

## Article

# The “Adaptation Paradox” and Citizen Ambiguity over Government Climate Policies: Survey Findings from Bangladesh

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**Abstract:** National governments in the world’s most climate-vulnerable nations are using domestically sourced and international funding and expertise. However, local governments are where citizens in many developing countries turn to solve problems. Using results from a nationally representative sample in Bangladesh, one of the most climate-vulnerable nations in the world, we examine citizens’ perspectives about the responsibility of different levels of government to address climate change problems. Inasmuch as Bangladeshi survey respondents do draw distinctions, they trust local governments more than the national one. However, local governments tend to be relatively weak vis-à-vis the national government: political and financial resources are concentrated there, and the national government has access to the resources of international financial institutions. Furthermore, respondents tend to view local officials as embedded community networks more than as formal government agents. We conclude that better public communications across levels of government with vulnerable communities are needed if these communities are to protect themselves from extreme weather events, access services, and reap the benefits of “polycentric” climate adaptation governance across a full range of levels.

**Keywords:** climate change; vulnerability; Bangladesh; adaptation; resilience; polycentric; local government trust



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## 1. Introduction to the Problem

The “adaptation paradox”, that “while climate change is a global risk, vulnerability to it is locally experienced” [1], has created a knowledge and experience gap between international-level actors and vulnerable people on the front lines of climate adaptation. Even as adaptation funding has become more available in recent years, and commitments have been made globally and at the country-level for improving adaptation planning, there is not yet a clear answer as to “how national governments translate these global templates for subnational policy action, a critical issue for adaptation studies because adaptation is supposed to be a primarily local effort” [2]. Indeed, at a time when concern about the adequacy of international cooperation in climate change mitigation is rising (see [3] for an illustration), authorities are turning to subnational actors to address climate change [4].

However, others claim that national governments, even in advanced developed nations such as the Netherlands, are not prepared to undertake a shift in roles “from a regulating and steering government towards a more collaborative and responsive government that enables and facilitates community initiatives” [5]. How then will highly climate-vulnerable developing nations such as Bangladesh, many of which have a weak history of government

accountability, find a strong role for local government? Perhaps even more important than the local effort made by subnational officials to implement national policies and international priorities is whether vulnerable-area citizens, who are the recipients of government assistance and guidance, understand which level of government, national or subnational, should be approached for adaptation action.

This article explores how people on the ground view government responsibility for taking action to ameliorate the adverse impacts of climate change. We focus on Bangladesh, one of the world's most vulnerable nations, as a case study. We use results from a nationally representative survey we conducted in 2019 of nearly 3500 climate-vulnerable citizens in Bangladesh. We found, in general, that citizens did not differentiate among levels of government. This implies that they cannot participate consciously in this aspect of "polycentric" governance, which implies a differentiated citizen appeals to both national and subnational governments (and a range of other organizations).

## **2. Introduction to the Context: Characterizing the Climate Vulnerable in Bangladesh, Polycentrism, and Perceived Shortcomings of Adaptation Policy**

This research follows the findings of another recent survey in the Chittagong Hill Tracts (CHT) region in Bangladesh [6], which concluded that the state has an "obligation to properly manage climate displacement in ways that protect the rights of long-term inhabitants and owners of lands affected by [climate-related] immigration (383)". That seems to be the only other comprehensive survey in Bangladesh addressed to adaptation policy, trust in government, and the attribution of blame for adverse climate-related weather events, particularly in vulnerable regions where citizens have low levels of education. That survey was conducted in a vulnerable region of the country, but it was limited in scope. Few, if any other surveys exist of vulnerable citizens on the "front lines" of climate change in the developing world.

Our nationwide survey data indicate that a majority of survey respondents are unsure about which level of government should fulfill this obligation. This is somewhat at odds with the growing literature on climate adaptation governance, which often assumes, implicitly or explicitly, that citizens solve collective action problems relating to climate via "polycentric" appeals to different levels of government (from the international down to the local). To the extent that Bangladeshi survey respondents do draw distinctions, they vest more trust in local governments. However, local governments tend to be relatively weak because power and financial resources are concentrated in the national government, which also has access to the resources of international financial institutions. We conclude that in Bangladesh, at least (and potentially elsewhere too), trust in government is "lumpy", and from the standpoint of vulnerable community citizens, polycentrism might constructively start with under-sourced and under-trained local governments first. Indeed, a disconnect seems to exist between trust in local governments and the concentration of decision-making authority and resources at higher levels.

From the survey responses, we sought to understand two aspects of the attribution of responsibility. One of these is "who caused" the problems of vulnerability to climate change, while the other is "who should fix it". Our survey findings show that in addressing both these aspects of responsibility attribution, respondents did not differentiate between local and national governments, or between those governments and international organizations which also offer support. Survey respondents did routinely approve of measures to reduce climate change vulnerability, such as disaster relief and the construction of cyclone shelters and ocean and river embankments, undertaken and funded by the national government. However, respondents often give credit to local authorities for these interventions, even when they result from actions by the national government. Most respondents tended to default to crediting (and blaming) local officials as these are the only ones with whom many citizens have had direct contact.

