

# The Most Important Topic Political Scientists Are Not Studying: Adapting to Climate Change

Debra Javeline

Few, if any, political scientists currently study climate change adaptation or are even aware that there is a large and growing interdisciplinary field of study devoted not just to mitigating greenhouse gas emissions but to reducing our vulnerability to the now-inevitable impacts of climate change. The lack of political science expertise and research represents an obstacle for adapting to climate change, because adaptation is fundamentally political. Technical advances in adaptations for infrastructure, agriculture, public health, coastal protection, conservation, and other fields all depend on political variables for their implementation and effectiveness. For example, adaptation raises questions about political economy (adaptation costs money), political theory (adaptation involves questions of social justice), comparative politics (some countries more aggressively pursue adaptation), urban politics (some cities more aggressively pursue adaptation), regime type (democracies and authoritarian regimes may differently pursue adaptation), federalism (different levels of government may be involved), and several other fields of study including political conflict, international development, bureaucracy, migration, media, political parties, elections, civil society, and public opinion. I review the field of climate change adaptation and then explore the tremendous contributions that political scientists could make to adaptation research.

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The world is being transformed by climate change.<sup>1</sup> Without human intervention, hundreds of thousands of species are threatened with extinction; infectious diseases are emerging in new areas; ecosystems on which humans depend for food, water, and clean air are increasingly dysfunctional; and urban environments are at risk from rising seas, storm surge, heat waves, and the resulting harmful effects on public health and critical infrastructure.<sup>2</sup> Even if today all countries could somehow immediately reduce greenhouse gas emissions, existing emissions guarantee considerable climate change, and that climate change has considerable impact.<sup>3</sup>

Although we need to continue mitigation efforts (steps to reduce emissions) to minimize the damage, the unfortunate reality is that we also must learn to live in a world transformed by climate change. Countries, states, cities, communities, businesses, and individuals are now compelled to develop strategies that allow societal “adaptation” to inevitable climate change. Adaptation, according to the Intergovernmental Panel on Climate Change (IPCC), is the reduction of vulnerability to climate change.<sup>4</sup> Adaptation involves protecting our coasts, cities, water supply, food supply, public health, ecosystems, and infrastructure. While not an alternative to mitigation, adaptation has become a crucially necessary accompaniment and a growing interdisciplinary field of study.

This new critical field, climate change adaptation, is currently populated by climate scientists, ecologists,

NGOs, environmental lawyers, urban planners, engineers, computer scientists, development experts, resource managers, and policymakers. Political scientists have been largely absent from the conversation, despite the importance of the topic and the need for their contributions. Many of the most pressing questions about adaptation are less about science and more about political, social, and economic behavior and the institutions that facilitate or obstruct that behavior—questions that political scientists are uniquely trained to answer. Such questions include why some people, land, infrastructure, and ecosystems get protected but not others, why some protective mechanisms are chosen over others, and how we can account for variation in the sources and quantities of funding for protection.

Environmental research, broadly conceived, is an increasing presence in political science. The subfields of international relations and political theory are probably the biggest contributors to the general environmental literature. Scholars of international relations have focused on institutions, negotiations, and policies between nations that affect global environmental outcomes,<sup>5</sup> including our current lack of progress in mitigating climate change.<sup>6</sup> Scholars of political theory have focused on questions of social justice and the relative responsibilities of different nations, social groups, and generations for mitigating climate change and the rights of victims of climate change to compensation.<sup>7</sup> In comparative politics, scholars in and outside the field have contributed cross-national studies of domestic environmental politics, such as disaster management and recovery,<sup>8</sup> domestic mitigation efforts,<sup>9</sup> and the domestic impacts of climate change.<sup>10</sup> Scholars of American politics have contributed a large literature on American environmental politics and decision making,<sup>11</sup> including our largely-failed climate policy efforts<sup>12</sup> and public opinion about those efforts.<sup>13</sup>

Yet even with the expansion of research relevant to climate change mitigation, there is little acknowledgment of the separate and increasingly important field of climate change adaptation. Adaptation, as I will describe, is not and should not be a small subfield of environmental politics; if anything, it is a large and growing superfield that connects almost all existing fields of political science. When we talk about adapting to climate change, we are talking about everything from urban politics to international development, public opinion to national security, interest groups to federalism to a variety of other seemingly disparate fields. The need to adapt to climate change will affect nearly every political decision in the coming decades, making adaptation relevant to political parties, elections, civil society, business and politics, and most other political phenomena as citizens and political officials grapple with changing conditions.

Some political scientists are beginning to recognize these connections. On occasion, the distinct topic of adaptation has been mentioned by international relations scholars discussing the new international institutions

designed to help fund adaptation in the least developed countries,<sup>14</sup> by scholars of the European Union interested in adaptation strategies within and across member states,<sup>15</sup> and by political theorists who appreciate the numerous justice questions that surround adaptation funding and implementation.<sup>16</sup>

Beyond these cases, we are hard pressed to find even passing reference to adaptation. A search of the 152 political science titles in JSTOR using the phrases “climate change adaptation,” “adapting to climate change,” and “adapt to a changing climate” as of May 2013 reveals a single article that has such a phrase in the title, a 2010 *Policy Sciences* article on alleviating flood impacts in Australia.<sup>17</sup> A full-text search on the same key phrases reveals 41 articles, most published in non-mainstream journals and including little more than the phrase “adaptation” with no meaningful discussion or analysis and sometimes having only a tangential connection to the topic.<sup>18</sup> Indeed, to call any of the articles “adaptation research by political scientists” would be misleading. Only a single article—Robert Keohane and David Victor’s “The Regime Complex for Climate Change,” published in *Perspectives on Politics*—goes beyond mentioning the phrase “climate change adaptation” and includes some discussion.

