010; O'Brien & Wolf 2010; Spence & Pidgeon 2010; Fünfgeld & McEvoy 2011; Juhola et al. 2011). Framing refers to the meaning that is given to a subject through the way in which, intentionally or unintentionally and explicitly or implicitly, certain features of it are prioritised over others through messaging and seemingly inconsequential implementation decisions (Gray 2003; Aarøe 2011; David et al. 2011).

In Australia, climate change adaptation has been primarily framed as a risk-management question (e.g. Australian Government 2006, 2007, 2010; Fünfgeld & McEvoy 2011). This reflects the pre-existing institutionalisation of formal risk-management practices in the public and private sectors, and the related way in which being a responsible risk manager is core to contemporary neoliberal notions of citizenship (Felli & Castree 2012). Given the positivist way in which risks are perceived in formal risk management, this framing lends itself to a narrow interpretation of climate change impacts as primarily biophysical and economic, identifiable and quantifiable, illustrated, for example, by crop yield modelling (Hulme 2009). It also reflects a higher-level framing of climate change adaptation as primarily

Table 1. Summary of two main framings of climate change adaptation

	Adaptation as adjustment	Adaptation as transformation
Time frame of interest	Near to medium term	Long term
Scope of change	Small	Large
Attitude to status quo	Protect, subtly improve	Critique, radically improve
Trigger for change	Often reactive	Often proactive
Consequences of change	Usually reversible	Often irreversible
Ease of implementation	Often high	Low
Pace of change	Rapid	Rapid or low

an incremental change: an adjustment rather than an overhaul (Felli & Castree 2012; O'Brien & Wolf 2010; Pelling 2011). A related framing of adaptation is the idea of adaptation being about 'climate-proofing' existing activities (Fankhauser & Schmidt-Traub 2011; Juhola et al. 2011).

Critics (Charlesworth & Okereke 2010; Manuel-Navarrete 2010; O'Brien & Wolf 2010; Eriksen & Brown 2011; Eriksen et al. 2011; O'Brien 2011) have argued that these approaches underplay the profound challenges that climate change presents and the need and opportunity for adaptation to radically shift society onto a more sustainable and ethical pathway. To these and other commentators, climate change is as much a wake-up call for humanity and a fundamental refutation of dominant notions of progress as it is a technical challenge. These authors highlight that adaptation needs to respond not only to emerging climate change impacts, but also existing adaptation deficits (cf. Burton 2009) in which past and present efforts to adapt to our circumstances have already proven maladaptive (see Barnett & O'Neill 2010) on account of being ineffective and/or worsening the situation for ourselves or others. It is notable that conventional economic (industrial) development that underlies the very problem of anthropogenic climate change is itself such a maladaptation, which is why some commentators perceive appropriate adaptation to climate change requires such a fundamental rethink (e.g. Ison 2010; Beilin et al. 2011). This framing of, or attitude towards, climate change adaptation can be distinguished from that which assumes or desires adaptation to be a matter of adjusting (e.g. climate-proofing) existing systems (Table 1).

A key concept within both the adjustment and transformation framings of climate change adaptation is planning. For those from the adjustment school, planning is of interest because climate change is considered a future threat that requires consideration

but not immediate action. For those from the transformation school, planning is important because the depth and breadth of the challenge requires that we devote time to seriously thinking through what is needed rather than proceeding in an unconscious or ad hoc manner. The centrality of planning to how adaptation is conceived is evident in the way many academic and policy discourses prioritise so-called planned adaptation, in contrast with what is often called autonomous or automatic adaptation (e.g. Lindseth 2005). Adaptation is idealised in this light as a conscious, strategic, anticipatory and novel process: a uniquely and proudly human and modern form of the age-old natural process of biological adaptation. Emphasis on planned adaptation represents an attempt to counter the unwelcome sense of environmental determinism and limited human agency that the idea of humanity being vulnerable to and having to adapt to environmental change can engender (see Clark 2011).