These findings, that the climate vulnerable (the beneficiaries of climate adaptation projects) have very little knowledge of who is funding or implementing the projects, are

at odds with a view of the polycentric governance of climate adaptation starting from the “top down”. Our findings are also inconsistent with models of government action inspired by Ostrom’s pioneering theory of collective action starting from the “bottom up” with overlapping autonomous levels of government that adjust to the actions of others (see [7]). In practice, most of Bangladesh’s climate-vulnerable citizens do not have a very effective way to insert themselves to provide feedback to higher-level governance of climate adaptation.

In the following section, we briefly introduce the concept of polycentric governance and note prior critiques in the context of international climate policy. Then, we describe climate change vulnerability and government actions in Bangladesh. We then describe the aforementioned survey and present an interpretation of findings from the responses with respect to climate change adaptation. We conclude by considering the implications of peoples’ misperceptions about sources of climate risk reduction measures as they relate to polycentric governance in adaptation. We call for better informing citizens so they can articulate demands to the appropriate levels of government so that resources can be adequately allocated. We conclude by drawing out the implications of our Bangladesh study to broader relations between levels of government (international, national, and subnational).

### 3. Literature Review: Polycentrism and Governance of Climate Change Adaptation

In ref. [8], Brown and Sovacool argue that “Polycentrism posits that when multiple actors at a variety of scales [from local to global] must compete in overlapping areas, they can often promote innovation as well as cooperation and citizen involvement”. For these analysts, policies need to include both homogenizing and coordinating elements from international and national levels of governance and more local and decentralized governance that facilitates heterogeneous components reflecting local circumstances. Seemingly, if citizens do not know who should address climate change within government, they cannot articulate their interests fully within a polycentric model.

Arguing against this vision of cooperative polycentrism in ref. [9], Morrison et al. assert that polycentric models of climate mitigation and adaptation pay little attention to power dynamics among different levels of governance. They argue that “while dominant conceptualizations of polycentric governance provide useful insights into the potential for climate mitigation and adaptation, present models downplay the powerful roles of higher levels including those of the nation state, as well as the more diffuse exercise of power at lower levels of governance”. They further argue that the power dynamics in which states have taxation authority and the apparatus for security and diplomacy, and local governments have very little power by comparison, need to be given more emphasis. This is an argument for state-driven solutions to climate adaptation, led by national governments. However, even though national governments have relevant taxing and spending authorities, lower-income developing countries frequently lack domestic funding for adaptation.

A compelling argument is also made by ethicists [10,11] that the international community may be the only “level of government” that can really implement a solution based on the scope of what is needed. This observation suggests, as per the critique of polycentrism in [9], that successful adaptation in nations such as Bangladesh requires the availability of funding from the “next level up”—the international community. Yet, funding flows from developed nations to developing ones remain scant [12,13]). Moreover, only three percent of 1700 adaptation initiatives surveyed had reported actually reducing climate risks to date [14]. Despite movement in the direction of mainstreaming adaptation into development assistance, that promise has not been delivered. Indeed, questions abound regarding whether and how success in adaptation can even be measured [15,16].

These critiques of polycentrism aver that only the nation state can muster the power to act and only the international community can provide the necessary financial support. Our work adds another critique: at least in some countries, only local governments seem to have the trust of citizens. We introduce the scope of the adaptation challenge in Bangladesh and

then demonstrate that vulnerable citizens place more of their trust in the local government to act on their behalf.

#### 4. Case Selection: Climate Vulnerability and Government Action in Bangladesh

One of the most vulnerable nations in the world by most measures (see [17]), Bangladesh's climate vulnerability is due to its low-lying terrain and propensity for cyclones, coastal storm sea-level surges, river flooding, and droughts. Its climate-sensitive sectors, such as agriculture, comprise over 20 percent of the country's GDP even as the nation has sought to diversify its economy. During the country's monsoon season, some 80 percent of its land is flooded. The Bangladesh government estimates that floods in 2007 caused over USD 1 billion in damage and that, by 2050, the nation will lose 2 percent of GDP (about USD 220 billion in 2016) yearly due to climate change [18], estimated costs of cyclones and associated storm surges in coastal areas of the country at about USD 2.4 billion per year.

Because most of the country is less than 12 m above sea level [7], it is vulnerable to salinization and sea-level rise. Soil salinity causes agricultural losses, compromising food security and agricultural livelihoods for lower-income households. Rising water salinity jeopardizes drinking water supplies and causes diseases [19]. Studies of coastal Bangladesh show the limits of adaptation. For example, households there lost USD 1.9 million in the three years after Cyclone Aila in 2009, even though farmers had already implemented adaptation strategies, such as planting saline-tolerant rice varieties [18]. In areas of the greatest salinity increases, rice yields are predicted to decline by over 15 percent by 2050 [20].