With the level of heat-trapping carbon dioxide in the atmosphere having just surpassed an average daily level of 400 parts per million in May 2013,<sup>19</sup> and with adaptation occupying more and more of the political discourse in important forums such as the forthcoming IPCC Fifth Assessment Report and the forthcoming US National Climate Assessment Report,<sup>20</sup> discussion of adaptation by political scientists must become more frequent and central to our discipline. We must continue discussing greenhouse gases and policies, but we must also seek to understand the urgent and directly political questions surrounding where people live, whether they are safe from disease and disaster, whether the land, water, and air can provide for them in their current locations, and what, if anything, is being done when the answer is “no.”

Here I make the case for political scientists from all subfields to contribute to climate change adaptation research and advance the adaptation conversation in mainstream political science. Recognizing that political scientists are more likely to engage in needed research if the startup costs are lowered, I first summarize the most essential scientific points about climate change, climate change impacts, and adaptations. I then describe how scholars with different specialties could apply their knowledge to help the world adapt to climate change while using adaptation to illuminate research questions and test hypotheses. Political scientists who seek theory-driven research questions with practical and even urgent implications will find a wealth of opportunity in the study of adaptation. The goal is to define a research agenda on the politics of adapting to climate change.

## Adaptation 101 for Political Scientists

Political scientists could participate actively in adaptation research without undertaking a lengthy course of study in climate science or ecology, in much the same way that political scientists study political economy without becoming economists. There are many short volumes that provide sufficient introduction to climate change, its impacts, and potential adaptations, with the most authoritative and useful being the IPCC's Summary for Policymakers.<sup>21</sup> Here I briefly review the most essential scientific findings that political scientists might need to know in order to assess where their own contributions could be most meaningful.

### *Climate Change Basics*

Most major impacts of climate change follow from a few basic scientific and historical facts.<sup>22</sup> First, human emissions of carbon dioxide, nitrous oxide, methane, and other greenhouse gases have increased dramatically since the beginning of the industrial age when humans became dependent on burning fossil fuels for comfort and economic gain and on large-scale changes in land use such as deforestation, urbanization, waste management, and industrial agriculture. Second, these excess greenhouse gases trap thermal infrared radiation (heat) in quantities that exceed the historical equilibrium and enhance the greenhouse effect, causing the atmosphere and the earth's surface to warm. The earth has *already* warmed almost 1°C in the last 100 years—this is a fact well established by empirical evidence<sup>23</sup>—and projections for future warming range from 1–6°C, based on different “emissions scenarios,” with previously unthinkable projections becoming more and more likely as new data accumulate.<sup>24</sup>

Third, and very relevant for understanding climate impacts, warmer air holds more water. Fourth and similarly relevant, warmer air warms the oceans, and warmer ocean water expands. Fifth, excess carbon dioxide in the atmosphere gets absorbed by ocean water and turns the oceans more acidic, potentially more acidic in the coming centuries than in the past 300 million years.<sup>25</sup> Climate science is certainly more complicated than my summary of these five facts can convey, but these facts are sufficient for political scientists to understand the impacts that follow, their urgency, and their relevance to politics.

### *Climate-change Impacts*

Why should we care about higher temperatures? Higher temperatures increase evaporation and the amount of moisture held in the now-warmer atmosphere. The evaporation and higher atmospheric water content culminate in increased rainfall, but the rainfall is not uniform. Some areas experience drought and losses in soil moisture, which in turn leads to reduced crop yield, reservoir depletion, hydroelectric interruptions, other

power shortages, land degradation, economic loss, diminished livelihood opportunities, hunger, and even desertification, famine, and human dislocation.<sup>26</sup> Other areas experience heavy rainfall and major floods, which in turn can lead to increased soil erosion, turbidity, water pollution, toxic mold, water-borne gastrointestinal illness and other disease, and death. Heavy precipitation also increases power outages and puts at risk commercial and residential real estate, transportation infrastructure, oil and gas infrastructure, and other assets. Some areas experience both droughts and floods. For example, they alternate between dry and rainy seasons, or they are downstream of rapidly melting glaciers that threaten to flood and then cause freshwater dams and reservoirs to run dry.

Higher temperatures also cause the sea level to rise. A warmer atmosphere warms the ocean, which in turn increases in volume in a process known as thermal expansion. Melting glaciers, ice caps, and ice sheets also contribute to the increased ocean volume, and once huge amounts of ice melt and dark water replaces shiny white ice, surface reflectivity is reduced, which only serves to accelerate warming and sea level rise. During the twentieth century, the global average sea level rose about 15–20 centimeters, and the IPCC estimates a continued global average rise of between .2 and .6 meters in the next century, threatening many populous metropolitan areas.<sup>27</sup> A rising sea contributes to coastal erosion, wetland and coastal plain flooding, salinization of aquifers and soils, and loss of habitats for fish, birds, plants, and other wildlife, not to mention humans who will lose fresh water supplies. Sea level rise, like rainfall, is not uniform around the globe, meaning that some species, ecosystems, and coastal communities are affected more severely than others. In the case of future potentially uninhabitable island-states, climate-induced sea level rise threatens not simply lifestyles but state sovereignty and citizenship.

Higher temperatures increase the severity of extreme weather events and natural disasters. Given that the warmer air holds more moisture and the warmer sea rises, when hurricanes, cyclones, and other natural disasters hit, there is more water in the atmosphere to pour down, and the sea has less distance to travel before wreaking havoc. While scientists debate whether climate change has increased the number of extreme weather events, most agree that climate change has contributed to the greater scope, intensity, and destructive power of recent hurricanes, tropical cyclones, fires, and other otherwise “natural” events.

