

An architecture for government action on adaptation to climate change. An editorial comment

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Abstract An architecture of government adaptation programs is presented. Components include leadership, institutional organization, stakeholder involvement, climate change information, appropriate use of decision analysis techniques, explicit consideration of barriers to adaptation, funding for adaptation, technology development and diffusion, and adaptation research. This architecture is a useful heuristic for identifying, evaluating, and reevaluating the needs of decision makers as they improve management of climate-sensitive resources in a changing environment.

1 Introduction

The de Bruin et al. (2009) article “Adapting to climate change in the Netherlands: An inventory of climate adaptation options and ranking of alternatives” in this issue is a fine example of applying a systematic method to evaluate and rank adaptation options.

In closing, the authors note, “Improved harmonization and coordination between different policy making and executing institutions is needed especially in areas where fine tuning between the central government, the provinces, and other stakeholders is a prerequisite for successful implementation....” This need has been neglected for too long in the climate change adaptation literature. Although many studies have focused on identifying impacts and vulnerabilities or evaluating adaptation options (e.g., Adger et al. 2007), very few have given more than a passing nod to the difficult question of adaptation policy, including building support for action, identifying effective policy strategies, and removing or transcending barriers to adaptive action. The governance structure of decision-making bodies—that is, how they are organized

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and carry out policies—is critically important. This is particularly true for climate change adaptation, which typically includes a diverse set of policy recommendations, using a range of strategies and policies relevant to different policy participants and institutions, often across multiple sectors.

This article suggests components of an architecture that could empower governments and other policy participants to move from words to deeds. It is our contention that most, if not all, of the components of this architecture are likely to prove fundamental for a government adaptation program to be fully effective in addressing particular problems in specific contexts. Different situations will require different combinations of components. However, any adaptation program that focuses on only one or two aspects of this architecture—such as the provision of climate change information or funding—is highly likely to fail in facilitating many adaptive actions.

This architecture is based on our experience helping Alaska and Florida devise adaptation strategies and developing an adaptation strategy for the US federal government. The experience of several municipalities (e.g., New York City, King County, Washington), states (e.g., Alaska, California, Florida, Maryland), and other countries (e.g., the UK, Australia, Bangladesh) in organizing to address adaptation, captured in written reports and interviews, also informs this architecture (e.g., Bloomberg 2007; King County 2007; Governors Action Team on Energy and Climate Change 2008; Council of Australian Governments 2007).

The components of the government adaptation architecture are as follows:

1. Political leadership
2. Institutional organization
3. Stakeholder involvement
4. Climate change information
5. Appropriate use of decision analysis techniques
6. Explicit consideration of barriers to adaptation
7. Funding for adaptation
8. Technology development and diffusion
9. Adaptation research

We briefly discuss these in the order listed. However, the components are not numbered in order of importance or in order of when they should be implemented.

2 Political leadership

When governments have comprehensively addressed adaptation, it has taken a commitment from the chief executive (e.g., the president, prime minister, governor, mayor) to state that adaptation is a priority to initiate a government-wide adaptation process. Some examples of chief executives stating the importance of adaptation are Governors Schwarzenegger in California and Crist in Florida, Mayor Bloomberg in New York, and then Prime Minister Blair in the United Kingdom. Clear leadership from a chief executive is needed to overcome bureaucratic resistance, turf battles, and risk aversion, especially regarding complex policy problems that cut across conventional agency jurisdictions. Differing missions and rivalries can inhibit the cross-department or cross-ministry coordination often needed to develop and implement sensible adaptation policies.

3 Institutional organization

Most governments are already heavily involved in adaptation through current governance structures and institutional mechanisms, for example, water resource agencies adapting to changing precipitation regimes, and agriculture agencies adapting irrigation practices or crop characteristics to changing climate conditions. These activities, however, often are undertaken in isolation and via a piecemeal approach. In many circumstances this piecemeal approach is adequate, but the experiences of the localities, states, and nations that have begun confronting this issue show that existing institutions do not always have the information, authority, motivation, or expertise necessary to adequately address adaptation. The two most significant institutional needs that have emerged from disparate contexts are (1) mainstreaming, or integrating the consideration of climate into the everyday decision making of an institution, and (2) coordination, or the constructive engagement of multiple government agencies or departments, possibly across geographic jurisdictions and substantive focus areas.

We do not believe it is necessary to create a new department or agency to focus on adaptation. In fact, trying to separate adaptation from everything else that various government agencies do may undermine the objective to mainstream consideration of climate into government decision making. However, innovations in institutional organization may be necessary to address mainstreaming and coordination needs. Mainstreaming, for example, may require new, top-down mandates for institutions to consider climate through mechanisms such as strategic planning or periodic policy reviews.

We have observed two types of organizational response to the need for coordination across government agencies. One is coordination led by the chief executive's office. A governor or mayor may create an interagency coordinating group and have someone in his or her immediate office chair this group. New York City has undertaken this approach (Adam Freed, personal communication, May 7, 2009). The second organizational response involves putting a single department or agency in charge of coordinating efforts across the government. The Canadian province of Ontario has undertaken this approach (Ian Burton, personal communication, April 27, 2009). Ultimately, we need an appropriate mechanism to enable and empower coordination when it is necessary. The choice of mechanism is not deterministic, but must be based on the practical realities of the situation at hand.