Sea-level rise and salinization are growing more pervasive, forcing relocation [21]. According to World Bank scenarios, a one-meter combined sea-level rise and storm surges could cause a loss of 3.2 percent of the country by 2050, whereas a two-meter combined sea-level rise and accompanying storm surge would inundate some eight percent of the country. Migration of some 13 million people (out of a current population of about 166 million) is expected, as some 47 percent of the people make their livelihoods from agriculture, and many of them would have to leave coastal areas [22]. In ref. [20], Dasgupta et al argue that migration seems to be the "only feasible form of disaster insurance for coastal households". While these climate change dynamics in Bangladesh's coastal south may be the most severe, the nation has also suffered fresh-water flooding from Himalaya ice melt and monsoons in the north and droughts in some isolated and elevated areas.

Adaptation projects such as embankment construction, the elevation of structures, and others enabling the vulnerable to reduce the adverse impacts of climate change offer particular and relatively localized solutions benefitting specific groups of people. This specificity of adaptation projects "close to home" and with specific types of benefits is what makes them concrete, leading survey respondents to have strong favorable opinions about them.

In Bangladesh, climate policies and programs have traditionally been the province of the national government, although the types of activities undertaken have been much more local in nature, as noted above. In contrast, local governments in Bangladesh tend to be weaker. "Resource allocation for local government is meager . . . the LG [local government] system as such cannot take proactive development functions, including addressing disaster-related development interventions" [23].

With respect to international engagement, the 2009 Bangladesh Climate Change Strategy and Action Plan provides a structure to channel international funds into the development of capacity to adapt to climate change [24,25]. The plan identified six areas of focus for climate finance: (1) food security, social protection, and health, (2) comprehensive disaster management, (3) infrastructure, (4) research and knowledge management, (5) mitigation and low-carbon development, and (6) capacity building and institutional strengthening. To implement the Strategy and Plan, the nationally-managed Bangladesh Climate Change Trust Fund (BCCTF) has spent nearly USD 390 million over seven years.

Items (1) through (4) above all focus on different elements of climate change adaptation, and item (6), capacity building and institutional strengthening, is also a key element for

effective adaptation. As expected in a highly vulnerable nation where mitigation is not a priority, the climate change-affected population in Bangladesh are more concerned about adaptation, the short- and medium-term interventions as well as visible solutions by the government, such as infrastructural projects. Greenhouse gas emission is not their priority concern [26].

There tends to be a disconnect between broad references to the need for reducing greenhouse gases that Bangladeshis may hear about on the news and the floods that salinized their rice fields and flooded the neighbors' house. As stated by an agriculture extension official in Sylhet, a highly climate-vulnerable area:

Climate change is a farfetched and vague idea for most of the people of the country. The term natural disaster and its effects in their lives and livelihood is easier for them to conceive [27].

Indeed, fewer than 30 percent of the sample had heard of climate adaptation or mitigation, and 73 percent of respondents thought these two concepts were "basically the same". For them, mitigation, which is invisible anyway, is "something happening somewhere else". However, 90 percent of the respondents had heard local officials discuss natural disasters, and 12 percent of the sample had received disaster relief in the last five years. Against this backdrop of concern for adaptation issues, but without extensive knowledge of climate change, our results will be even more stark.

## 5. Methodology of Survey and Descriptive Statistics of Respondents

We recruited a sample of Bangladeshis to complete a face-to-face public opinion survey. Our primary sampling units (PSUs) for this survey were rural Union Councils (4553), suburban Municipalities (323), and City Corporations (11). Our secondary sampling units (SSUs) were rural villages and suburban and urban wards. Our tertiary sampling units (TSUs) were family households. The last stage of sampling respondents relies on the classic Kish table for within-household selection. All selections of PSUs and SSUs followed the probability proportional to size (PPS) mechanism, using census information on PSU and SSU sizes. As elaborated in Appendix A, TSU selection followed a systematic sampling mechanism using selected village and ward lists of registered households.

We interviewed 3494 respondents between 26 June and 3 September 2019. The sample was intended to be nationally representative, and according to the most recent available census figures, this goal was largely met, given some allowance for the novelty of the setting and standard issues of survey responses (Bangladesh Bureau of Statistics 2018 [28]). The survey had a margin of error of plus or minus 3 percent and a response rate of 80 percent. Our survey sample is reasonably well-matched to the general population in terms of urban/rural split, religion, and gender. Our survey respondents skew older (median age 38 versus 27 in the population) and are more likely to be unemployed (27 percent in survey versus a 4.1 percent unemployment rate in the population, though some of this discrepancy could be measurement-related and Bangladesh's actual unemployment rate is likely much higher than statistics indicate). Further information on the sampling frame and its representativeness is in Appendix A.

