

The Politics of Climate Change Adaptation

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Abstract

Climate action has two pillars: mitigation and adaptation. Mitigation faces collective action issues because its costs are focused on specific locations/actors but benefits are global and nonexcludable. Adaptation, in contrast, creates local benefits, and therefore should face fewer collective action issues. However, governance units vary in the types of adaptation policies they adopt. To explain this variation, we suggest conceptualizing adaptation-as-politics because adaptation speaks to the issues of power, conflicting policy preferences, resource allocation, and administrative tensions. In examining who develops and implements adaptation, we explore whether adaptation is the old wine of disaster management in the new bottle of climate policy, and the tensions between national and local policy making. In exploring what adaptation policies are adopted, we discuss maladaptation and the distinction between hard and soft infrastructure. Finally, we examine why politicians favor visible, hard adaptation over soft adaptation, and how international influences shape local policy.

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1. INTRODUCTION

Climate change is among the most visible policy challenges facing the world (1). There appears to be a consensus among political, policy, and business elites for urgent climate action. Every year, the World Economic Forum (2) publishes the *Global Risks Report* ahead of its annual summit in Davos, Switzerland, identifying the “top 5 global risks in terms of impact.” The 2016 report placed “failure of climate change mitigation and adaptation” as the top risk. In the 2017 report, three of the top five risks are related to climate change: “extreme weather events” (second), “major natural disasters” (fourth), and “failure of climate change mitigation and adaptation” (fifth). The World Bank (<http://www.worldbank.org/en/topic/climatechange>) notes the adverse implications of climate change for global poverty and also identifies development opportunities offered by climate action. The United Nations (<http://www.un.org/sustainabledevelopment/climate-change-2/>) lists climate action (“Take urgent action to combat climate change and its impacts”) among the 17 sustainable development goals.

Climate action has two pillars, mitigation and adaptation, both posing different sorts of policy challenges. Mitigation requires addressing the tragedy of the global commons (3). This is because the ability of the global atmosphere to absorb greenhouse gas emissions is a rival common pool resource (4). Given the open access nature of the atmosphere, it is difficult to exclude individual actors from using it as an emission sink. Various multilateral treaties, starting with the 1992 United Nations Framework Convention on Climate Change (UNFCCC), have attempted to transform the global atmosphere from an open access resource to a common pool regime. The strategy is to create excludability by assigning national level emissions targets, which countries are expected to translate into their domestic policies.¹ But in doing so, countries face a political challenge: The costs of reducing these emissions tend to be local and concentrated on specific actors/locations,² but

¹Prior to the 2016 Paris Agreement, Annex I countries were subject to mandatory pollution reduction targets, whereas non-Annex I countries were not. Subsequent to the Paris Agreement, all countries have voluntarily agreed to intended nationally determined contributions.

²The 1992 UNFCCC outlined the principle of shared but differentiated responsibility for emission reductions. Consequently, whereas developed countries (listed in the Annex I to the Convention) faced mandatory emission reduction targets, developing countries such as China and India did not. This has contributed to the so-called China Excuse, the contention of some US interest groups regarding the US being asked to sacrifice economic growth by limiting its emissions whereas its economic competitors such as China are exempt from it.

their benefits are global and nonexcludable (although not uniform because successful mitigation will benefit climate-vulnerable areas more than others). This creates incentives for some countries to cheat even on their voluntary commitments (5, 6).

Alongside mitigation, adaptation is the second pillar of climate policy. Climate adaptation refers to policies, proactive or reactive (7), that seek to reduce the biophysical, social, and economic vulnerability (or enhance resilience) of a given area, organization, population group, or individuals to climate change (8). In contrast to mitigation, the benefits of climate adaptation tend to be local (9, 10). Therefore, collective action issues rooted in free riding that impede mitigation are probably less pronounced for climate adaptation (11).³

Moreover, with the scientific and policy consensus on climate change, one expects that governance units will enthusiastically support adaptation. Furthermore, given the intensive international and policy focus on climate action, and the high level of technical expertise being devoted to climate action, governance units' adaptation policies will be informed by technical and economic considerations. Governance units will probably seek to adopt the optimum adaptation policy mix that reflects the prevailing scientific and economic wisdom (13). For example, scientists could pinpoint locations that are most vulnerable to extreme weather events, local governance units would use this scientific knowledge to develop their adaptation policies, and international donors would support such efforts instead of imposing their policy templates. An economic approach might identify the areas that provide the highest net benefits to the ecosystem and the society, and again local governance units will use their expertise to develop their adaptation portfolio.

Why do adaptation policy portfolios not match these theoretical optimums: the best policy type being supplied by the most competent actor for the most deserving sector/location? We call this the adaptation puzzle. Analysts and scientists would probably blame it on politics (14). Sir Paul Nurse, a Nobel Laureate and the President of United Kingdom's Royal Society, notes that "he feels "distressed" when scientists find clear evidence that contributes to a particular issue—such as drugs policy—only for politicians to ignore it "because they don't think it will play well with the public" (15). The recommendation is that policymakers should listen to scientists and insulate themselves from politics.

We suggest that this reflects a narrow view of adaptation, and even a narrower view of politics. We suggest conceptualizing adaptation-as-politics because adaptation speaks to the issues of power, conflicting policy preferences, resource allocation, and administrative tensions. Politics is not a negation of rationality, a roadblock in achieving policy optimums. Collective action challenges are an expression of politics and occur because decision makers are (boundedly) rational actors playing "games" with specific payoff structures. Most times, the theoretical optimum outcomes that maximize net benefits are difficult to achieve. As Ostrom (4) shows, if the rules governing these policy games are changed, actors will start behaving in remarkably different ways. But changing these rules can involve substantial costs, and rational actors often have to function in a world with technically and economically suboptimal policy. Politicians paying attention to the public sentiment are behaving rationally. It is critical to understand what shapes public preferences, instead of asking politicians to ignore them.

In adaptation policy making, governance actors are embedded in different policy games with varying incentive structures. Their incentives are shaped by their perceptions about climate risks,

³In addition, there is the issue of risk perception. Sunstein (12, p. 508) notes the following: "The United States is unlikely to take significant steps to reduce greenhouse gases unless the perceived costs of risk reduction are decreased, an available incident triggers fear of significant and relatively imminent harm, sustained analysis or influential leaders suggest that Americans face serious risks."

policy priorities, institutional dynamics, and resources constraints. Consequently, it is conceptually difficult to identify an optimum adaptation portfolio (16). In addition to the issue of uncertainty about the impact of climate change, actors vary in their perceptions about their vulnerability to climate stressors (17–19). Furthermore, adaptation has many dimensions. It involves investing in hard infrastructure (such as physical structures) as well as soft infrastructure (for example, the social and economic capacity of the community) (20). The latter is difficult to carefully assess and benchmark against a theoretical optimum. Some dimensions of social and economic capacity may be in conflict (see 21 for some literature on the unexpected implications of economic growth on gender equity).