Higher temperatures by themselves and in combination with low moisture, sea level rise, flooding, or extreme weather events have impacts on human health and infrastructure. When higher temperatures are relentless (“heat waves”), they increase the likelihood of dehydration, kidney failure, respiratory disease, and death, and they can overtax hospitals, emergency services, and health

care budgets. Higher temperatures increase the range and reproductive frequency of insect-borne diseases such as malaria, dengue, West Nile, and Lyme, as well as the incidence of air and water pollution and associated diseases such as asthma and cholera. By drying crops, reducing agricultural productivity, and thus driving up food prices worldwide, higher temperatures can exacerbate malnutrition and poverty.<sup>28</sup> By increasing evaporation and drying soil and plant life, higher temperatures increase the likelihood of wildfires and their accompanying human and economic costs in evacuations, property loss, fire-fighting resources, and death, in addition to the tremendous natural value of lost forest and its carbon-capturing abilities. Tropical cyclones expose about 120 million people each year to hazards and kill more than 12,000 people a year.<sup>29</sup> As human settlements continue to expand into already vulnerable coastal areas, destruction is expected to increase. All of these impacts increase climate-induced human migration and displacement, which again increases disease risk as more people clump together in urban slums.

Higher temperatures cause things to melt or expand—important things, like railroad tracks, roads, and other infrastructure that are now stressed beyond their design limits.<sup>30</sup> Metals suitable in the historical climate can expand and kink in higher temperatures and cause trains to derail; previously suitable but now softened asphalt can cause aircraft to stick; and hot, dry soil can shrink and lead highways to buckle or crack, creating road hazards and costing thousands or even millions of dollars to repair. In some areas, higher temperatures cause the ground itself to melt. Permafrost, permanently frozen subsoil, remains intact at 32°F (0°C) or lower, but just a few degrees of warming turns the soil mushy and unstable, causing ground collapse, landslides, and “drunken forests.” The resulting “thermokarst” no longer provides solid support for houses, buildings, pipelines, highways, railroads, and other infrastructure.<sup>31</sup>

Higher temperatures lead to species extinction and ecosystem dysfunction.<sup>32</sup> The relationship is both direct and indirect, since climate change impacts like desertification reduce habitat for endangered plants and animals and threaten their survival, and many species, such as those with restricted diets (“specialized predators”) or those living on mountaintops or islands or near cities, farmland, or other human-made barriers, are unable to adjust on their own by evolving or moving to new locations. This is the plight of the climate change poster species, the polar bear. Higher temperatures affect lifecycles and the availability of nutrients, especially for species at the bottom of food chains, such as plankton and coral, which then triggers reactions up the food chain and threatens entire ecosystems.<sup>33</sup> It does not take much warming to induce this effect. A mere 1–2°C increase over the usual summer maximum temperature causes coral bleaching and the losses of potentially thousands of fish and marine creatures

that feed off the coral, as well as the use of corals and reef animals and plants for medicinal purposes and tourism.<sup>34</sup>

As with most climate change impacts, these losses are not distributed evenly, and crucial ecosystems such as coral and mangroves—and the communities that depend upon them—suffer sooner and more extensively than others. Even where extinction is not the main risk, species may decrease in abundance, threatening fish stocks, timber supply, pollination, and other ecosystem provisions for humans. Subsistence farmers and communities directly dependent on fisheries and agriculture are most affected by these ecosystem changes.<sup>35</sup>

For marine life, the effects of higher temperatures are compounded by the effects of increased ocean acidity. Acidification reduces the water’s content of calcium carbonate and hampers the shell-building, growth, and reproductive capacity of shellfish, crustaceans, mollusks, and species of plankton and coral that are critical to food chains. At even low projections of acidification, coral skeletons begin to dissolve, and reefs fall apart.<sup>36</sup> The inability of plankton to maintain their shells could threaten their survival in some areas and lead to the collapse of entire ecosystems.<sup>37</sup>

### *Adapting to These Impacts*

People often respond to climate change impacts by coping, or employing short-term remedies to immediate problems. For example, victims of food shortage may receive humanitarian assistance, or victims of flooding might seek shelter at higher elevation, wait for the flood to recede, and then begin the process of cleanup and rebuilding. Adapting to climate change differs from coping. Adaptation is a more permanent change—a change in “business as usual”—that results in a community’s reduced vulnerability to future climate change impacts. Perhaps a community begins to acquire its food differently, regardless of whether an acute crisis is predicted, or perhaps the community elevates infrastructure, builds new infrastructure such as seawalls, or relocates.

Just a few years ago, policymakers, environmentalists, and even scientists avoided talking about adaptation and focused exclusively on mitigation. The concern was that such discussions seemed defeatist or accepting of climate change. If human and natural systems are adaptable, then perhaps the climate change deniers would have further ammunition to stymie mitigation efforts. Perhaps, too, adaptation discussions might give the false impression that adaptation is easily attainable. At the level of the United Nations, policymakers feared endorsing a course of action without the financial assistance such action would require.<sup>38</sup>

Increasingly, the call for adaptation research and policy has grown. While mitigation continues to be the primary concern, adaptation is now seen as a crucial accompaniment. Chief among the many reasons is that temperature

change is a reality that even the most intense mitigation efforts now cannot stop. The greenhouse gases already emitted into the atmosphere “commit” the planet to further warming and the oceans to centuries of thermal expansion. Even in a best-case scenario, the world must adapt.<sup>39</sup>

However, most if not all adaptation strategies are controversial. Because we are living in a “no analog future,” tremendous uncertainty surrounds the costs, benefits, and potential effectiveness of most adaptation decisions. In best-case scenarios, adaptation strategies still often involve high costs such as the expense of building and maintaining seawalls and irrigation systems or relocating entire human populations of soon-to-be-engulfed island nations, communities in vulnerable coastal cities such as Mumbai or Dhaka, or even small villages in Alaska.<sup>40</sup> In worst-case scenarios, measures ostensibly designed to reduce vulnerability may end up increasing vulnerability and become “maladaptations.” For example, irrigation may encourage the continuation of agriculture in arid locations with unreliable water sources that cannot sustain agriculture in the long term. Levee construction or insurance practices may encourage more people to underestimate their risk, move to flood-prone areas, and even build new homes and infrastructure directly in harm’s way—the so-called “levee effect.”