Our survey prominently captured concerns related to climate change vulnerability. Some 18 percent of survey respondents had noticed changes in seasons over the last five years, some 46 percent had become personally ill or injured due to climate events (which included loss of cropland from sea-level rise, crop failure, loss of cropland due to salinity of non-coastal waters, cyclones, flooding, and/or landslides), drought, or heat waves. At least 10 percent of respondents knew people directly affected by several of these climate events. Some 33 percent knew people who experienced crop failure, 31 percent knew people who experienced drought, and 25 percent knew people who experienced flooding. Furthermore, some 12 percent of respondents claimed that they have had to leave their homes temporarily because of at least one of these events.

Overall, respondents claimed that disaster relief and climate projects were implemented more effectively than basic services (which 15 percent of respondents rated as



ineffective or highly ineffective). Some 23 percent rated disaster relief as ineffective or highly ineffective, while some 20 percent rated infrastructure to protect people from natural disasters as ineffective or highly ineffective. Respondents did have first-hand experience with these programs; while only 12 percent had received disaster relief in the last five years, some 73 percent knew of disaster prevention infrastructures (cyclone shelters, ocean and river embankments) being constructed near them. Overall, our respondents held positive views of these adaptation projects.

Nevertheless, although the government of Bangladesh has been raising large trust funds—such as the nearly USD 400 million by the Bangladesh Climate Change Trust Fund (BCCTF)—for responding to climate change, our respondents did not identify these projects as climate-related. Even the national government planning of extensive projects, such as the river and ocean embankment network built by the Bangladesh Water Board, were not tied to climate change in survey respondents' replies, nor even to the national government. Respondents largely praised the local government and criticized the national government. As assessed by one analyst in Kutubdia, where flooding has been widespread and embankments have failed.

The local people are very dissatisfied with the quality of construction works of most of the embankments and dams at the local level. They blame the central government agencies for the corruption and misuse of resources [29].

A local official in Kutubdia acknowledged corruption but attributed it to the national government's procedures [15].

## 6. Descriptive Information on Attitudes about Climate Change Responsibility across Levels of Government

At the descriptive level, we sought to see how differently respondents regarded the three levels of government (local, national, and international) across a range of questions. "International" was represented in the survey by "governments of rich countries". We posed the questions "Who is responsible for [causing] climate change?" and "Who must try to solve climate change?" We also posed the question "Overall, is government [local and national] doing a good job?" and we asked about overall levels of trust (a little, a lot, and complete) in differing government institutions. We also included "international organizations" in the queries about who is responsible for climate change and general trust in different levels of governance.

Table 1 shows that the responses were similar across local, national, and international levels of government in answering the questions about who is responsible for climate change and who must try to solve climate change. The respondents also provided fairly similar responses on overall trust in different levels of government. However, the percentage of respondents indicating that local government was doing a good job overall was strikingly higher than the percentage of positive responses for the national government, even though the question on trust indicates more confidence in local over national government. This implies that individuals *do* distinguish among levels of government on some dimensions (in this case, overall performance), but that they do not distinguish among different levels of government with respect to responsibility for addressing climate change. This is consistent with the descriptive information provided in Section 2 above.

Table 2 presents the correlations between the responses to the four questions in Table 1 for two different levels of government. For example, the leftmost entry in the top row of the table indicates the relative frequency with which an individual saying local government was responsible for climate change also indicated that national government was responsible. This measure of similarity in individual responses differs from the comparison of aggregate responses in Table 1. The "percentage of off-diagonal" responses provide a complementary measure of differences between answers, for example, the number of respondents that said local but not national government was responsible or national but not local government was responsible for climate change.

**Table 1.** Descriptive Statistics on Assignment of Responsibility to Levels of Government and Perceptions of Government.

Question	Local Government	National Government	Rich/Foreign Countries	International Organizations
Who is responsible for climate change? (% “Yes”)	60 (1514)	62 (1575)	59 (1436)	46 (979)
Who must try to solve climate change? (% “Yes”)	80 (2257)	84 (2395)	75 (1906)	n/a
Is [X] doing a good job overall (% “Yes”)	84 (2901)	64 (2198)	n/a	n/a
Trust [X] (% Trust “a lot”, and “complete”)	30 (958)	40 (1187)	31 (755)	38 (1022)

Note: The top line describes the percentage of respondents, and the bottom line of each entry (in parentheses) represents the number of respondents in the category. In the “Rich/Foreign Countries” column, the referent is “Rich countries” for the first two rows and “Foreign governments” for the fourth. The “Trust [X]” row is based on items scaled on a 6-point scale from a minimum of “complete distrust” to a maximum of “complete trust”. On this measure, the “Local government” indexes two items: trust in male and female union local leaders. “National government” indexes trust in “Government in Dhaka” and “Political Parties”. In both cases, the average of *both* items must be at “trust a lot” or higher to be included.