Even if one drops the quest for an optimal adaptation policy portfolio, should an individual policy be assessed with the standard cost-benefit approach? Do governance units adopt policies with the highest net benefits? This analytic approach has merits but should be used with caution. There is extensive debate about the appropriate metrics with which to assess the benefits of adaptation policies (22–24). First, it is not clear what the appropriate type and level of adaptation investment should be because actors have different preferences and abilities to live with environmental risk (25). Moreover, given the uncertainty about the timing and location of climate change impact, it is difficult to predict *ex ante* (i.e., before the climate stress can be observed as upsetting the status quo) whether a given level of adaptation investment constitutes an underinvestment or overinvestment to address the climate stress.

What then drives adaptation policy making? Why are some governance units enthusiastic whereas others are lukewarm? Why do units focus on different aspects of adaptation? First, there is an issue of mismatch in policy priorities. Although global policy elites attach a high priority to climate action, local governance units may not share their perspective. They have a different perception of climate risks. Or, local governance units may see a political payoff in devoting resources to address the more visible and immediate challenges of, for example, economic development, deforestation, and desertification. Second, local units may prefer to wait and assess the new threats posed by climate change (reactive adaptation), instead of proactively committing resources to address specific climate-related stressors (12). In addition to risk perception issues, local units may fear policy, political, or technological lock-ins if they move too fast on adaptation. Third, local units may have specific preferences about how, when, and where to adapt but not the resources to do so. They may face political challenges in raising resources internally, for example, via taxation. They could seek help from the national government but it may not share their priorities. This local-national tension may play out at the international level as well. Developing countries might be able to secure resources from international donors, but may not agree with donors' policy preferences and templates. Fourth, governance units may already have a disaster management infrastructure that they think will work well for adaptation. They may not feel the need to either rebrand it as climate adaptation or create a parallel administrative infrastructure devoted solely to adaptation.

Thus, in spite of generating predominantly local benefits and the global scientific and policy consensus for its support, climate adaptation navigates political, economic, and institutional complexities. It faces political contestation, interest group pressure, and institutional inertia. From a political science perspective, we expect that there will be considerable variations across units in the types and levels of adaptation policies. And to explain this variation, scholars should carefully study its politics.

Adaptation occurs via individuals (private adaptation), firms (business adaptation), community organizations (community adaptation), and the government (public adaptation) (26, 27). Our review focuses primarily on public adaptation, that is, efforts conceptualized, designed, and

Table 1 Climate adaptation polycyscape: a political perspective

Political dimension	Policy dynamics	Policy manifestation
Who	Which actor is tasked with developing and implementing adaptation policies?	Should existing disaster management organizations be tasked with providing adaptation or are new structures created? How is the division of resources and responsibilities apportioned between local versus national levels?
What	What types of adaptation policies are provided and who benefits from them?	Reactive versus proactive adaptation Soft versus hard adaptation Government provided or coproduced with citizens Maladaptation Adaptation spillovers Equity
Why	Why are specific types of policies preferred?	Visible versus less visible adaptation policies Role of international influences in favoring specific policies

implemented by governmental (subnational and national) bodies.⁴ Following Laswell (29) and Dupuisa & Biesbroek (30), the remainder of the article is organized in three sections, followed by a conclusion.

In Section 2, we examine who develops and implements adaptation policies. Specifically, we explore whether adaptation is simply old wine of disaster management in the new bottle of climate policy. We also review the tensions between national and local policy formulation and implementation. In Section 3, we examine what type of adaptation is provided, including hard and soft infrastructure. We critique the emphasis on soft infrastructure given its somewhat open-ended and expansive conceptual boundaries. We then examine how adaptation in one sphere can create negative consequences in other spheres. In Section 4, we explore why specific types of adaptation policies are provided and why politicians may prefer to invest in hard and visible infrastructure as opposed to soft, less visible infrastructure. We also consider the role of international influences in shaping the adaptation polycyscape. We critique international donors' strong preference for nongovernmental organizations' (NGOs') involvement because it can prove problematic in some political systems. We conclude in Section 5 (Table 1).

2. WHO DEVELOPS ADAPTATION POLICIES?

2.1. Adaptation, Old and New

Is adaptation old wine in a new bottle? After all, humans have faced uncertain weather and changing climate conditions since time immemorial (31). They have protected themselves (with varying levels of success) from nature through adjustments and innovations. Take the case of water. Farmers have practiced crop diversification and planted crops that are better able to withstand fluctuations in water availability (32, 33). Communities and governments have created infrastructure to collect and store rainwater, dug wells, and constructed canals to move water from one location to another. Lucero et al. (34) provide the example of how Mayan society dealt with annual variations in water

⁴Mendelsohn (28) makes an interesting point about the underprovision of private adaptation. Private actors, such as firms and individuals, underprovide adaptation when their actions create positive spillovers, or when complementary efforts from other actors are required to realize the full potential of adaptation efforts. Thus, absent governmental intervention, such private adaptation will tend to be underprovided. Future research should carefully assess how local governments are allocating adaptation funding and which specific groups stand to benefit the most from such projects.

availability during its Classic Period (250–950 AD). The authors note that the Mayan kings recognized that water management was the key pillar of their political survival. Hence, they invested in creating physical (hard) infrastructure such as artificial reservoirs to ensure water availability during drought, and in cultural (soft) infrastructure such as public ceremonies and festivals that celebrated water and reinforced the importance of the physical infrastructures they had created to enhance social welfare. Pandey et al. (35) document rainwater harvesting structures constructed by different kingdoms and empires starting with the earthworks in 4500 BC in the Thar Desert in response to the weakening of SW Monsoons. In their study of urban water systems in ancient Greece, Koutsoyiannis et al. (36, p. 45) document several remarkable achievements and go on to suggest that these water management “practices and institutions are relevant even today, as the water-related problems of modern societies are not very different from those in antiquity.”

Given their vast experience of dealing with weather events, most local governments have some sort of administrative system that can create physical infrastructures as well as formulate and implement rules and laws. These laws could range from, for example, regulating water use in rural settings to zoning regulations and building codes in urban areas. Government units typically have fire departments (part time, volunteer, fulltime, and professional firefighters) and a police force to respond to natural disasters (37). When the scale of weather-related disruption overwhelms their resources and infrastructure, local governments work with national-level organizations such as armed forces or specialized agencies such as the United States Federal Emergency Management Agency (FEMA) (38). Viewed in this way, climate adaptation will involve local governance units working with existing policies, personnel, and administrative units that address natural hazards.

But do scholars and practitioners recognize the above capacities as adaptation? They are often asked to create an inventory of adaptation policies for national adaptation plans (NAPs), for example, or to assess levels of adaptation preparedness. Perhaps, they should recognize that governance units will probably utilize their existing administrative systems for climate adaptation. For one thing, duplication of infrastructure is often expensive. Furthermore, as bureaucratic politics literature notes, existing administrative bodies have an interest not only in surviving but also in expanding their budgets and head counts (39). If these bodies see substantial funding for climate adaptation, they will probably relabel themselves as climate adaptation bodies. This relabeling might allow these administrative units to proclaim their readiness to adapt to climate change.⁵ However, it is not clear whether these relabeled bodies will necessarily provide superior climate resilience in relation to the “old” disaster management departments. After all, relabeling may not introduce any substantive changes in how the department is organized, how it perceives various climate challenges, and how it seeks to respond to them. Thus, without “reinventing” the administrative body in fundamental ways, relabeling an existing structure would probably do little to improve climate resilience. The challenge is that climate resilience administrative systems need to take a more holistic view of climate challenges instead of responding to them in a piecemeal fashion.