The controversies—and the politics accompanying the controversies—present obstacles to action. Despite the heightened awareness and increased conversation about the critical need to adapt, very little adaptation has actually been implemented anywhere in the world.<sup>41</sup> It is especially telling that the city known for having one of the best climate-preparedness plans in the world, New York City and its PlaNYC,<sup>42</sup> is not prepared and recently suffered billions of dollars of losses from Hurricane Sandy.

One potential route to minimize the controversies and facilitate action would be in the provision of knowledge about adaptation. However, little is known so far about the potential effectiveness or harm of various adaptations and the causes of variability in effectiveness.<sup>43</sup> Even less is known about how adaptations come to be—how governments or publics come to accept the need to adapt to climate change and move from acceptance to action.<sup>44</sup>

### **A New Interdisciplinary Field, Minus Political Science**

Scholars in a variety of fields are trying to address this knowledge deficit. There is tremendous dialogue among climate scientists, ecologists, legal scholars, urban planners, engineers, architects, public health experts, geologists, hydrologists, agronomists, economists, computer scientists, development experts, and more. Climate change adaptation is thoroughly interdisciplinary.

However, to date, the field of political science has contributed virtually nothing. Our absence is noteworthy

and problematic because most adaptation questions are fundamentally political,<sup>45</sup> and political scientists possess tools of analysis that make them uniquely equipped to contribute vital insights. For example, an engineer can decide where to build a seawall to best protect a city from sea level rise, and an engineer combined with a climate scientist might determine how high to build the seawall, how thick, and with what material and what procedure. The engineer, however, does not decide *whether* to build the seawall—a question that involves political officials and the people who vote for them, as well as political institutions, the economy, and other factors that potentially constrain or facilitate action.<sup>46</sup>

We know this even about mitigation. Climate scientists can employ the most sophisticated analyses of General Circulation Models (GCMs) to project future global mean temperatures, but those models are really a function of politics. If today, the US Congress and other legislatures around the world issued currently unthinkable laws rationing gasoline or restricting driving, greenhouse gas emissions would be reduced, and the margin of error in the GCMs would decrease because of new information guiding the “emissions scenario.” The 2008 Olympics in Beijing hinted at this possibility: The Chinese restricted diesel truck traffic, limited automobile traffic, shut down heavily polluting factories, raised auto fuel emission standards, and halted construction, and as a result, carbon dioxide emissions in Beijing were 47 percent lower than the year prior.<sup>47</sup> Politics explains much of what the GCMs can’t.

Consider even something as seemingly apolitical as nature. To some extent, species extinction is a political decision. Do we allow species to go extinct, or do we implement wildlife adaptations to try to save them? If we try to save them, how do we decide which ones? Given estimates of Earth’s biodiversity of 5 to 80 million species,<sup>48</sup> and given projected extinctions between 9 and 40 percent, or one-half to eight million of those species,<sup>49</sup> such decisions will involve only a few winners and many losers, making the decisions highly controversial. Assuming we succeed at selecting species, how do we decide on adaptation strategies? These decisions too are highly controversial, given the spatial and financial demands of most forms of conservation and the competition of conservation goals with the other societal goals for a human population predicted to reach 9 billion by the year 2050. Whatever decisions are made will require bargaining and trade-offs and most likely laws, public financing, and leadership—that is, politics.

Changing crops or diversifying crops as an agricultural adaptation is also extraordinarily political. In the US and elsewhere, farmers choose their crops based largely on subsidies and other political incentives, which in the US leads them to emphasize corn and to a lesser extent cotton, wheat, rice, and soy. Climate change adaptation is

not as simple as saying “change which crops you grow” and having this outcome materialize. Lawmakers must agree which crops to subsidize in the new climate, and they must negotiate with lobbyists and each other and “sell” any new farm bill to constituents.

Politics also play a decisive role in coastal adaptations, especially those involving the possibility of coastal retreat. Research in geology, oceanography, economics, and other fields may show that moving away from the coastline is the only available long-term option for some coastal communities, but such research is unlikely to encourage relocation. Residents are often invested in their communities, financially, socially, culturally, and emotionally, and they may resist the science-based advice to move. Opposition to a perfectly scientific and sensible solution to climate change impacts is not a salient research topic for most geologists, but it can be for many political scientists.

Even the most severe climate change impacts that may have advanced beyond our capacity to adapt can still be the subject of important political science research. For example, if coral reefs are truly beyond conservation,<sup>50</sup> we may then allocate funds not to saving ecosystems but to economic structural adjustment for communities and industries that depend on coral reefs and to studying how these new ecosystems could provide food and other ecosystem goods and services. If higher temperatures and accompanying water shortages make nuclear reactors too risky in certain locations,<sup>51</sup> we might consider alternative sources of energy. Political scientists could contribute to our understanding of how these political decisions get made, how the decisions vary across countries and other geopolitical units, and the implications of these decisions for the environment, electoral outcomes, and other ecological and political variables.

### **Bringing Political Scientists to the Table**

Almost every subfield of political science has potential relevance for climate change adaptation. Table 1 presents a dozen or so such subfields, as well as examples of research questions that specialists in these subfields could address. Together, these represent a huge untapped opportunity for political scientists to contribute to the adaptation literature. The table is by no means exhaustive, and there are undoubtedly other important applications of political science to climate change adaptation research. Also, while the table suggests ideas for research within conventionally-defined subfields, the multifaceted nature of climate change and its impacts often demands research that bridges subfield and methodological divides. To expand on a few of these ideas, we now turn to examples from four subfields and their currently unaddressed research questions.