A key characteristic of planned adaptation is that it is informed. This emphasis on the epistemic character of adaptation aligns with the ideals of evidence-based policy making (see David 2002; Head 2008) and citizenship as active and responsible decision making (Rose 1999; Dean 2004). It also highlights the way government is positioned in adaptation policy and discourse as a major source of planning and information, and private citizens and organisations are positioned as the prime bearers of climate change risk, as well as able and informed decision makers.

Given the centrality of informed planning to existing understandings of climate change adaptation, what information is considered appropriate? Work on the knowledge needs of sustainable development indicates that, in today's policy-oriented research climate, appropriate information is broadly perceived as that which is not only credible (academically

rigorous and defensible), but also relevant (salient, timely, useful, usable) and legitimate (socially representative and acceptable; cf. Lubchenco 1998; Cash et al. 2003; Connelly et al. 2006; Dilling & Lemos 2011). Generating information that fulfils these goals is made especially difficult in the context of climate change because of the mix of certainty and uncertainty, as well as objectivity and subjectivity, which characterises climate change and our possible responses. As discussed below, the tool of scenario planning seems to be one way that the epistemic challenge posed by climate change can be tackled.

SCENARIO PLANNING

Scenario planning is both increasingly mainstream and potentially subversive (Slaughter 2002). Stemming from systems theory, scenario planning was first used in military and business planning in the 1970s in response to concerns that the dominant paradigm of the time (prediction) was inadequate and even dangerous in addressing issues characterised by the deep uncertainty that results from significant complexity, long time horizons and possible tipping points. Although prediction remains important in many areas of contemporary decision making, the idea that predictive tools are only appropriate in some situations (notably near-term, well-understood situations) has continued to gain credibility as ‘nasty surprises’ (cf. Howard 2011) such as climate change and the Global Financial Crisis continue to manifest (Sarewitz et al. 2000; Hulme et al. 2009; Maricle 2011). Climate change has especially intensified interest in alternative means of understanding and preparing for the future, given the way it epitomises situations in which alternatives to prediction are needed. According to Pielke Jr et al. (in Sarewitz et al. 2000), this is when:

- predictive skill is low or unknown
- little experience exists with the predictions or phenomena in question
- the characteristic time frame of change is long and
- the outcomes of alternative decisions are highly uncertain.

Interest in scenario processes arose following their early use in helping to anticipate unlikely shifts in international geopolitical relationships and the control of fossil fuels (Becker 1983; Docherty & McKiernan 2008). Since then, scenario planning

has been increasingly applied in the public sector to support strategic planning on varied issues, including climate change (e.g. Docherty & McKiernan 2008; Gawith et al. 2009). Some features of the public sector, such as responsibility for long-term matters like strategic direction and infrastructure, mean that scenario planning is potentially especially useful. However, other aspects of the bureaucracy, such as siloed departments, short-term political cycles and a desire to inform (and defend) policy with positivist, quantified and transparent forms of evidence, mean that scenario planning faces particular hurdles within such settings (Shackley et al. 1999; Docherty & McKiernan 2008; Gawith et al. 2009; Wiseman et al. 2012; Cairns et al. 2013).

The multiple techniques referred to by the term ‘scenario planning’ partly reflect the diverse aims that the methodology is called upon to fulfil: not only is scenario planning a means to frame issues such as climate change, but it is itself framed in different ways. Overall, there are two distinct approaches to scenario planning, representing, among other things, ends of a spectrum in attitudes towards uncertainty. On the one hand, scenario planning is often used to get people thinking systematically about the future, especially the long-term future, in an attempt to break the hold of present-ism and short term-ism on much modern decision making. In this light, scenario planning sits alongside prediction as one of the family of futures methodologies where the often loose conclusions of scenario planning can look rather insipid alongside boldly definitive predictions. As a result, scenarios can be seen in this light as a compromised and imperfect form of prediction made necessary by the deep uncertainty that continues to thwart the application of prediction over long time frames. Thus, research is directed at strengthening the predictive ability of scenario methods in order to narrow the bounds of uncertainty around possible futures and provide decision makers with information of the credible and relevant sort they are accustomed to. This ‘predictive approach’ to scenario planning (as we can call it) is often characterised by a strong focus on the plausibility of scenarios and attaching probabilities to them in the name of providing decision makers with as much information as possible (Yohe et al. 1999; Risbey 2004; Dessai et al. 2005; Schneider et al. 2007; Risbey & O’Kane 2011).