How then to assess the readiness of the administrative bodies for adaptation? This requires identifying specific climate stressors or threats and understanding the extent to which the governance unit has done the planning and has the administrative competences (economic and technical) to implement these plans. We must understand the extent to which existing disaster management systems can respond to the increasing scale and increased frequency of existing climate stressors

⁵In our review of the literature, we find that scholars have outlined several frameworks to guide adaptation assessment (40–43). There is an opportunity for large *N* studies that translate these excellent frameworks into quantifiable assessment of both the hard and the soft adaptation capacities of governance units.

and to new types of stressors.⁶ Depending on the type of climate challenge, the level of stress it causes, and the “slack” (45) in the administrative system to accommodate these perturbations, administrative and policy changes might be required. These could be incremental or transformational (40, 42). In the former, the policy systems are modified or upgraded at the margins only. In the latter, however, the governance unit recognizes that the existing systems will not suffice and creates new policies and administrative structures.

Take the case of the agriculture sector where climate change is likely to increase frequency of both abiotic stresses (heat, drought, rain) and biotic stresses (pests and diseases) (32). Depending on the frequency, level, and types of these stresses, along with the perceived level of preparedness, some governance units may decide on an incremental response. Others might assess that their existing institutional and social infrastructure, as well as technical capacity, are inadequate. They may undertake deep-seated changes in both technology and institutions: discontinue farming of some crops, accept the extinction of some species, or relocate elsewhere to a more hospitable terrain (46). In the context of Australian agriculture where wheat is an important crop, units have responded with a mix of incremental and transformative strategies. After the decline of yields by 5.5% between 1998 and 2008 due to rising temperatures and changed rainfall patterns—especially the decline in winter rain—some farmers with appropriate capacities have moved their operations to the wetter areas of Southern Australia, whereas others have adopted incremental strategies for their existing lands to reduce water runoff such as conservation tillage (47, 48).

Arguably, adaptation often requires a multisectoral response. Sometimes a new administrative structure is required, especially if the existing administrative bodies have confusing and overlapping mandates. However, governments may fail to respond to such problems. In the case of Uganda, Ampaire et al. (49) highlight the problem of such administrative confusion: Although the central government has formulated a National Climate Change Policy, it is not linked to other national-level policies such as the Agriculture Policy, the Land Policy, the Environment Management Policy, and the Forestry Policy.

However, such administrative confusion can have a profound political logic. In the context of Nepal, Nightingale (50) notes the influence of national-level politics on the distribution of authority on climate change issues. Nepalese leaders decided to give jurisdiction over climate change policy to the Ministry of Science, Technology, and Environment (MSTE). In part, this was because international donors want the environment ministry as the nodal body for their funding and projects. Local politicians, not wanting powerful ministries getting more power and resources, and therefore becoming too big for them to control (51), found this to be politically acceptable; historically, MSTE has been a weak ministry compared to the more powerful ones such as Ministry of Forest and Soil Conservation and the Water Ministry. Given the fractured nature of Nepalese politics, the politicians agreed that donors could funnel climate aid via MSTE. However, they did not want MSTE to become too powerful and control this lucrative resource stream. Hence, they gave jurisdiction for mitigation programs to the Ministry for Forest and Soil Conservation. This discussion suggests that administrative response to climate adaptation cannot be interpreted in terms of its impact on resilience or administrative rationality. Climate action speaks to fundamental questions of power and resource allocation. Donors want their funds to be handled by appropriate and competent actors. To ensure this, donors may want adaptation programs to be managed by environmental ministries. However, such reliance on

⁶In their study of policy response to urban heat waves, Hess et al. (44) note the debate about whether climate change will accentuate existing health hazards or present fundamentally new public health challenges. If the latter, the existing public health infrastructure may be inadequate to respond to climate change.

standard operating procedures for distributing grants can shape bureaucratic and organizational dynamics in unexpected ways. What if the ministry labeled as the “environmental ministry” is not the most competent organization to manage such programs? Instead of fulfilling donors’ intent, politicians can leverage donors’ operating procedures (including preference for the appropriately labeled organization) as a tool for pursuing their own political ends that may eventually undermine the effectiveness of adaptation efforts.

The clash between political and administrative rationality is on a vivid display in Mexico’s Upper Lerma River Valley where existing administrative structures are charged with supplying adaptation policies. Eakin et al. (52) note that the rapid urbanization that has encroached upon rural spaces, often accompanied by new construction in the traditional flood plains, has posed new challenges on, for example, how to handle excessive precipitation. However, the disaster response infrastructure continues to view flooding in terms of an agricultural problem that is within the purview of agricultural and water agencies. Thus, in mixed land use areas with urban and rural areas coexisting, new systems need to be established that allow the agriculture-focused departments to work with urban managers to handle the issue of flooding (53).

But suppose policymakers decide that effective adaptation requires reorganizing the policy-making system. Such reorganization can take many forms. New administrative structures could be created that take over the jurisdiction of existing ones. Alternatively, they could place different administrative units under a common umbrella such as the Department of Homeland Security (54) that was created in the aftermath of 9/11. Although several countries have established new administrative structures to respond to climate change, we have not found examples of countries or subnational units establishing so-called climate czars by merging existing units (or creating umbrella bodies) to coordinate their multisectoral climate policies; however, would such new bodies produce different policy outputs? Future research should examine whether new administrative units tend to develop adaptation plans that are more technocratic documents (akin to FEMA) or holistic plans that place adaptation in the broader political and social context. Furthermore, do they create plans that concentrate power at the national level, or are these new bodies sensitive to the issue of polycentric governance that Ostrom (55) has highlighted?

2.2. Tension Between National and Local Adaptation

Adaptation is implemented at the local level but much of its planning seems to take place at the national level. Following UNFCCC’s guidance (http://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/4585.php), several countries have developed National Adaptation Programs of Action (NAPAs) to inventorize their projects and signal the country’s political commitment at the highest level to address climate change. As of 2016, the UNFCCC (http://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/4585.php) Secretariat has received NAPAs from 51 least developing countries. These plans provide a useful framework to begin assessing how countries view adaptation challenges and how they propose to address them. How do national plans relate to local adaptation efforts operating at a national level? If local regions face unique climate threats, arguably regional-level planning might be more appropriate. But it is not clear whether regional plans will emerge from an agreed national template, or regional plans will shape the national template itself. Although the omniscience of the national planner should not be assumed, uncoordinated regional plans can lead to incoherent national efforts as well (4). As a polycentric governance model suggests, the scale of the problem should probably cohere with the scale at which the governance response is conceived (56, 57). Although a national plan could nest several regional or subnational plans, we have not seen systematic evidence of this nested approach to adaptation planning.