#### ***Comparative Politics***

Specialists in comparative politics could address the question, “Why do some countries adapt to climate change better than others?” Country-level adaptation

questions are important because climate change impacts such as a flooding river or a drying water supply often cross local or regional jurisdictions, and political decisions to adapt must therefore often happen at higher administrative levels or not happen at all.<sup>52</sup> The national government often plays a role in policy formation, policy enactment, stimulating innovation, and research funding. If any government level is going to identify vulnerabilities throughout the country and coordinate a plan of action, it will probably be the national level.<sup>53</sup>

The relative adaptation performance of countries is acknowledged in the so-called “grey literature” (literature that may originate from government agencies, think tanks, or non-governmental organizations but is not commercially published), but the subject is not systematically studied. Adaptation specialists often describe the United States as a laggard among developed nations, due to our lack of a comprehensive national adaptation strategy that assesses our nation’s vulnerabilities and offers strategies for reducing them.<sup>54</sup> There is a fair amount of adaptation planning in the United States at the state and city levels but no national-level adaptation mandate, grand master plan, or funding, let alone national-level action. Conversely, adaptation specialists usually describe the United Kingdom and the Netherlands as adaptation leaders, partly because they—along with Germany, Portugal, Spain, France, Belgium, Denmark, Switzerland, Hungary, Sweden, and Finland—have adaptation plans at the national level, often referred to as National Adaptation Strategies.<sup>55</sup>

Because these National Adaptation Strategies are reasonably accessible, adaptation planning receives more attention than actual adaptations. At times, the (non-political science) literature seems to conflate the plans with actual adaptations, despite the absence of empirical evidence that adaptation plans translate more quickly and efficiently into adaptation implementation and can serve as reasonable proxies for adaptation.<sup>56</sup> A rare recent study moves in the right direction by focusing on activities rather than potentially unfilled plans,<sup>57</sup> but to my knowledge, no study as yet has attempted the more labor-intensive work of determining which countries have reduced their vulnerability to specific climate impacts such as heat waves, drought, coastal erosion, or disease outbreak, and no study systematically analyzes the causes of variability in adaptation and thus allows us to understand and learn from success.

Within the developing world, a potential source of information for cross-national comparative analysis is the National Adaptation Programmes of Action (NAPAs) from 47 Least Developed Countries as of January 2012.<sup>58</sup> Like the NAS of the developed world, many of the NAPAs represent plans more than actual adaptations, but there is the possibility to compare projects in specific economic sectors and country priorities across sectors. Outside these clusters of countries—the European Union and Least Developed Countries—few if any one-stop-shopping sources of information exist that

**Table 1**  
**Political science research questions on climate change adaptation**

Subfield	Sample Research Questions
Comparative politics	Why do some countries adapt to climate change better than others?
Regimes and regime change	Do democracies adapt better than authoritarian governments, or vice versa?
Foreign assistance	Is climate change adaptation in developing nations facilitated by international actors? If so, which circumstances are conducive to effective aid?
Urban politics	Why do some cities adapt to climate change better than others?
State politics/subnational governments	Why do some states take greater initiatives than others? Why do some states work together on adaptation issues? Why do some state adaptation plans get implemented while others do not? Of the implementations, what accounts for variation in success?
Federalism	How do center-periphery relationships or the presence of multiple layers of governance affect adaptation? Is there is an optimal allocation of adaptation tasks between different government levels?
Bureaucracy	How can the problems of regulatory fragmentation be minimized for adaptation? How can institutions be structured to help governments and publics best adapt to climate change? Is mainstreaming or centralizing adaptation efforts the most effective institutional approach?
International development	What is the effect of development on adaptation and adaptation on development? Can poverty reduction and the reduction of vulnerability to climate change be jointly pursued, and if so, how?
Business and politics	Why do some businesses adapt to climate change better than others? What is the role of government in encouraging or discouraging the private sector to take adaptation action? What is the most effective mixture of market and government responses to climate change?
Political economy	How can the value of nature or natural capital be incorporated into adaptation decision making?
Political theory	How do we justly allocate the burdens and benefits of climate change adaptation between the developed and developing world, the wealthy and poor (especially indigenous peoples), current and future generations, men and women, and humans and non-humans?
Public knowledge, opinion, and behavior	What accounts for public awareness of adaptation options, opinions on those options, and public willingness to support adaptation policy and to implement individual adaptations?
Media	What is the content and message of adaptation reporting? Does adaptation reporting vary cross-nationally (or even between states and cities in the same nation), and if so, what are the effects of this variation?
Social capital	When does social capital have positive versus negative implications for adaptation?
Civil society	What are the causes and implications of limited civil society involvement in adaptation?