4 Stakeholder involvement

Leadership from the top of a government structure is often necessary to address adaptation, but so too is the involvement of stakeholders. Stakeholder involvement in policy development and implementation is needed to ensure that adaptation policies (1) are designed to meet the needs of those affected by climate change and (2) promote stakeholder identification with and buy-in to the policies. The de Bruin et al. (2009) article highlights the importance of stakeholder involvement, which helps make policy development more democratic and yields pragmatic benefits that are often underappreciated. Policies developed absent stakeholder involvement might

not promote buy-in to adaptation policies and could produce impractical options that stakeholders cannot realistically implement. Furthermore, stakeholder involvement can identify policy innovations developed on the ground, reduce sources of conflict, provide political cover to tackle difficult policy issues, and reveal unanticipated barriers to adaptation policies as well as unidentified opportunities.

5 Climate change information

The significance of many current and anticipated climate impacts, the extensive resources required to mitigate those impacts, and the inevitable opportunity cost of choosing one adaptation policy over another make the best available information an important input to making wise policy choices. This implies providing demand-driven information sensitive to the needs of decision makers, not just the proliferation of more undirected information (McNie 2007; Sarewitz and Pielke 2007). At least as important, relevant information can raise awareness of climate risks and build support for taking action.

Many decision makers, however, argue that climate information at the scale decisions are made is too uncertain to support adaptation; based on this, they often fall back to a “wait and see” approach. This demand for precision and accuracy presumes that climate information can be substantially improved in a reasonable timeframe and that it will reduce the range of uncertainty. In practice, these assumptions are often misleading or incorrect (Sarewitz et al. 2000).

The need for precise information is often overstated because many, if not most, adaptations can be justified based on reducing vulnerabilities under current climate. Climate change often simply adds further justification for these “no regrets” adaptations. de Bruin et al. (2009) quote a United Kingdom Climate Impacts Program publication that provides an excellent definition of no regrets adaptations as “options...that would be justified under all plausible future scenarios, including the absence of human-induced climate change” (Willows and Connell 2003). Such adaptations can include improved productivity of agriculture, market-based schemes for allocating scarce resources such as water supplies, or well-designed insurance reforms that distribute risk without eliminating its price signal. Such adaptations are no regrets because they are beneficial regardless of how climate changes. Our experience in adaptation policy development in the USA and abroad is that most adaptations currently being considered by governments are no regrets.

6 Appropriate use of decision analysis techniques

Decisions about adapting to climate change are made under conditions of what some refer to as “deep uncertainty” (Groves et al. 2008; Popper et al. 2005). Among other decision ambiguities, this means that a broad range of future climate conditions is possible. Such uncertainty can cause policy makers to postpone or avoid making adaptations to climate change (Sarewitz 2004). To reduce paralysis in the policy process, policy makers can employ decision-making techniques that help identify appropriate choices in the face of uncertainties.

Decision analysis tools are more valuable as a means of informing decision makers than as a formulaic means of prescribing decisions. In fact, when decision analysis frameworks are misrepresented as being capable of producing deterministic results in the presence of daunting uncertainties, decision makers are rightly skeptical and less likely to embrace their use. Whether it is multicriteria analysis, benefit-cost analysis, or any number of other tools, part of the analytical process will always be difficult and challenging primarily because of underlying uncertainties. Decision analysis tools should encourage the user to confront these difficulties and grapple with them explicitly, but at an appropriate level. The different tools give alternative perspectives appropriate to different levels of decision makers; these perspectives illuminate different features of adaptation options.

When decision analysis tools are used appropriately, decision makers should emerge with a much deeper understanding of the character of the problem. Significantly, this deeper understanding often leads to a more refined and explicit problem statement that can be used to identify where current knowledge is weak but might be improved within a meaningful time span to reduce some of the risk of acting under uncertainty.

Several efforts have been made at defining frameworks to guide decision makers dealing explicitly with climate adaptation (e.g., Broadleaf and MJA 2006; Burton et al. 2004; Willows and Connell 2003). These efforts are a valuable start, but more practice-oriented evaluation of such tools is merited.

7 Explicit consideration of barriers to adaptation

In most cases, institutions, policies, and practices are in place that support or maintain existing activities under the assumption of a stationary climate. Some of these encourage behavior that can increase risks under current climate (see, e.g., Whetmore et al. 2006). Flood insurance policies, crop subsidies, water allocation schemes, building codes, and land use planning are examples of government policies and programs that are often based solely on current climate risks and that may not even manage those current risks appropriately. Such policies often focus on other public values so narrowly that they mask signals of climate variability and change, consequently preventing or actively discouraging adaptation. For example, subsidizing the production of certain crops, sometimes in specific locations, can discourage switching of crops in response to climate change and even the development of climate-robust crop varieties. Subsidizing flood insurance in a way that removes market price signals can encourage location of settlements in areas that are already at risk to flooding; these areas may face even greater exposure to flooding under climate change.