Biesbroek et al. (58) offer a comparative analysis of the National Adaptation Strategies (NASs) of seven EU countries. They find that NASs tend to offer general guidelines that lack specificity. Finally, they tend to work with an expansive notion of climate vulnerability, without recognizing how this may vary across climate stressors and across different geographical and social contexts. Disturbingly, they find that NASs typically do not consider different climate scenarios. This is surprising because there is uncertainty about the timing and magnitude of the effect of climate change on specific stressors.

Other scholars have also noted the problems that Biesbroek et al. (58) identify. They criticize national-level adaptation plans for lacking specificity, failing to connect with the situation's local experiences, and ignoring issues of climate equity. Examining national adaptation strategies produced by OECD (Organisation for Economic Co-operation and Development) countries, Panic & Ford (59) offer several criticisms, including not adequately acknowledging the challenges faced by vulnerable sections of society, not adequately taking into account location-specific risks, and not carefully mapping implementation and funding issues. This discussion suggests that the lack of specificity in NAPAs is not limited to developing countries. The variable quality of NAPAs probably cannot be attributed to administrative capacity deficits because developed countries tend to do well on the capacity dimension. Future work should identify factors that drive variations in the quality of NAPAs, especially their specificity and careful attention to local risks, climate justice (60), and implementation issues.

Given the international pressure to prepare NAPAs, the typical bureaucratic response probably is to produce a standard document that allows them to "check the box." Local units, be it in the developing world or the developed world, probably do not have the time and resources (along with the perception that this is not "their" project) to think deeply about the specific adaptation details. Thus, in explaining the variation in quality of adaptation planning, future work should focus on the political incentives for the local governance units in this regard.

Adaptation planning can also suffer from local-national tensions. National-level technical bureaucracies that propose adaptation plans sometimes overlook ground-level reality, and do not sufficiently appreciate the multiple challenges that communities confront in their everyday sustenance. On the basis of their field work in the Rakai district of Uganda, Ampaire et al. (49) report that the central government not only tends to dominate the formulation of adaptation policy, it also has poor communication channels with district-level actors even for plan implementation. Examining adaptation in three African countries (Swaziland, Botswana, and Malawi), Stringer et al. (61) find a tension between local adaptation efforts, which the communities have probably been undertaking for a while, and the policy-led managed adaptation often outlined by the technical bureaucracies of the national governments. Their comparative study shows the folly of assuming that local responses are reactive whereas policy-driven planned adaptation is forward looking. They also highlight that local adaptation confronts a core resource allocation problem facing farming communities. Farmers might face multiple challenges, including climate change, in their everyday lives (62, 63). Consequently, it is a folly to expect that farmers will begin focusing predominantly on adaptation just because this is now an important national and international policy priority. Policy-driven, top-down adaptation must therefore be sensitive to its coherence with local priorities. Otherwise, local actors will pay it a lip service and treat it as yet another mandate from above, instead of as an opportunity to improve their lives.

Furthermore, before prescribing specific adaptation activities, national planners must survey and understand what communities are already doing to address climate change stresses, and then explore how their technical adaptation approaches can leverage existing practices. Take the case of Norway (64), a country that does very well on traditional proxies of adaptive capacity such as income, education levels, and social cohesion (65). Næss et al. (66) compare how the municipalities

of Skedsmo and Ringeby responded to the 1995 floods. They find that local governments are skeptical about national-level guidelines about adaptation, especially because such guidelines tend to ignore local knowledge. This supports the argument about the virtues of polycentric approaches to climate adaptation. Although Ostrom (55) has tended to focus predominantly on mitigation issues, her argument extends well to the realm of adaptation. Naess et al. (66) also criticize the technocratic orientation of adaptation approaches, especially its lack of understanding that flood management has to be rooted in social dimensions. They note the following: "Flood protection is traditionally the domain of technical departments, which is reflected in a technical bias on proposed solutions such as building of dikes along rivers and drainage of sediments. Within the municipal administration, flood problems were also perceived as being caused by lack of technical protection schemes" (66, p. 133). However, they suggest that these technical solutions probably do not address the problem. Worse, they probably redirect attention to another location without such structures, an issue of maladaptation that we discuss in the next section. Viewed this way, climate change adaptation could become a zero-sum game that allows the privileged to redirect climate stressors toward the less privileged.

Of course, the above discussion raised a fundamental political question: What explains the strong role national planners play in adaptation, as reflected in the preponderance of intergovernmental regimes in this issue area? We suggest looking at institutional design that centralizes decision-making authority (political authority) and the centralization of fiscal power (economic authority). Take the example of the city of Cape Town in South Africa. Mukheibir & Ziervogel (67) report that, although Cape Town is likely to confront climate issues such as rainfall variability, the city has not been able to devote adequate resources to adaptation. Instead, much of the adaptation planning effort is directed from the national level where considerable resources are available.

This sort of administrative centralization is not limited to developing countries. Consider the case of the \$1 billion earmarked for the 2014 National Disaster Resilience Competition. This initiative was sponsored by the US Department of Housing and Urban Development and sought to encourage local climate adaptation initiatives. It eventually awarded \$48 million to Louisiana to relocate the Biloxi-Chitimacha-Choctaw tribe (with 25 occupied houses) off the Isle de Jean Charles, which was being submerged by rising sea levels. However, it denied funding to Newtok, Alaska, populated by the Native American Yupik tribe that faced a similar predicament (68, 69). Relocation decision, or government-initiated managed retreats from flood-prone areas, are expensive policies. As the displeasure of Alaskan politicians over the denial of funding to Newtok suggests, climate adaptation will increasingly get mired in budgetary politics, given the concentration of fiscal resources at the national level.

This sort of budgetary tension is particularly visible in the context of international climate funding. Because these funding decisions are decided in intergovernmental forums such as the UNFCCC, national governments have center stage. Consequently, much of formal adaptation planning and documentation required by intergovernmental funders are developed at the national level. This is not to say that subnational or city-level efforts are always neglected in international climate policy. There are examples of city-level programs such as the C40 network (70) and Covenant of Mayors (71) that reflect global coordination of subnational efforts. As of now, however, most of these efforts tend to be focused on mitigation and not on adaptation.

In sum, the above discussion raises an important concern about the mismatch between the locus of action and the locus of funding, and how this provokes budgetary politics. If adaptation is to remain a predominately local effort (nested in regional and national plans), local governance units should have sufficient autonomy and resources to construct and implement their own plan (56). This raises tough institutional and political questions about decentralization, fiscal power,

and national politics. Global institutions, multilateral banks, and external donors interested in adaptation have negotiated primarily with national governments, and local actors have had only a token presence at the decision-making table. In this policy process, local concerns are likely to get less attention and unfortunately, the local commitment for adaptation will suffer.