On the other hand, scenario planning contrasts with predictive methodologies in its insistent emphasis on what is unknown as well as known, and open as well

as closed, about the future. Its core message is that multiple outcomes must always be taken into account (Fig. 2). These outcomes include positive or negative scenarios that diverge considerably from current trajectories, representing discontinuities between the present and future (some of which may emerge rapidly as the term ‘tipping points’ above implies; Wilkinson 2011). Indeed, according to various commentators, the aim of ‘scenario thinking’ is to get people to ‘imagine the unimaginable’ (e.g. Smith et al. 2011). In this imaginative approach to scenario planning (as we can call it), the perceived plausibility of particular scenarios is of far less concern than the ability to escape institutional, cultural, cognitive and emotional limitations on what we can envisage. As Braithwaite (2010, p. 3) argued, the aim of scenario planning should be to ‘move away from the “one future” mentality and expose the inherent and sometimes irrational assumptions that lie behind our vision of the future’. A key way to do this is to help people think more systemically as opposed to, or as well as, thinking systematically (Ison 2010; Ison et al. 2010).

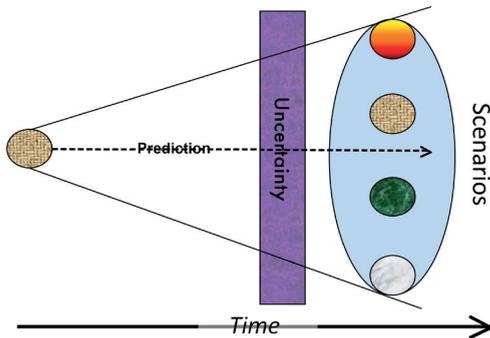


Fig. 2. Schematic depiction of the difference between prediction and scenario methods.

Scenario planning formalises, organises, extends and challenges the sort of predecision consideration of alternative outcomes that all of us regularly engage in. As such, it is typically used in the early agenda-setting stages of decision making, although it can also be implicitly constructed to simply represent rather than question pre-existing agendas (Slaughter 2002; Aligica 2005; Atwell et al. 2011). Moreover, the growing literature on scenario applications (e.g. Becker 1983; Audsley et al. 2006; Borjeson et al. 2006; Hjerpe & Linnér 2009; Bryson et al. 2010; Dong et al. 2013; Smith et al. 2011) indicates that it is used for a wide variety of ends, including:

- engaging people on (politically sensitive) issues
- identifying key drivers of change
- exposing possible penalties of allowing negative future worlds to emerge
- generating debate about possible actions
- testing different options for action in a virtual, low-risk fashion
- promoting cross-sectoral learning about different groups’ views and roles and
- developing shared agendas for change.

Overall, the main value attributed to scenario planning is that it is a tool for learning. However, exactly what is learnt varies widely. In the predictive approach, learning is focused on knowledge deemed to be relevant to pre-identified decision-making needs. Here, scenario planning outputs are designed to form inputs to the decision-making (often policy-making) process. In the imaginative approach, learning is more broadly conceived and is directed at what systems theorists refer to as the ‘insight-generating capacity’ of models aimed at understanding rather than prediction (Lane 2012). Such insights are often qualitative in nature and may contribute to decision making in oblique rather than direct ways, challenging preconceived notions

Table 2. Summary of key differences between the idealised ‘predictive’ and ‘imaginative’ approaches to scenario planning

	Predictive approach	Imaginative approach
Aim	To bound uncertainty as narrowly as possible	To emphasise uncertainty and broaden the futures considered
Main method	Exploratory	Exploratory or normative
Priority	Decision-relevant end product	An engaging learning process
Participants	Primarily experts	Diverse stakeholders, often including some experts
Types of knowledge	Primarily objective, quantitative, modelling based, multidisciplinary	In addition: subjective, qualitative, imaginative and transdisciplinary

of what is 'relevant' to the issues at hand (Radaelli 1995; Owens 2005).