(continued)

**Table 1**  
**Political science research questions on climate change adaptation (continued)**

Subfield	Sample Research Questions
Interest groups	What is the role of the carbon-intensive industry lobby, environmental organizations, and other interest groups in adaptation policymaking and implementation?
Elections	What, if any, are the incentives for office-seeking politicians to promote adaptation over time? Under which circumstances might voters reward an incumbent for planning and implementing adaptation or vote a candidate into office specifically on the promise to adapt? Under which circumstances might politicians lead voters by raising awareness of climate change impacts and “selling” adaptation policies?
Political parties	Does partisanship drive adaptation decision making? What is the influence on adaptation of a viable green party, other minority parties, a strong or weak left wing party, rules of the electoral system, a two-party versus multi-party system, and a presidential versus parliamentary system?
Political conflict and national security	Can climate change adaptation diminish the likelihood of conflict and increase national security, and if so, under which circumstances? Which adaptations hold the greatest promise of reducing or resolving conflict versus causing or enhancing conflict?
Human migration and displacement	How can climate change migration be governed and managed effectively so that humanitarian crises are minimized and conflicts are avoided? How will relocations be funded, and if they are not funded, what becomes of climate refugees and the health and financial systems where they migrate?
Political methodology	When is it appropriate to measure whether adaptation objectives have been met? What is the proper unit of measurement for successful adaptation –money saved, lives saved, quality of life preserved, or some other metric? Is it possible to compare adaptation effectiveness across sectors in order to facilitate decision making?

would allow comparison of adaptation efforts and results across countries. The need for such a database is strong, especially one that is regularly updated to monitor adaptation progress in every country of the world, including national-level legislation, commitment or disbursement of funds, implementations, specific dates, specific amounts of money, and which agencies do the organization and implementation. Political scientists could use their skills to fulfill this need.

***Public Opinion and Behavior***

Opinion research on public concern about climate change is reasonably available and shows that most people know that the climate is changing,<sup>59</sup> but they perceive climate change as a spatially and temporally remote risk:<sup>60</sup> “It will affect future generations and other countries, but not me personally, my generation, or my locale.” Opinion research on adaptation, however, is extraordinarily rare, even in the face of recent disasters such as Hurricane Sandy, which have communities and their leaders scrambling to decide how to rebuild.

Such research by scholars of public opinion, political behavior, and political psychology is urgently needed, because public opinion on adaptation matters. Adaptations are expensive and may require raising taxes or other forms of public finance that could be the subject of electoral debate, and adaptations sometimes involve direct changes in individual behavior such as preventive maintenance on homes, purchasing insurance coverage, relocating, responding to early warning systems, changing agricultural practices, or supporting legal measures to protect climate-threatened species, behaviors which could be influenced by opinions.<sup>61</sup> The limited research to date suggests that awareness of climate change impacts is somewhat correlated with adaptation action. For example, awareness of flood risks associated with climate change leads to a greater willingness to pay for flood-protection measures, such as raising electrical fixtures, putting in door guards, and replacing wood staircases with concrete.<sup>62</sup> However, I am not aware of any research that investigates adaptation awareness and opinions on a larger scale and asks, for example, whether



New Yorkers are prepared to spend billions on a flood protection barrier and, if so, who they believe should foot the bill. Such studies would amount to much more than opinion polling; they could contribute to research on collective action, social choice, public choice, and other fields.

Public opinion and behavior studies could also help illuminate the barriers to adaptation on the public side—barriers that are hypothesized in the grey literature and the much smaller scholarly literature but that are currently untested. These hypothesized barriers include poor communication, poor transportation, illiteracy, and other factors that limit information and knowledge about adaptation and how to reduce vulnerability;<sup>63</sup> feeling powerless, overwhelmed, in denial, apathetic, or fatalistic;<sup>64</sup> competition with other values, emotions, and priorities such as fear of change or love for one's hometown and lifestyle;<sup>65</sup> differing perceptions of risk;<sup>66</sup> differing perceptions of public versus private responsibility for adaptation;<sup>67</sup> poverty, the inability to borrow, inconvenience, the unavailability of technological alternatives, and other structural limitations to adaptive behavior;<sup>68</sup> and basic civic disengagement and disinterest in politics.<sup>69</sup> Mechanisms for increasing public motivation to adapt are hypothesized to include the media, social networks, civil society organizations, educational programs, outreach campaigns such as agricultural extension services, and public awareness campaigns about threats to wildlife.<sup>70</sup> Both the hypothesized barriers and the hypothesized mechanisms to overcome the barriers could be systematically tested by political scientists specializing in various dimensions of mass politics.

### ***Political Parties***

Specialists in political parties could contribute to understanding the extent to which partisanship drives decision making on adaptation. On the one hand, adaptation leaders in the United States can be found not just among Democrats and liberals but among prominent Republicans such as California Governor Arnold Schwarzenegger, extreme conservatives like Alaska Governor Sarah Palin, and independents such as New York City Mayor Michael Bloomberg, suggesting that there are few meaningful partisan differences on adaptation. On the other hand, US political parties are quite polarized about climate change itself and mitigation,<sup>71</sup> and it is plausible that this polarization extends to adaptation.

Party polarization is a subject for cross-national study as well. Like in the United States, parties in Australia reduce climate science to an ideological debate, whereas climate science in Germany receives bipartisan acceptance and respect.<sup>72</sup> Again, whether party polarization about mitigation extends to adaptation is currently in need of research. Other potentially fruitful areas for cross-national research include the influence on adaptation of a viable green party or other minority party; a strong or weak left wing party; the rules of the electoral system; two-party

versus multi-party systems; and presidential versus parliamentary systems. While to my knowledge no literature exists on these topics in reference to adaptation, specialists in political parties could look to the more general literature on parties and the environment.<sup>73</sup>

### ***Political Conflict and National Security***

Many specialists in political conflict predict that climate change and its accompanying drought, food insecurity, and stress on state capacity will increase the likelihood of communal violence, ethnic violence, rebellion against the state, internal or civil war, and interstate conflict.<sup>74</sup> The conflicts themselves, as well as the diversion of military forces from external defense to domestic disasters and the direct threats to military bases from rising seas and extreme weather events, lead many to suggest that climate change poses a national security risk.<sup>75</sup> Moreover, conflict can erode the capacity to adapt to climate change. It can deplete human resources, destroy infrastructure, exhaust natural resources, undermine social networks, weaken government institutions, shift resources to military use, stifle economic development and innovation, and prevent collaboration and information-sharing on climate change.<sup>76</sup>