3. TYPES OF ADAPTATION POLICIES

3.1. Soft Infrastructure and Adaptation

Adaptation requires substantial investment in hard infrastructure: new sea walls to protect against sea-level rise, canals to move water, rain-harvesting structures, etc. This hard infrastructure probably needs to be developed at the local level but cohere with a national plan. After all, if local infrastructure malfunctions, the effects could ripple across the whole economy. Consider critical infrastructures required for the normal functioning of the digital economy. If a windstorm knocks down power lines, then the server farms critical for the functioning of the global internet system, for example, might be out of commission. This is not a far-fetched idea. Take the case of the hub and the spoke system that structures the operations of the airline industry (72). In recent years, extreme weather events that have affected major airline hubs such as Atlanta, Frankfurt, or Singapore have severely disrupted international air travel. If critical infrastructure is “local,” then subnational governance units charged with providing adaptation services will need the resources, tools, and training to secure these critical facilities. This is where soft infrastructure comes in. Scholars recognize that along with hard infrastructure, adaptation also necessitates significant investments in soft infrastructure, namely improving the technical, organizational, and social capacities of administrative and social systems to respond to climate-related stress (73, 74).

Soft adaptation has a critical citizen-government dimension. The reason is that some aspects of soft adaptation are coproduced by governments and citizens (75, 76). Consequently, even local adaptation has a public good component and faces collective action issues. Adaptation therefore requires strengthening social capital that allows citizens to work with administrative agencies and with each other. This should motivate governments to engage with nonstate actors, including civil society actors, starting from the planning stage.

The role of coproduction in enhancing adaptive capacity would probably vary actors and sectors. Scholars note that public health has an important social coproduction aspect, beyond its medical/technical one, because it requires active citizen involvement in ensuring one’s own health and that of others. Simple tasks such as washing hands before serving food or not spitting in public places can help control the spread of contagious diseases. However, governments alone cannot accomplish such tasks; citizens have to be educated, nudged, and reminded to undertake them because private actions have public consequences.

Community engagement and social capital (77, 78) should therefore be particularly salient in public health adaptation. In fact, adaptation scholars should learn from public health scholarship in this regard. Ebi et al. (79) remind us that preventive public health seeks to reduce the vulnerability of the community to health risks. This is analogous to what climate change adaptation seeks to accomplish. Not surprisingly, as Ebi et al. contend, public health scholars recognize the role of social capital in effective adaptation “because the potential health impacts of climate change, and therefore the actions to reduce these impacts, are intimately interwoven with specific population and regional vulnerabilities. Public health interventions generally have been less effective in populations with a lower SES [socioeconomic status; *brackets added*]. Stakeholder engagement is needed to ensure that messages designed to reach vulnerable groups provide the information and motivation necessary for individuals to make appropriate choices” (79, p. 502).

What if the social capital and community engagement interventions take place in contexts that are not supportive of civic engagement in public policy? In some social systems where governments have traditionally not consulted with civil society actors, initiating such collaborations *de novo* can pose a challenge. In authoritarian contexts, the state has a political logic for not giving legitimacy to actors beyond its control. Even in post-authoritarian societies, states often have not acquired the skills, capacities, and the culture of engaging with nonstate actors. Furthermore, citizens are often skeptical of civic groups and do not see them as authentic voices of their people. This is because NGOs historically have functioned as front organizations for the regime. Furthermore, the prevalence of the state-sponsored NGO sector is well established in authoritarian countries such as China (80), where they are referred to as GONGOs (government-organized NGOs). In the contemporary period, NGOs tend to be funded by foreign donors, resulting in their neglecting local accountability. This is a standard critique of the weakness of civil society in Eastern and Central European countries (81). Given this background, it is difficult to see some states successfully engaging with nonstate actors to strengthen the soft adaptation infrastructure.

In recent decades, the government-NGO relationships have taken a new direction because some national governments have turned against civil society groups, particularly the ones that receive foreign funding. We bring up this issue because climate policies are being constructed in the context of political tensions. Dupuy et al. (82) document how approximately 40 developing countries have enacted laws that restrict foreign funding to domestically operating NGOs. In addition to soft infrastructure issues, this poses a problem for the distribution of climate aid. Since the 1990s, donors have begun channeling a significant percentage of their developmental funding through NGOs (83), a route that many governments have now restricted. If the evolution of soft adaptation infrastructure requires active collaboration between governments and NGOs, and foreign funding is critical to support this relationship, the prospects of developing this infrastructure are slim, given the backlash against foreign funding of NGOs.

Finally, scholars should probably reexamine the concept of soft infrastructure. It is a somewhat fuzzy concept because its definition is open ended. It could conceivably cover various social and interpersonal interactions (84). Some social relationships can certainly improve social cohesion. But social capital can also create an “in-group mentality” where the group cohesion increases by excluding those outside the group. This is the tension between bridging and bonding social capital that scholars have alluded to (85, 86). It is conceivable that adaptation faces opposition because some groups feel that these funds will be deployed to help “others,” maybe even at their expense.

Soft infrastructure has multiple dimensions, and it is not clear which ones governance leaders should prioritize. Given its open-ended definition, vested interests can capture the policy-making process and push through their favorite projects under the guise of soft infrastructure. Furthermore, soft infrastructure policies might ignite social and political tensions over the distribution of costs and benefits of adaptation. In multiethnic societies, such tensions could become serious if costs and benefits are borne by different ethnic groups (87–89). Even in ethnically homogenous but economically stratified societies, if adaptation is viewed as reproducing inequalities, we can expect to see pushback by the underprivileged to climate action (17). Thus, social systems will vary in their adaptive investments due to their economic and technological abilities, as well as their social and political characteristics. Governance units may not invest in adaptation, even when it is technically desirable, because of the social tensions it might ignite. Once we recognize these considerations, we can begin to explore why social systems (and individuals within them) vary in climate change adaptation approaches.

Viewed this way, scholars should debate about the merits of an intuitively useful but fuzzy concept of soft adaptation infrastructure. One option is for scholars to focus on sharply defined

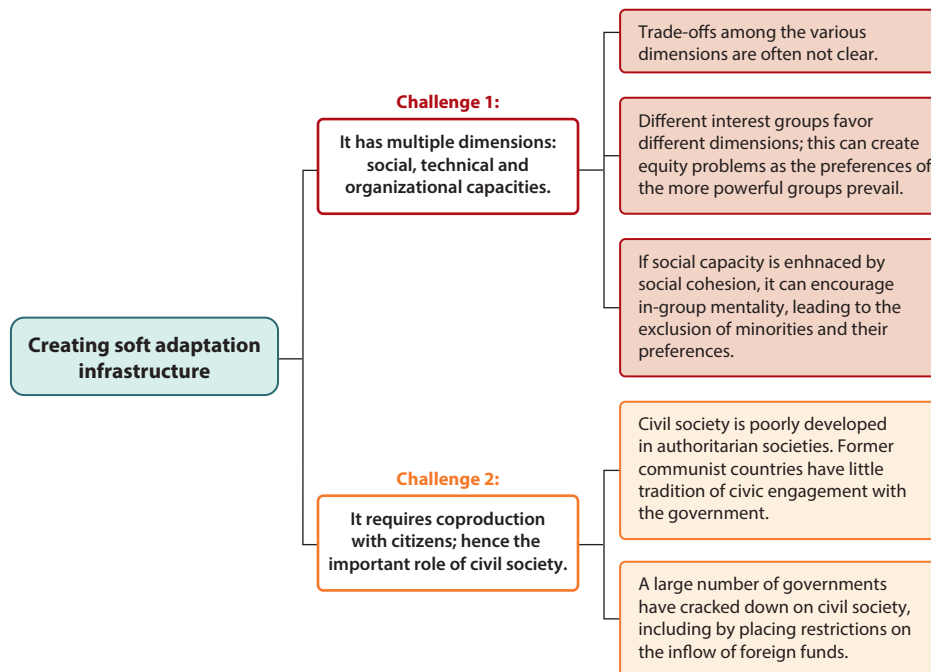


Figure 1

Challenges in soft adaptation.