**Table 2.** Correlations by Item Across Levels of Government.

		National Government			
		Who Is Responsible?	Who Must Try to Solve?	Overall Job Rating	Political Trust
Local Government	$r_{xy}$	0.68 ***	0.67 ***	0.41 ***	0.63 ***
	% “off diagonal”	15% (378)	10% (274)	26% (897)	12% (336)
	n	2447	2766	3411	2850
Supranational Institutions	$r_{xy}$	0.62 ***	0.62 ***	n/a	0.49 ***
	% “off diagonal”	19% (429)	13% (336)	n/a	12% (292)
	n	2317	2498	n/a	2504

Note: “Off diagonals” defined as either No/Yes OR Yes/No respondents on binary answers. N corresponding to percentage in parentheses. On ordinal responses (political trust), they are Above Median/Below Median OR Below Median/Above Median. \*\*\* Indicates 99% statistical significance.

The findings in Table 2 largely bear out the results for the aggregate responses in Table 1. Individuals affirming local government responsibility for addressing climate change also tended to affirm the responsibility of national government, and those affirming national government responsibility tended to affirm the responsibility of supranational institutions. Individuals expressing trust in the local government also tended to express trust in the national government. The off-diagonal responses in these pairs of responses were small. On the other hand, the low correlation between responses on local and national government on overall job performance amplifies the finding in Table 1. The respondents have a lower regard for national government performance than local government performance, though the higher percentage of off-diagonal responses than for other questions suggests variability across individuals in how they assessed the local and national government performance.

## 7. Hypotheses Regarding “Who Wants Government to Do More?” on Climate Change

As demonstrated above, the respondents do not tend to differentiate between the levels of government in assessing responsibility for climate change, though they do tend to hold the overall performance of the local government in higher regard than the national government. The next step in our analysis is to explore the influences on the propensity among various groups in the population to favor more government action to address climate change problems. Our dependent variable is an index summing the number of parties the respondent thinks should help solve climate issues. The constituent parts of the

index are “local government”, “national government”, and “rich countries”. A score of 0 indicates that the respondent holds none of these responsible, and 3 indicates that they hold all three responsible. Thus, the indicator for support for government action on climate change is an integer taking values 0, 1, 2, or 3.

Our survey findings provided information relevant to four hypotheses regarding factors that might shape individuals’ desires to seek more engagement across the levels of government to reduce the impacts of climate change. Our most important hypothesis is that people experiencing either increased vulnerability to climate threats, or the anticipation of increased vulnerability in the near future, would be more interested in a stronger government response [30,31].

To capture the personal experience of vulnerability, we asked people: “Has there been more flooding where you live over the last five years”, on a scale running from 0 = “much less” to 1 = “much more”. While many respondents viewed flooding as a diminished problem over the last five years, fully 26 percent of respondents said there was “a little more”, “more”, or “much more” flooding where they lived over the last five years.

**Hypothesis 1 (H1).** *The higher a respondent’s experience with vulnerability to actual or perceived climate disaster, the more a respondent favors more action from all levels of government in response to climate change.*

Peoples’ belief in religion relative to science may also be an important influence on peoples’ perceptions about what people, and thus governments, can do to address climate-related problems. In Ecuador, one study found that evangelical Christian survey respondents were more likely to question the validity of human-caused climate change, whereas Catholics and Kichwa people were more likely to believe that humans had caused, and could solve, climate change [30].

The variables are coded using responses to a question about whether climate threats are caused by humans (coded as a 1), Alla/Vogoban (“God’s will”) (0), or both (0.5). The responses indicated that 51 percent saw climate threats as God’s will, 21 percent said both, and 27 percent answered that climate threats are human-caused. In broad terms, we expected that respondents who viewed God as the ultimate driver of events would be less likely to favor more government action on climate change. About 91 percent of respondents identified as Muslim and eight percent identified as Hindu, but the specific faith identification was not significant as a predictor of attitudes.

**Hypothesis 2 (H2).** *The higher a respondent’s belief in the religious attribution of climate change, the less the respondent favors more action from all levels of government in response to climate change.*

We also used answers to several questions in the survey to construct three indicators to measure perceived governmental responsiveness. One was the yes (1)/no (0) question: “Have you sought assistance from or presented a request to any office, official or councilperson of the municipality within the last 12 months (21 percent had)?” Another was an indicator based on answers to three questions: (i) “In general, do you think your MP [member of parliament] listens to people like you (25 percent answered “yes”)?” (ii) “In general, do you think your ‘mayor’ or ‘Upazila chair’ [Upazila is like a county] listens to people like you (37 percent answered “yes”)?” and (iii) “In general, do you think your ‘Union Chair’ [mayor] listens to people like you (41 percent answered “yes”)?” This index was assigned a value of 0, 1, 2, or 3, depending on the number of affirmative replies, so a larger value indicates a stronger perception of governmental responsiveness. Finally, a dichotomous indicator was used based on whether the respondent voted in the last national election (64 percent had).