Conflict therefore diminishes the likelihood of adaptation. The pressing question for scholars of political and violent conflict is just the reverse: Can adaptation diminish the likelihood of conflict and increase national security? Two types of adaptations are at issue. One involves non-military adaptations in a variety of economic sectors, with the question being whether the reduction in vulnerability to climate change also reduces the potential for conflict. Does the protection of livelihoods and natural resources from the impacts of climate change preserve peace?<sup>77</sup> Or could adaptations that influence contiguous locations, such as coastal protection, irrigation, or river diversion, actually create or enhance conflict?<sup>78</sup> A second type of adaptation is specifically related to security: security adaptations, or reductions in the vulnerability of military or domestic police forces to climate change. The question here is whether reducing the military's vulnerability to climate change by, for example, weatherproofing military installations or incorporating climate modeling into military preparations reduces the potential for conflict and enhances security.

Specialists in conflict and national security could make very constructive contributions to adaptation studies by investigating which adaptations hold the greatest promise of reducing or resolving conflict and which hold the greatest promise of causing or enhancing conflict. They might also investigate the possible conditionality of adaptation impacts. Are there circumstances where adaptation provokes conflict and other circumstances where the same adaptation does not provoke conflict?<sup>79</sup> Finally, specialists might identify the barriers to military adaptations, as well as barriers to those non-military adaptations that have implications for conflict-resolution and national security.

## Conclusion

Adaptation studies sorely need the contributions of political scientists from almost every subfield. Political scientists do not need to gain much additional expertise to make these contributions. Plenty of ecologists, geologists, engineers, and other non-political scientists are working on climate change adaptation and drawing on their expertise in relevant ways, and there is no need to duplicate that expertise. Instead, we need to fill a huge gap. It is our own expertise in politics that is lacking and should be applied to the many critically important and unanswered political questions about adaptation.

Mitigation studies too could benefit tremendously from the involvement of political scientists with relevant expertise. The argument here is that political scientists who do not see the relevance of their expertise to mitigation can still make important contributions to solving problems associated with global climate change by conducting much needed research on adaptation, the other half of the climate puzzle.

Some adaptation-relevant research is already being conducted in regard to individual disasters and recovery efforts, such as Daniel Aldrich's *Building Resilience* and articles in the *Perspectives on Politics*' special issue, "Post-Katrina New Orleans and the Politics of Reconstruction." And of course our discipline has established bodies of work on public choice, governing the commons,<sup>80</sup> and environmental politics that are also relevant. The next steps in the adaptation research agenda are to integrate these seemingly discrete topics into a cohesive literature on the politics of adaptation and to expand the number of political scientists who apply their expertise to studying the climate crisis. The latter goal could be facilitated by additional government or foundation funding, new journals or task forces, decisions by the editorial boards of existing journals to solicit climate-relevant articles, and most importantly, decisions by individual political scientists to incorporate climate change into their personal research agendas. Given the urgency, we need not wait for financial or other career incentives to ponder whether we can share our knowledge of politics with the larger community of scholars and policymakers trying to address the climate crisis. We are all relevant to the climate change discussion and all have something to contribute, and we arguably have responsibilities to make those contributions.

## Notes

- 1 Of climate researchers most actively publishing in the field, 97 to 98 percent agree with the primary conclusions of the Intergovernmental Panel on Climate Change that the Earth's average temperature has warmed and that most warming is caused by anthropo-

genic greenhouse gases. The remaining tiny minority of climate change skeptics have the least expertise and scientific prominence; Anderegg et al. 2010. There is no meaningful scientific debate occurring about the existence of climate change. The discussion and urgent need for research concern mitigation and adaptation.

- 2 IPCC 2007b.
- 3 See, e.g., Anderegg et al. 2010.
- 4 More specifically, adaptation is the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities"; IPCC 2007c.
- 5 See, e.g., Selin 2010.
- 6 Roberts and Parks 2007; Young, King, and Schroeder 2008; Aldy and Stavins 2009; Keohane and Victor 2011.
- 7 See, e.g., Vanderheiden 2008; Hiskes 2009; Gardiner et al. 2010; Baer 2011; Dietz 2011; Gardiner 2011; Howarth 2011; Brooks 2013.
- 8 See, e.g., Perrow 2007; Boin, McConnell, and Hart 2008; Kunreuther and Useem 2010.
- 9 Bättig and Bernauer 2009; Harrison and Sundstrom 2010; Christoff and Eckersley 2011.
- 10 See, e.g., Dalby 2009; Matthew et al. 2011.
- 11 See, e.g., Mullin 2009.
- 12 See, e.g., Keller 2009.
- 13 Dunlap and McCright 2008; Krosnick 2010.
- 14 Keohane and Victor 2011,12.
- 15 Jordan 2010.
- 16 Adger et al. 2006; Duus-Otterstrom and Jagers 2012.
- 17 Tryhorn and Lynch 2010.
- 18

Number of articles	Publication
7...	<i>Economic and Political Weekly</i>
5...	<i>Policy Sciences</i>
4...	<i>Development in Practice</i> <i>American Journal of International Law</i>
3...	<i>Environmental Values</i>
2...	<i>Journal of Peace Research</i> <i>International Affairs</i> <i>Global Governance</i>
1...	<i>Perspectives on Politics</i> <i>International Studies Quarterly</i> <i>Foreign Affairs</i> <i>International Studies Review</i> <i>The World Today</i> <i>World Policy Journal</i> <i>The Modern Law Review</i> <i>Review of International Studies</i> <i>Asian Survey</i> <i>India International Centre Quarterly</i> <i>Journal of Palestine Studies</i> <i>The American Journal of Comparative Law</i>