issues such as education levels, wealth, income equality, and gender equality, instead of subsuming all under soft infrastructure. We believe this is an important subject for future research (Figure 1).

3.2. Critiques of Adaptation

Adaptation is necessary because climate is already changing and even drastic mitigation effort cannot reverse global warming (unless some breakthrough carbon capture or negative emission technologies are developed). But do adaptation policies always enhance local resilience to climate stressors? If not, why is this the case?

Historically, adaptation was a neglected if not a taboo topic (90) in climate policy because some feared that adaptation may reduce the policy commitment to mitigation. This could take place in two ways: psychological drivers and budgetary drivers. Adaptation policies might lead some to believe that climate issues have been addressed, and they may even begin to lead more carbon-intensive lifestyles, the so-called rebound effect (91). This is consistent with social psychology insights on the risk compensation hypothesis, which suggests that actions to reduce the negative consequences of risky behaviors may actually lead to encouraging such behaviors (92, 93). The classic example is of regulations requiring use of seatbelts to decrease traffic fatalities that may actually encourage reckless driving and eventually increase fatalities (94).

Of course, if the infrastructures for mitigation and adaptation were identical, the adaptation-mitigation tension would not arise. But this is not the case, and budgetary politics could require making tough choices. Suppose communities face budgetary constraints that allow them to either invest in renewable energy or build seawalls. Creating solar energy facilities and wind farms

connected to the national grid can allow communities to contribute to climate change mitigation, but not to local adaptation. Similarly, building seawalls could help communities adapt to rising sea levels but not contribute to climate change mitigation.

The second critique of adaptation pertains to its negative spillovers (95–97). Maladapted projects reduce the climate vulnerability of a governance unit but reduce its climate resilience over time, or those of other units, sectors, and geographies.⁷ Hannah et al. (98) show that in response to temperature increases, winegrowers may relocate their vineyards to higher altitudes but in the process may disturb the ecosystem and natural vegetation. Or, if they stay in the existing location and use sprinklers for temperature control, this may put excessive demands on local supply of freshwater. Magnan et al. (99) provide examples of different aspects of maladaptation in Hulhumalé, Maldives; Afar, Ethiopia; Cape Town, South Africa; and Bangladesh. An infrastructure project to raise the river bank may encourage homeowners to build houses in the flood plain, thereby reducing their resilience to future floods (100, 101). The construction of an embankment or seawall may direct erosion elsewhere. A desalinization plant in Melbourne, Australia, that enhances the resilience of the water supply system damages several sites that are important to the Bunurong Aboriginal community (102).

Maladaptation may manifest in budgetary issues as well. International donors might commit funds to specific adaptation projects (with high media salience) but simultaneously reduce their appropriations for development projects that could enhance community resilience by creating new economic opportunities. Alston et al. (103) report that in adapting to the economic challenges posed by climate change, Bangladeshi families are marrying off their daughters at an early age. This is a result of the family's anticipation of increasing dowry demands as their daughters age. Anticipating that climate change might undermine their economic capacities in the future, they adapt by forcing their daughters to marry early, an action that has adverse consequence for the young bride, and eventually for the society. Scholars note that the social-economic resilience of a community is strengthened with gender equality; arguably, this forcible marriage undermines long-term resilience of the community to climate change and other natural stressors.

4. WHY SPECIFIC TYPES OF ADAPTATION POLICIES EMERGE

4.1. Policy Visibility and Political Choices

Adaptation involves political choices and balancing competing demands. Governance units have to decide the specific dimensions they will focus on and how they will construct adaptation policies and programs. In some cases, adaptation is probably a “routine” bureaucratic decision guided by standard operating procedures (104) of disaster management units. But for nonroutine decisions, especially when resources and budgets are at stake, it is less clear what sorts of adaptation policies will emerge.

Take the case of soft and hard infrastructure. We have alluded to how soft infrastructure is ensnared in the political problems of engaging with civil society. In addition, policymakers might have a higher payoff if they invest hard physical infrastructure because citizens favor these policies and their outcomes are visible. Hard infrastructure allows leaders to demonstrate that they are solving problem: After all, leaders get rewarded for solving problems, not merely flagging them (105). In their study of the Middle East and North Africa, Sowers et al. (106) find that governments

⁷Should maladaptation exclude wasteful policies that politicians push through under the guise of adaptation, such as an expensive infrastructure project that does very little to improve resilience or reduce vulnerability to climate change? We suggest such policies should be treated as sham adaptation as opposed to maladaptation.

place low priority on social engagements as mechanisms to enhance the adaptive capacity. Instead, they devote resources to creating hard infrastructure such as water supply projects, desalination projects, canals, and dams.

The political payoffs associated with visible projects might also motivate policymakers to invest in reactive policies, and not proactive ones. Healy & Malhotra (107) examine voter preferences regarding federal spending via FEMA in response to disaster damage. They find that voters reward political parties for reactive policies (such as delivering disaster relief), but not for investing in proactive policies (disaster preparedness). This is especially worrisome because “\$1 spent on preparedness is worth about \$15 in terms of the future damage it mitigates” (107, p. 387). Indeed, politicians all over the world make a point to survey areas where a disaster has struck. On one hand, disasters can open the “policy window” (108) for politicians to introduce new policy initiatives by invoking the inadequacies of existing policies. Disasters can allow them to demonstrate that they are in charge and responsive to the needs of their constituents (109). This is consistent with broader policy research that emphasizes that political leaders want to invest in the provision of visible public goods that allow them to proclaim their achievements (110, 111). If climate adaptation can create visible hard infrastructure, politicians will probably have incentives to support it. However, if adaptation entails investment in less visible soft infrastructure and capacities, public support for such measures might not be forthcoming.

But policy visibility may not be the only driver of adaptation preferences. Demand for specific adaptation projects also depends on perceptions about climate risk. As Mercer (112) points out, the willingness of local communities in Papua New Guinea to invest in climate adaptation is shaped by their understanding of how climate change is affecting their vulnerability to natural hazards. These communities recognize the multiple challenges they face. For example, the community might seek to focus on its forestry practices because it recognizes that these practices have contributed to the destruction of rainforest (113). Thus, these communities may prioritize a change in forestry practices over adaptation infrastructure projects. In all probability, these sorts of investments will not be noticed in adaptation assessment, although they are critical in enhancing the capacity of the community to respond to climate stressors.