**Hypothesis 3 (H3).** *The greater a respondent’s belief in the responsiveness of local government, the more a respondent favors more action from all levels of government in response to climate change.*



Regarding trust in institutions, we put forward the hypothesis that people who have more trust in the government are more inclined to want the government to take action to solve the problem. We used a standard political trust measure (“How much trust do you have in each of the following groups/institutions?”), scored on a 6-category scale running from 0 = “trust not at all” to 5 = “trust completely”. It was applied to two institutions relevant to local government, three relevant to national government as a whole, two relevant to security services, two relevant to civil society, and two relevant to international organizations. The rankings of complete trust ranged from 11 percent for foreign governments to 38 percent for the military, and the rankings of full distrust ranged from three percent for clerics to 22 percent for the police.

**Hypothesis 4 (H4).** *The greater a respondent’s trust in institutions, the more a respondent favors more action from all levels of government in response to climate change.*

We also included a range of control variables: education level (maximum level of formal education achieved on a five-point scale running from 0 = no formal education to 5 = more than high school), employment (dichotomous, 0 = no and 1 = yes), age (a series of dummied category groups), gender (0 = male, 1 = female), material affluence (an additive index summing possession of bathroom, motorized vehicle, and refrigerator), and retrospective economic optimism (whether respondents’ family economic conditions were better than five years ago, running from 0 = worsened a lot to 5 = improved a lot). Detailed coding information on these variables is presented in Appendix B.

## 8. Results and Discussion

Table 3 shows the models assessing the strength of our hypotheses. Each column represents an OLS regression with coefficient estimates and standard errors in parentheses. We include models that examine each class of predictors individually as well as altogether, and with and without the demographic controls noted above.

In Model I, the coefficient on experience with flooding as an indicator of vulnerability is negative and significant. This argues against H1. A possible alternative explanation is that people that have experienced flooding have become more fatalistic, with less confidence in government action to improve their situation. Those who believe humans are the cause of climate change are more inclined to favor government action. This provides support for H2, the distinction between more religious versus other perspectives on causes of climate change.

The results varied for the trust in institutions variables in Model IV. Recall from Table 1 that trust in national government was lower than in local government. The corresponding finding in Model IV is that trust in national government had no significant relationship with support for government action on climate change. Trust in local government was significantly but negatively associated with support for government action on climate change, while trust in international government institutions was significantly and positively associated with support for government action on climate change.

Thus, the results are mixed regarding our hypothesis H4. However, given that respondents were asked specifically about trust in their Upazila (county) and Union (locality) chairs (these two were joined for the questions about whether and which levels of government should do more), it is also possible they did not associate these individuals with “local government”. To them, even local government might be interpreted as an abstract bureaucracy. It then could be quite reasonable for citizens who thought that their Upazila and Union “communities” and leaders merited their trust could also view government as less necessary.

Model V contains all the variables relevant to the four hypotheses. When all the various influences are considered together, we find that those who believed that their local officials listened to “people like you” were more inclined to favor some level of government action on climate change. The political responsiveness index is also significant

and positively associated with that view. The signs and significance of coefficients for the other explanatory variables have the same signs and pattern of significance as they do in the single-hypothesis regressions. In particular, past experience with a disaster that could reasonably be associated with climate change does not increase interest in a government response.

**Table 3.** Correlation of Hypotheses with “Need for More Government Action” Dependent Variable.

	I	II	III	IV	V
More experience with flooding	−0.65 *** (0.06)				−0.47 *** (0.09)
Humans cause climate change		0.36 *** (0.02)			0.25 *** (0.03)
Belief in political responsiveness			0.03 (0.02)		0.07 ** (0.02)
Voted last national election			−0.10 * (0.04)		−0.01 (0.05)
Requested assistance from local official			−0.02 (0.05)		−0.04 (0.06)
Trust local				−0.07 ** (0.02)	−0.10 *** (0.03)
Trust international organizations				0.07 ** (0.02)	0.06 * (0.03)
Trust national government				−0.07 (0.03)	−0.01 (0.03)
Trust civil society				−0.04 (0.11)	0.16 (0.11)
Trust security services				0.09 ** (0.03)	0.08 ** (0.03)
_constant	2.55 *** (0.03)	2.09 *** (0.03)	2.42 *** (0.04)	2.53 *** (0.09)	2.18 *** (0.16)
N	2453	2453	2453	1601	1397
R-sq	0.043	0.085	0.003	0.021	0.034

\*\*\* Indicates 99% statistical significance. \*\* Indicates 95% statistical significance. \* Indicates 90% statistical significance.