An important component of a government adaptation program is identifying such institutional and policy barriers to adaptation in order to remove or transcend them. Otherwise, continuing such policies or programs is likely to impede adaptation efforts and result in increased risks as climate changes. Such policy review is useful not only to enable government entities to adapt the systems they operate or manage but also to enable other entities such as individuals, private industry, or nongovernment organizations to adapt as well. The US Department of Interior recently reviewed its policies and identified rules, regulations, policy direction, and programs that will

need to be modified to enable adaptation or make it more effective and efficient (U.S. DOI 2008).

8 Funding for adaptation

Few adaptation policies can be implemented using only existing funding streams. Many adaptations will require additional funding, whether they involve incremental costs to incorporate climate risks, such as building a sea wall higher than current practice to account for projected sea level rise, or policy initiatives that make sense under all plausible future climate states, such as revising building standards to reduce the vulnerability of the existing building stock in flood-prone areas. The literature on climate change has tended to focus on damages rather than the financial costs of adaptation (e.g., Nordhaus 2008; Tol 2008),¹ but recently, some attention has been paid to estimating the global financial costs of adaptation. The estimates are preliminary and range from tens to hundreds of billions of dollars per year within several decades (e.g., Stern et al. 2006; UNDP 2007; UNFCCC 2007).

A key issue for governments is whether adaptation expenditures will come from a new, dedicated fund or from existing sources that fund investments in climate sensitive resources. The correct strategy depends on the extent to which investments in adaptation can be separated from other investments in climate sensitive resources. As we noted earlier, our experience examining projects that are identified as being adaptations to climate change is that most support basic development, i.e., are no regrets. If most adaptations make sense anyway—or are no regrets—then segregating funding for them based on a linkage to climate change per se would be quite complicated, so complicated that almost any project might soon be justified under the banner of adaptation to climate change (Pielke 2005). Even adding earmarked incremental funds to enhance existing funding streams to cope with climate change can be complicated. In most circumstances, new adaptation funding needs to be integrated into baseline funding for climate sensitive sectors and activities, a concept known as “mainstreaming” climate change.

9 Technology development and diffusion

Development and diffusion of new technologies and management practices will be critical to many adaptation efforts. The role of technology is not so much to make adaptation possible—a wide range of adaptations are possible with current technologies and management practices—but to expand the range of adaptation possibilities by expanding opportunities or reducing costs. For example, technologies or management practices that use water more efficiently, desalinate water at lower capital and energy cost, or enable crops to grow in hotter temperatures and drier soils

¹Damage estimates include some financial adaptation costs such as the costs of building sea walls. A significant portion of the damage estimates is estimates of changes in welfare, not financial costs of making adaptations.

all improve the flexibility or robustness of water resource management and agriculture. This inherently increases the adaptive capacity of those systems. Unfortunately, the status quo generally requires no new capital costs and may be more profitable in the short term than developing more climate resilient technologies. When this is the case, government investment in climate resilient technologies may be an appropriate and possibly necessary component of a successful adaptation program.

10 Adaptation research

The final component of the adaptation architecture is use-inspired adaptation research. Governments have tended to mainly fund research on the science of climate change, then, to a much lesser degree, research on the consequences or impacts of climate change (e.g., Leggett 2007), and finally research on adaptation. Adaptation research is use inspired in the sense that it seeks to expand the frontiers of knowledge for a practical purpose (Stokes 1997). Adaptation research is needed to understand not just what society needs to adapt to, but how we adapt, in order to better understand what conditions, incentives, and information promote or impede adaptation. Behavioral economics, psychology, organizational theory, natural hazards management, and other fields of study contain many insights that will be key to moving from the recognition of a climate-sensitive problem to effective action. Such research must examine the need to create appropriate incentives or alter the behavior of both individuals and institutions. The research should look at how decisions are made; how to improve the effectiveness of policy implementation; how to empower decision makers with limited time, limited information, and limited capacity; and other topics of practical relevance. Because government plays a major role in funding research, moving an adaptation program forward requires research initiatives focused on the practical realities of decision makers facing the complex problems associated with climate adaptation.

11 Conclusion

Each component of the architecture of government adaptation is likely to prove important and even critical in addressing particular adaptation problems in specific contexts. To focus exclusively on one architecture element or a small subset of them or to neglect any single element of the architecture entirely will most likely lead to failure in adapting to climate change. This is not to suggest that there is a one-size-fits-all solution or that every element of the architecture must be implemented in one fell swoop—in fact, just the opposite. Successful adaptation programs at the national, regional, and local scales have taken years, even decades, to build. The process takes persistence, a willingness to take risks and correct mistakes, and a dedication to continued improvement and enhancement. The term “adaptive management” is widely used to describe such a process. This architecture is a useful heuristic for identifying, evaluating, and reevaluating the needs of decision makers on a systematic basis in support of improving the management of climate-sensitive resources.

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