Tucker et al. (114) make a similar argument in the context of coffee producers in Central America and Mexico. They suggest that although coffee producers acknowledge the challenges posed by climate change, they do not believe that this poses grave danger to them and their communities. Indeed, they may not attribute extreme weather events to climate change, and hence, may not be motivated to invest in policies to modify their agricultural practices to address climate-related environmental stresses.

4.2. International Influences on Local Adaptation

International influences play an important role in motivating local communities to invest in adaptation. They work through a normative logic and an instrumental logic (115). International normative discourses outline policy templates for governments to follow. As the world society literature suggests (116), coercive, mimetic, and normative isomorphic pressures (117) drive the diffusion of these templates across the world. In this norm-focused perspective, governance units are more likely to follow these templates if they are embedded in the international networks of NGOs and intergovernmental organizations (IGOs) that serve as the conveyor belts for the diffusion process. A promising area for future research is to assess whether these conveyor belts are more effective for mitigation policies versus adaptation templates (with mitigation being more normatively appropriate in relation to adaptation), and within different types of adaptation policies (especially, hard versus soft infrastructures).

To what extent can global diffusion processes penetrate local institutions? National governments are probably most embedded in the global networks of NGOs and IGOs. Subnational governance units, especially in developing countries, typically do not have the standing in inter-governmental organizations, and certainly do not have the resources to attend their meetings. International NGOs also probably focus their policy efforts at the central authority. Subnational governments, therefore, receive these global policy templates via the agency of their national governments. It is less clear how national governments translate these global templates for subnational policy action, a critical issue for adaptation studies because adaptation is supposed to be primarily a local effort.

The global system also provides instrumental incentives for the adoption of global policy templates. Scholars note the role of the European Union in popularizing climate action, the so-called EU Effect, by regulating the access of overseas exporters to its markets (118, 119). But international actors exercise a direct instrumental influence over developing countries via foreign aid. The 1992 UNFCCC had noted developed countries' obligation to assist developing countries in adapting to climate change. The Kyoto Protocol established the Adaptation Fund (1) that has committed \$426 million since 2010 for specific adaptation projects. The various conferences of the parties, the 2009 Copenhagen Accord, and the 2016 Paris Agreement have reaffirmed developed countries' commitment to funding climate adaptation in developing countries. In addition to individual countries, multilateral development banks have pledged billions of dollars for adaptation.

We recognize that there is probably some double counting in these adaptation commitments (because donors have political incentives to inflate their levels of generosity), international financial support for adaptation seems sizeable. Yet, some caveats are in order because it is less clear the extent to which adaptation aid or climate aid is more generally supplanting the development aid. If the "regular" development aid enhances economic, political, and social resilience of communities (soft infrastructure), and climate funding is crowding out development aid, then the net effect of climate aid on climate resilience is less clear. This suggests that to carefully assess the effect of climate aid on adaptation capacities, scholars must adopt the additionality principle: the effect of climate aid over and above development aid. This can pose an accounting and measurement problem if adaptation aid supports hard infrastructure while development aid focuses on soft infrastructure (or vice versa). This brings us back to the question we raised previously: How should both scholars and practitioners measure the "stock" of soft infrastructure or assess how it has enhanced adaptation capacities? With these metrics, the task of adding or subtracting the two types of infrastructure will become easier. We suggest that this is an important area for future research.

Another important area of enquiry is whether international aid enhances or crowds out local resource mobilization efforts via, for example, taxation: After all, if a government can secure resources from abroad, why should it spend its political capital on the unpleasant task of taxing its citizens? This is a subject of the ongoing debate on the relationship between foreign aid and development more generally (120–122). Scholars also debate whether foreign aid undermines good governance by insulating government from public pressure and whether it fosters corruption (123, 124). These debates have also resonated in the climate policy domain. Murtinho et al. (125) examine whether foreign funding crowds out or crowds in local adaptation efforts in the context of autonomous Water User Associations in the Andean communities in Colombia. They report mixed findings: When communities solicit external support, it crowds in local efforts, but when external support is unsolicited, it crowds out local efforts.

Tompkins (126) reports a different finding in the context of the Cayman Islands. She notes that Cayman Administrators have had little prior experience with tackling large-scale weather-related disruptions. Along with physical resilience, they appreciate the need to build up institutional

resilience. These administrators worked on this issue diligently after experiencing Hurricane Gilbert in 1988. Instead of writing it off as a low-probability event, Cayman administrators began to invest in institutional resilience. Tompkins attributed much of this institutional change to external encouragement, primarily from the United Kingdom. Specifically, the Cayman Islands revised its building codes (127) and undertook measures such as increases in waterfront setbacks. Future research should document the extent to which such changes in building codes have taken place in hurricane- or typhoon-prone communities in both the developing and developed world. Additionally, the Cayman Islands annually began producing national-level planning documents, starting with the National Hurricane Plan in 1989. Organizationally, it created new administrative structures, namely the Department of Environment, and sought to actively involve the Ministries of Tourism, Environment, Development, and Commerce in its planning process (although limited to the Cayman Islands' National Hurricane Committee). Tomkins attributes many of these changes to international support, an important factor given that international support often is viewed as imposing international templates that ignore local contextual issues.

5. CONCLUSION

Politics is about who gets what, when and how (29). Political scientists note that policy adoption depends not necessarily on its aggregate benefits and costs (the so-called Kaldor-Hicks criterion), but also on how these benefits and costs are distributed across different actors, sectors, or industries (128, 129). Consequently, policies that impose concentrated costs on few and in the short run, motivate policy losers to organize in opposition to the policy. In contrast, when policies create benefits for many, and these benefits materialize in the long run, the beneficiaries do not have similar incentives to organize in support of the policy. Although this characterization holds for climate mitigation, it might usefully inform the discussions on adaptation as well.

We suggest that climate change adaptation is shaped by a host of factors, including institutional capacities, political dynamics, interest group mobilization, bureaucratic politics, and donor preferences. Governance units face resource constraints in their adaptation planning. Moreover, adaptation projects focused on one climate stressor may crowd out investment in other adaptation priorities. Actors also have different levels of risk perception and vulnerability assessment. We suggest that the type and levels of adaptation investment and the timescale within which they occur, should be viewed as a political choice that actors make in a given economic and institutional context. Consequently, it should not be assumed that adaptation policies will be targeted to improve the resilience of the most vulnerable (or valuable) areas, populations, and activities, or that adaptation policies will not create negative spillovers for other policy domains, actors, or geographies. In reality, adaptation failure will occur alongside adaptation success (130).