Our findings provide reasons to question the strength of the polycentric model for climate change adaptation policy in the case of Bangladesh, and potentially in other developing countries with similar characteristics, such as limited citizen engagement with a non-local government. The findings suggest that, on the one hand, respondents do not strongly differentiate in their views about what levels of government should be acting to solve climate change problems in Bangladesh (Tables 1 and 2). On the other hand, the proclivity to favor government action, broadly speaking, is traceable in part to individual-specific factors (Table 3). Specifically, personal convictions about human activities being the source of climate change and trust in government each increase the strength of individual support for more government action on climate change. General support for the need to have more government response to climate change does not readily translate into

findings about which level of government should take a lead role. However, trust in local government is significant (albeit negative for reasons addressed), while trust in national government is not. The notion that respondents may consider Upizala and Union officials as “community members” rather than “government” gives the coefficients of models IV and V a more plausible interpretation.

## 9. Conclusions: Citizen Understanding Is Needed to Reduce the “Adaptation Paradox”

There is some evidence of an “adaptation paradox” (as defined earlier) within Bangladesh—a disconnect in how climate change is addressed locally, nationally, and in international settings. At the international level, climate change threats are highlighted by the Bangladeshi government when seeking financial and technical assistance from the international community. However, national government officials do not so often publicly refer to climate change in the aftermath of flooding and other catastrophes. Officials at the Bangladeshi Meteorological Department [for example] insisted that despite an average increase in temperature nationwide of more than one degree Fahrenheit since 1971 and increasingly unpredictable extreme weather events, they have insufficient data to attribute these to climate change [32].

Bangladeshis across the country, not just in climate-vulnerable areas, likely would benefit from a more complete understanding of how the climate is changing and how that links to immediately relevant phenomena such as increasingly frequent or serious extreme weather patterns. In turn, as the inevitability of climate change is more widely understood across Bangladesh, national government acknowledgement of the threats and of its role in stemming adverse climate change impacts could help reduce the lack of trust on the part of those who have previously faced natural disasters with only limited government responses.

Furthermore, if we are correct and very local (Upizala and Union) officials are not considered government, this would imply a construal-level problem. In the climate space, and in others, people mentally construct a concept based on its psychological distance from them [33]. To improve how citizens see the relevance of national and local governments to climate change, both levels need to educate citizens on the impacts of climate change so that they may prepare for floods or, if they tire of such extreme events, relocate.

The national government could strengthen its initiatives for climate change adaptation by building on its citizens’ predilection to trust the local government and by making its efforts better known by the millions of especially vulnerable Bangladeshis. Whatever the effectiveness of the local government, people trust it. Thus, it will need to play a leading role in public education efforts to help phase-in adaptation planning. While more research is needed to directly assert that citizens trust Upizalas and Unions but not the abstract concept of “government”, if this is found to be true, then the national and local governments would benefit by explicitly describing climate change harms and involving citizens in day-to-day efforts to minimize risks. Only then, when informed citizens work with the various levels of government, will polycentrism be plausible via government-centered institutions, as well as NGOs, the private sector, and other political actors.

International climate agreements such as the 2015 Paris Agreement involve “top-down” negotiations with little room for direct input by citizens, especially the most vulnerable ones. Under polycentrism, those negotiations are seen as part of climate governance in which each level of government complements the contributions of other levels. Our findings suggest that the polycentric model of climate governance may require some reconsideration. Our survey findings in Bangladesh show that whatever its effectiveness, the local government brings people’s trust, and thus, it will need to play a key role in public education efforts to help phase-in adaptation planning and implementation.

Our findings also raise the question of the extent to which an “adaptation paradox” exists in other developing countries with relatively powerful central governments and weak local governments. Survey research in other nations may allow scholars of polycentrism and adaptation policy to better understand how government at all levels may

better communicate how vulnerable people can protect themselves and each other. Such communication, along with a government-led agenda of action, may allow “bottom-up” citizen mobilization to also play an important role in diminishing the worst impacts, even in some of the world’s most vulnerable nations, like Bangladesh.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** Data from the survey (and the codebook) is available at the American University Digital Research Archive, catalogued online (DOI 10.17606/eb9x-r743) as “Climate Change Attitudes in Bangladesh: Data from a 2019 National Survey”. It is available at: <https://dra.american.edu/islandora/object/auislandora%3A97858>.

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## Appendix A. Technical Notes on Survey Sampling

This study is based on a national representative sample of Bangladesh for understanding the citizens’ general perceptions of the threats from climate change and related issues, their political and social trust, and migratory intentions, as well as their experience with and perceptions of climate finance-related activities. A multi-stage stratified sampling with probability proportional to size (PPS) was used for data collection.

The Integrated Multi-Purpose Sampling frame (IMPS) developed by the Bangladesh Bureau of Statistics (BBS) was used as the sampling frame. The estimated sample size of the national survey is around 3334, with a margin of error at 3 percent, a design effect of 2.5, and a response rate of 80 percent. For more on the IMPS, see <https://microdata.worldbank.org/index.php/catalog/616/download/15825> (accessed on 16 May 2022).