- 19 Gillis 2013.
- 20 Information about the IPCC Fifth Assessment Report (AR5) can be found at <http://www.ipcc.ch/>. The draft of the US National Climate Assessment Report can be found at <http://ncadac.globalchange.gov/>.
- 21 IPCC 2007a, b.
- 22 IPCC 2007a.
- 23 *Ibid.*, 5.
- 24 Brysse et al. 2013.
- 25 Caldeira and Wickett 2003.
- 26 Adger et al. 2007, 734; Roberts 2010; Webber 2012.
- 27 IPCC 2007a, 13.
- 28 Jones 2011; Reardon 2011.
- 29 UNFCCC 2009, 421.
- 30 Wald and Schwartz 2012.
- 31 Dean 2012.
- 32 Hansen, Biringer, and Hoffmann 2003; Fischlin et al. 2007, 242-4.
- 33 Richardson and Schoeman 2004.
- 34 Fischlin et al. 2007, 235.
- 35 Adger et al. 2007, 734.
- 36 Fischlin et al. 2007, 235.
- 37 Orr et al. 2005.
- 38 Schipper 2009, 362.
- 39 IPCC 2007b, 19; Pittock and Jones 2009.
- 40 Bicknell, Dodman, and Satterthwaite 2009; Western Governors' Association 2010, 6.
- 41 Thanks to monetary incentives provided by the United Nations Framework Convention on Climate Change (UNFCCC), most least-developed nations have NAPAs designed for specific adaptation projects ([http://unfccc.int/national\\_reports/napa/items/2719.php](http://unfccc.int/national_reports/napa/items/2719.php)); several projects have been funded by the Adaptation Fund ([www.adaptation-fund.org](http://www.adaptation-fund.org)); and international support is also available from the Global Environment Facility (GEF), the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Green Climate Fund (<http://unfccc.int/adaptation/items/4159.php>; [http://unfccc.int/cooperation\\_and\\_support/financial\\_mechanism/green\\_climate\\_fund/items/5869.php](http://unfccc.int/cooperation_and_support/financial_mechanism/green_climate_fund/items/5869.php)). However, adaptation needs far exceed the projects proposed or the funding available. Many European countries have National Adaptation Strategies (<http://climate-adapt.eea.europa.eu/web/guest/adaptation-strategies>), and many US states and cities have climate action plans that incorporate adaptation or are devoted exclusively to adaptation (e.g., <http://www.climatechange.ca.gov/adaptation/>). However, it is a grand leap from assessing and planning to implementation, and even the developed world has few funds allocated for adaptation and little evidence of climate preparedness.
- 42 PlaNYC can be found at <http://www.nyc.gov/html/planyc2030/html/theplan/the-plan.shtml>.
- 43 IPCC 2007b, 19; National Research Council 2010, 60.
- 44 National Research Council 2010, 77, 213-4.
- 45 Moser 2009a.
- 46 Karl, Melillo, and Peterson 2009, 156.
- 47 Schreurs 2011, 457.
- 48 Mace, Masundire, and Baillie 2005.
- 49 MacLean and Wilson 2012; Javeline et al. 2013.
- 50 Bradbury 2012.
- 51 Wald and Schwartz 2012.
- 52 Giddens 2009, 167.
- 53 Berrang-Ford, Ford, and Paterson 2011, 32.
- 54 See, e.g., Moser 2009b; Ebi 2010.
- 55 National Adaptation Strategies are available at <http://climate-adapt.eea.europa.eu/countries>.
- 56 Farber 2011, 366-8.
- 57 Berrang-Ford, Ford, and Paterson 2011; Ford, Berrang-Ford, and Paterson 2011.
- 58 National Adaptation Programmes of Action are available at [http://unfccc.int/national\\_reports/napa/items/2719.php](http://unfccc.int/national_reports/napa/items/2719.php).
- 59 Egan and Mullin 2012, 799; Davenport 2013.
- 60 Whitmarsh, Seyfang, and O'Neill 2011, 57; Bichard and Kazmierczak 2012.
- 61 Hunter 2007, 1358; Bichard and Kazmierczak 2012.
- 62 Bichard and Kazmierczak 2012.
- 63 Whitmarsh 2008; "Decision Making" 2010-2011; National Research Council 2010, 127-8.
- 64 Moser 2009a, 288.
- 65 Adger et al. 2007, 735.
- 66 *Ibid.*; National Research Council 2010, 127-8.
- 67 Bichard and Kazmierczak 2012, 638.
- 68 Maddison 2007; Moser 2009a, 289; Whitmarsh and O'Neill 2010.
- 69 Moser 2009a, 287.
- 70 Maddison 2007; Mandleni and Anim 2010; National Research Council 2010, 127-8; "National Fish, Wildlife and Plants" 2012.
- 71 Dunlap and McCright 2008.
- 72 Christoff and Eckersley 2011, 442.
- 73 Dolsak 2001; Blackburn and Stone 2003; Neumayer 2003; Spoon 2009.
- 74 Brown, Hammill, and McLeman 2007; Busby 2007, 2008; Brown and Crawford 2009; Burke et al. 2009; Habib 2010; Hsiang, Burke, and Miguel 2013; but see Salehyan 2008; Gleditsch 2012.
- 75 Busby 2007, 2008; Broder 2009; de Brito 2010.
- 76 Adger et al. 2007, 730; Brown, Hammill, and McLeman 2007, 1150; Brown and Crawford 2009.
- 77 Brown, Hammill, and McLeman 2007, 1152; Busby 2007, 20.
- 78 Goulden, Conway, and Persechino 2009; Lewis 2009, 1207.
- 79 Brown, Hammill, and McLeman 2007, 1152; Goulden, Conway, and Persechino 2009, 822.
- 80 See, e.g., Ostrom 1990.

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