Governance units cannot adapt to every conceivable climate risk, certainly not at any reasonable cost (apart from the problems of their bounded rationality). Adaptation, therefore, has financial and political limits. For example, adaptation might require farmers to find new plots of land and herders to find new pastures. But migration-based adaptation poses important policy challenges. For one, there is a finite supply of agricultural land and pastures. Second, migration creates tremendous political and social disruptions, especially in host regions, as the ongoing backlash against migration in various parts of the world suggests. Consequently, limits to specific approaches to climate adaptation ought to be recognized. This should hopefully enhance our motivations to move quickly on climate change mitigation before climate disruption reaches unmanageable levels that even far-reaching adaptation policies cannot address.

Scholars seeking to create inventories of adaptation projects or assess the readiness of a governance unit to climate threats face an unusual problem. Given the highly partisan nature of climate

politics in the United States, an attempt to identify policies with the adaptation label can turn up false negatives. This is because governance units might be willing to undertake adaption (say via disaster management) but not willing to proclaim publicly that they are doing so. On the basis of a survey of 200 local governments in the United States, Romsdahl et al. (131) found that even in conservative “red” states, public officials recognize the disruption caused by climate-induced stressors such as heat waves, irregular precipitation, droughts, and floods. In response, they are investing in adaptation but avoiding the climate label for them. Such below-the-radar stealth adaptation efforts are probably not picked up in national assessment plans or reports. The lesson is that a low policy silence of climate adaptation in “official” documents or statements should not be equated with policy inaction or neglect.

This review also speaks to the broader debate on whether climate adaptation should be mainstreamed; for example, should policies aimed at, for example, economic development explicitly address climate adaptation issues (132)? The core assumption is that economic development enhances the soft infrastructure for improving climate resilience. However, claims about the climate-development nexus need careful scrutiny. Adger et al. (133, p. 193) note that climate change puts the spotlights on competing objectives often subsumed under sustainable development: “Populations ‘at risk’ from climate change impacts range from owners of second-home beach-front properties in Europe and north America to resource-dependent farmers and labourers in Africa and Asia—building adaptive capacity necessarily requires consideration of rights to development and security rather than just avoidance of pertinent risks.”

The role of policy elites and stakeholders in shaping adaptation policies also needs careful examination. As the perceptions about the threat posed by climate change intensify, there will be policy temptation to impose top-down adaptation measures rooted in either technical rationality or economic rationality without adequate local consultation and appreciation of local needs. This will be counterproductive because developing the soft adaptation infrastructure is a crucial pillar of climate proofing efforts. At a minimum, the processes of policy formulation should be inclusive; research shows that individuals oppose policies that they perceive to be procedurally unjust (134). Adaptation advocates must avoid perception that adaptation is an elite project, a perception about environmentalism that some population groups already hold (135–137). The rise of populism across the world, the backlash against the European Union, and the demand for rolling back trade agreements should serve as cautionary tales in this regard.

This is not to say that the community engagement, stakeholder consultation, or collaborative processes are always the best mechanisms for policy formulation and implementation. They are not. For one, collaborative processes can mask considerable power differences among stakeholders (138); the notion of community itself poses conceptual problems (139). What is critical is that scholars and practitioners remain sensitive to the issue of power imbalances and appreciate the incentives for the powerful to “capture” the adaptation projects (140).

Adaptation involves trade-offs, and some policies will probably create negative spillovers across individuals, sectors, geographies, and time horizons. Zero negative spillover policies probably cannot be designed. Adaptation may also clash with other societal objectives: It will be a folly to assume that it is a magic bullet that can improve climate resilience, without compromising societies’ ability to pursue other goals such as economic growth, inclusion, and poverty reduction. Adaptation must, therefore, involve critical scrutiny, and not be treated as a holy cow. In the long run, climate adaptation will be effective, will secure a social buy-in, and will shape social and individual conducts in desired ways, if it is viewed as legitimate, fair, and effective. Many scholars call for climate proofing of development policies (141); we suggest serious attention to political proofing of climate adaptation.

Finally, climate change is portrayed as a global “bad” with negative consequences for people and their communities. Much of the literature on adaptation focuses on assessing climate risk and reducing the vulnerability of communities that face this risk. However, scholars also note that climate change can create economic opportunities (90), and adaptation policies must address this part of the climate puzzle as well. The Arctic presents an important case to study the challenges posed by climate change (142) along with the new economic opportunities it offers. At a political level, the melting of the Arctic is even creating competing claims of sovereignty, including a movement for autonomy in Greenland (143). As world powers compete to assert their claims over the Arctic, they are investing in hardware such as a new icebreaker fleet to secure benefits from the thawing of the Arctic. But beyond the frontier politics of the Arctic, climate change adaptation can create new economic opportunities in new and interesting ways. Biesbroek et al. (58) note that the Netherlands’s NAS focuses on the possibility to leverage Dutch technical expertise on water and coastal engineering as an important “product” for exports. The NAS of several northern European countries note the opportunities to invest in new infrastructure to take advantage of a longer growing season and higher levels of agricultural productivity.

To conclude, climate adaptation is supposed to pose fewer policy challenges in relation to climate mitigation, given its local benefits. However, governance units reveal remarkable variations in their response to the adaptation challenge. Some of their projects may not cohere with the typical prescriptions of scientific and economic rationality. However, there is a logic to these variations, which is better understood by bringing politics into the study of climate adaptation.

SUMMARY POINTS

1. Climate action has two pillars: mitigation and adaptation. Mitigation faces collective action issues because its costs are concentrated on specific locations/actors but benefits are global and nonexcludable. Adaptation, in contrast, creates local benefits and therefore should face fewer collective action issues.
2. Adaptation, however, faces its own set of policy challenges. There is no template for optimum adaptation. Governance units adopt different adaptation policies because they vary in (a) their perceptions of climate risks, (b) policy priorities, (c) resources availability, and (d) institutional competence and organizational politics.
3. Soft adaptation faces political problems because policy makers have electoral incentives to favor hard, visible adaptation over soft adaptation. It also faces implementation challenges because the concept of soft adaptation is open ended, and its salient dimensions may be in conflict with one another.
4. Adaptation has a scale mismatch problem: It is often implemented at the local level but much of the planning and resource availability is concentrated at the national level. The availability of climate funds, often from international donors, may incentivize local governance units to repackaging disaster management as adaptation.
5. Adaptation policies might lead some actors to believe that climate issues have been addressed, and they may even begin to adopt more carbon-intensive approaches, the so-called rebound effect.
6. Maladapted projects reduce climate vulnerability of a governance unit in the short run. But they may erode its climate resilience over time, or those of other units, sectors, and geographies that face spillover effects.

FUTURE ISSUES

1. How should governance units prioritize different climate risks in order to plan their adaptation investments? Whose voices and perceptions should count in this risk evaluation process?
2. Adaptation investments might crowd out other policy priorities. Improved climate resilience could compromise societies' ability to pursue other goals such as economic growth, inclusion, and poverty reduction. How should such policy trade-offs be assessed?
3. Given much of adaptation in developing countries depends on foreign aid, how might adaptation policies incorporate lessons of both aid failure and aid success?
4. How should governance units find a balance between investments in mitigation and adaptation?

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