The difference between predictive and imaginative scenario approaches encompasses a range of other characteristics. Although this idea of a binary distinction is an oversimplification of the actual range of approaches to scenario planning, it helps elaborate the existence of such a range (Table 2).

Of note is the difference between exploratory and normative scenario methods (Borjeson et al. 2006). Exploratory methods are typically used to diagnose issues facing the collective external world using modified versions of trend analysis to explore the various future consequences of identifiable pathways (Slaughter 2001; Docherty & McKiernan 2008). Less common normative approaches aim to identify desirable or undesirable (utopian or dystopian) futures and to consider how such outcomes could be brought about or avoided. Being more transparent about values, normative scenario methods seek to engage participants' inner worlds, as well as to dispassionately analyse external factors (Slaughter 2001). They also tend to be more anticipatory (i.e. less focused on the past and present) and ambitious in the sense of engaging with the idea of utopia and emphasising the role of human agency in creating it. Epistemologically, they are more imaginative and inclusive, not only because they often go beyond the objective data available (Docherty & McKiernan 2008), but also because other forms of knowledge and thinking are valued.

A further distinction to highlight is that between expert-driven and more inclusive participatory scenario processes (Gidley et al. 2009; Larsen & Gunnarsson-Östling 2009). Lane (2010) argued that using modelling approaches such as scenario exercises to address climate change and other big issues requires not only more technically sophisticated analysis, but also a strong commitment to being participatory. Reflecting the emphasis on 'transdisciplinary' knowledge production and collaborative decision making in modern governance (Wickson et al. 2006; Russell et al. 2008; Sheppard et al. 2011; Chakraborty 2012), participatory approaches enhance the social legitimacy of scenario processes and products, as well as bolstering their credibility by introducing a broader range of information. For those involved, participatory processes also enhance the learning derived from scenario exercises by engaging them in a progressive process of thinking and discussion rather than simply

presenting them with a 'solution' at the end (Lane 2010). Nevertheless, participation in such exercises is demanding of participants, is typically available to only relatively small groups and is an inherently open-ended and thus risky methodology for scenario practitioners and funders (Baccaro & Papadakis 2009; Sheppard et al. 2011; von Korff et al. 2012).

A final distinction to note is whether scenario activities are valued for their products or process. When the focus is on scenarios as products, the scenarios themselves (usually described in a written document of some kind) are considered the key outcome and are judged according to their credibility (e.g. their technical correctness) and relevance to external decision makers. When the focus is on the process, the quality of participants' experience in building and elaborating the scenarios is paramount. Research indicates that the learning, motivation and relationships that people develop through actively participating in collaborative scenario development processes often prove more valuable than the subsequent application of the scenario details to decision making (e.g. Gawith et al. 2009; Cairns et al. 2013).

DISCUSSION

How do the characteristics of scenario planning relate to those of climate change adaptation? Three broad points can be made. First, scenario planning is a good fit for climate change adaptation, both substantively and procedurally. Scenario planning is uniquely able to represent the mix of certainty and uncertainty that characterises our knowledge of the future under climate change. It draws attention to the long-term, multidimensional nature of the issues involved and facilitates the sort of participatory discussion, normative decision making and widespread action that are needed.