Detailed stratification and sampling strategies are summarized as follows:

First of all, 64 Bangladesh districts were stratified along two dimensions: (1) the level of climate vulnerability (based on the government report entitled *Bangladesh Delta Plan 2100* (at [http://brri.portal.gov.bd/sites/default/files/files/brri.portal.gov.bd/page/7c888a53\\_3697\\_4e11\\_828b\\_75cc60b88ddf/BDP%202100%20Volume%201%20Strategy.pdf](http://brri.portal.gov.bd/sites/default/files/files/brri.portal.gov.bd/page/7c888a53_3697_4e11_828b_75cc60b88ddf/BDP%202100%20Volume%201%20Strategy.pdf) (accessed on 16 May 2022)) and (2) the number (both accomplished and ongoing) of climate change-related projects (based on reports from the Bangladesh Climate Change Trust Fund (BCCTF) since 2010). Considering the approved projects from the BCCTF, Patukhali was identified as a representative case of districts with high climate vulnerability and a large number of climate change-related projects from the BCCTF. Chandpur/Laximpur was identified as a representative case of districts with high climate vulnerability but a small number of climate change-related projects. Mymensingh was identified as a representative case of districts with a low climate vulnerability but a large number of climate change-related projects. These three districts were assigned to Stratum11 for the subsequent oversampling of respondents with varying experience of extreme weather events and the operation of

climate change-related projects. The remaining 61 districts were assigned to Stratum12 for subsequent standard sampling of respondents.

The primary sampling units (PSUs) are districts. The three PSUs in Stratum11 were all selected. Meanwhile, 16 out of 61 PSUs were randomly selected from Stratum12, using the PPS method. Altogether, 19 PSUs were selected. Then, each selected PSU was further stratified into two sub-districts (i.e., Upazilla Parishads), one for urban areas and one for rural areas. This stratification was based on related information from the Bangladesh Bureau of Statistics. Altogether, 38 sub-districts were identified.

The secondary sampling units (SSUs) are Union Parishads. Within each identified sub-district, SSUs were randomly selected using the PPS method. Altogether, 15 SSUs were selected from Stratum11 and 183 SSUs were selected from Stratum12.

The tertiary sampling units (TSUs) are segments of 100 households (again, using related information from the Bangladesh Bureau of Statistics). Within each selected SSU, two TSUs were randomly selected using the PPS method. Altogether, 30 TSUs were selected from Stratum11 and 366 TSUs were selected from Stratum12.

The quaternary sampling units (QSUs) are households. In Stratum11, within each selected TSU, 40 households were randomly selected using the systematic random sampling (SRS) method. In Stratum12, with each selected TSU, six households were randomly selected, using the SRS method. Altogether, 1200 households were selected from Stratum11 and 2196 households were selected from Stratum12.

Last, we randomly selected one adult from each selected household for an interview, again using the SRS method. Overall, 3396 respondents were selected for tablet-based face-to-face interviews. Table 1 presents detailed information of all strata and selected PSUs, SSUs, TSUs, and QSUs (i.e., households).

## Appendix B

**Table A1.** Descriptive Statistics and Coding of Table 3 Variables.

Variable	Obs.	Mean	Std. Dev	Min	Max
Climate Change Attribution Index (3-Item)	2453	2.38	1.05	0	3
More Flooding? (1 = high)	3441	0.27	0.34	0	1
More Sunburns? (1 = high)	3441	0.80	0.21	0	1
Climate Change God or Humans? (2 = humans)	3106	0.75	0.86	0	2
Political Efficacy Index (3 = high)	3441	1.03	1.21	0	3
Voted, last national election (1 = yes)	3441	0.64	0.48	0	1
Requested Assistance from Local Official (1 = yes)	3441	0.21	0.41	0	1
Trust local political authority (5 = high)	3155	2.81	1.54	0	5
Trust international political organizations (5 = high)	2499	3.02	1.32	0	5
Trust national government (5 = high)	2890	3.30	1.25	0	5
Trust civil society (5 = high)	2670	1.13	0.32	0	5
Trust security services (5 = high)	2977	3.14	1.18	0	5
Female (Dummy)	3441	0.40	0.49	0	1
Age 30–39 (Dummy)	3441	0.28	0.45	0	1
Age 40–49 (Dummy)	3441	0.21	0.41	0	1
Age 50+	3494	0.27	0.44	0	1
Formal Education (4 = high)	2802	2.53	1.25	0	4
Frequency News Media (4 = high)	3441	2.36	0.76	1	4
Unemployed (Dummy)	3441	0.28	0.45	0	1
Objective Socio-economic status (3 = high)	3441	1.44	0.88	0	3
Subjective Economic well-being (1 = high)	3441	0.58	0.22	0	1



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