Second, both adaptation and scenario planning are characterised by a tension between 'conservative' and 'radical' framings (Fig. 3). The very fact that both can be framed in these ways points to the potential influence of the scenario planning approach used on the approach taken to climate change adaptation, and vice versa. It points to the potential for strong but implicit discord between them, including the possibility that an intended approach to adaptation is unwittingly compromised by using a contrasting scenario approach. However, the interaction between them is not a straightforward matter of



Fig. 3. Overview of the type of adaptation responses that are likely to emerge when different approaches to climate change adaptation and scenario planning are combined.

compatibility or incompatibility. Recognisable conclusions about adaptation emerge out of all of their varied combinations, from transformational adaptation action being triggered by predictions as well as uncertainty about the future, to conservative adaptation being justified by both confidence in existing approaches and a techno-optimist faith that miraculous new solutions will emerge.

Third, both climate change adaptation and scenario planning are shaped by the contemporary focus on using credible, relevant and legitimate information to understand and address issues. Moreover, their similarity means that they face similar difficulties in meeting these epistemological and governance ideals.

In terms of credibility, messages about climate change face the tension inherent to scenario planning. This is the need to simultaneously represent, on the one hand, the realism and certainties that bound the future and necessitate adaptation and, on the other hand, the deep uncertainties, the qualitative, subjective and normative factors and the generative role of human agency, which mean every question about adaptation other than the need for it is left open. Given the ongoing dominance of a positivist paradigm and preference for simple predictive and quantitative information in many high-level settings, the results of scenario planning, and messages about climate change adaptation derived from it, are likely

to be neglected unless they conform as closely as possible with the existing ideals (Aligica 2005; Docherty & McKiernan 2008; Gawith et al. 2009). The Australian government's framing of adaptation as a matter of formal risk management illustrates this pragmatic approach.

The relevance of climate change adaptation to modern decision making is not always obvious. One problem is the artificiality of focusing on climate change in isolation, given it is not emerging in a vacuum and the fact that its impacts flow through all facets of society. Scenario planning helps ameliorate this problem by presenting climate change in the context of a wide number of other independent and related issues. At the same time, the multidimensional, large-scale and long-term character of scenario planning can reduce the perceived relevance of its messages to decision makers faced with having to make decisions in the near term. Other efforts to bridge the distant and the near term are needed. In addition to the way formal risk management processes partially fulfil this need, new frameworks, such as robust decision making, are being developed (Dessai et al. 2009; Wilby & Dessai 2010).

Climate change adaptation efforts are vulnerable to being challenged on legitimacy grounds because of the inherently political nature of questions, such as what counts as a climate change impact, whose and what impacts will be addressed, and who will

carry the costs (O'Brien & Wolf 2010; Eriksen et al. 2011). Helping address these concerns is one of the benefits of inclusive, participatory scenario processes. However, to the extent that this is missing or limited to a restricted range of views, so too is the enhanced legitimacy gained. For individuals not directly involved in a scenario process, the rich but dense descriptive outputs it produces can seem impenetrable, ad hoc and jargon filled, not to mention being difficult to access in the first place (Slaughter 2001; Gawith et al. 2009). For this reason, scenario reports can represent a weak justification for contentious adaptation decisions.

Overall, scenario planning helps enhance the credibility, relevance and legitimacy of climate change adaptation. However, given the way in which it accommodates many key characteristics of climate change, it also shares many of the difficulties climate change adaptation faces in fulfilling these ideals, particularly when the more unfamiliar imaginative form is used. Both adaptation and scenario planning can be approached in widely divergent 'conservative' or 'radical' ways. Unappreciated incompatibilities between the goals and tools used are liable to reduce the perceived successfulness of efforts to use scenario planning to inform climate change adaptation or to shape adaptation in unintentional and unacknowledged ways. As one tool among many that could be applied to climate change adaptation, scenario planning is an ambiguous method that needs to be used in a careful and deliberate manner for it to deliver desired outcomes. However, being forced to take care in this way (i.e. to reflect on what outcomes are desired and how climate change adaptation problem is framed) is in itself an important first step for decision makers. Overall, appropriately addressing climate change adaptation requires that not only do we recognise the socially constructed nature of adaptation, but that we also recognise the socially constructed nature of the tools we are beginning to use to understand and address the many challenges involved.

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