



Research Article

Vol. 12, No. 1, Jun., 2026: 55-69

Title: From Policy to Practice: Agro-Adaptive Governance, Local Government Capacity, and Climate Resilience in Southwest Coastal Bangladesh**Authors:** Sheikh Anwar Hossain^{1*} and Tuhin Roy²¹PhD Fellow, Sociology Discipline, Khulna University, Khulna-9208, Bangladesh²Professor, Sociology Discipline, Khulna University, Khulna-9208, Bangladesh***Corresponding Author:** Sheikh Anwar Hossain Email: ahossain.anwar@gmail.com

Article Info:

ABSTRACT

Received:

June 03, 2026

Accepted:

June 18, 2026

Published:

June 30, 2026

Keywords:Agro-adaptation;
decentralization; local
government; climate-
smart agriculture;
disaster risk
governance; policy
implementation.

This study critically examines the extent to which local government (LG) agro-adaptive governance policies and practices operate effectively and equitably across the pre-disaster, during-disaster, and post-disaster phases in southwestern coastal Bangladesh. Drawing on qualitative field evidence conducted across Bagerhat, Khulna, and Satkhira districts, the research undertakes a critical comparative analysis of major national governance instruments, including the National Policy. Guided by the Asia as a Method (AAM) analytical framework, the study interrogates the alignment between formal decentralization mandates and local operational realities. The findings reveal a persistent policy–practice paradox: while the national framework articulates progressive goals of climate-smart agriculture, salinity-tolerant crop promotion, fiscal devolution, and inclusive smallholder engagement, LG institutions remain constrained by delayed fund flows, limited agronomic technical capacity, symbolic participation of marginalized farming communities, and fragmented inter-agency accountability. Agro-adaptive effectiveness is strongest in procedural seed distribution and early warning dissemination, whereas livelihood recovery governance and inclusive co-production of agricultural resilience remain structurally weak. By exposing phase-specific institutional gaps, the study offers novel insights into the temporal unevenness of local agro-adaptive governance. The paper concludes that genuine agrarian resilience in coastal Bangladesh requires devolved fiscal authority, embedded agricultural extension capacity at the Union level, and accountability-driven coordination reforms between agricultural and disaster management institutions.

DOI: <https://doi.org/10.3329/saja.v12i1.90470>**To cite this article:** Hossain, S. A., & Roy, T. (2026). From Policy to Practice: Agro-Adaptive Governance, Local Government Capacity, and Climate Resilience in Southwest Coastal Bangladesh. *South Asian Journal of Agriculture*, 11(2), 55-69.

Copyright on any research article is transferred in full to South Asian Journal of Agriculture published by Agrotechnology Discipline of Khulna University, Khulna-9208, Bangladesh, upon publication in South Asian Journal of Agriculture.

INTRODUCTION

Coastal Bangladesh remains one of the world's most climate-exposed agricultural landscapes. Accordingly, recurrent cyclones, tidal surges, prolonged inundation, and accelerating salinity

intrusion collectively undermine smallholder farming livelihoods across an estimated 2.85 million hectares of coastal agricultural land (Kashem, 2025; Muna et al., 2025). Over the past three decades, the country has received international

recognition for reducing cyclone related mortality through investments in early warning systems, multipurpose shelters, and community-based preparedness mechanisms (Choudhury et al., 2024; Shamsuzzoha et al., 2025b). Nevertheless, the agricultural dimensions of climate adaptation, encompassing salinity tolerant variety promotion, aquaculture-agriculture integration, embankment-based agro-ecology, and post-flood cropping system restoration, have received comparatively limited systematic attention within local governance scholarship (Panja et al., 2024). Within this evolving landscape, LG institutions are formally positioned as frontline actors responsible for translating national agro-adaptive policies into context-specific preparedness, response, and recovery actions for farming communities.

Despite this progressive policy architecture, a growing body of scholarship suggests that the effectiveness of decentralized agro-adaptive governance in Bangladesh remains uneven. National frameworks, including the National Agricultural Policy (2018), the Bangladesh Delta Plan 2100, the Coastal Zone Policy (2005), and the National Adaptation Plan (NAP, 2023–2025) - assign extensive responsibilities to Union Parishads, Upazila Agriculture Offices, and District Disaster Management Committees (DDMCs) for coordinating agricultural adaptation interventions (Lopa et al., 2026; Mondal et al., 2026). Empirical evidence, however, indicates that the devolution of authority has not been matched by adequate fiscal autonomy, agronomic technical capacity, or institutional coordination at the local level (Sumari et al., 2026).

Further, existing studies (i.e., Hossain et al. (2026); Vyas et al. (2026) and Islam and Islam (2026)) have pointed on disaster risk reduction (DRR) in Bangladesh have predominantly emphasized community vulnerability and post-disaster outcomes, while comparatively neglecting the agricultural governance dimensions of

climate adaptation at local levels. There is insufficient empirical examination of how LG structures manage agricultural extension coordination, seed and input supply chains, and smallholder recovery financing across the full disaster management cycle (Guja and Bedeke, 2025; Reardon et al., 2024). This gap is especially significant in southwest coastal Bangladesh, encompassing Bagerhat, Khulna, and Satkhira, where complex interactions among soil salinity, tidal flooding, cyclone exposure, and shrimp-rice land-use conflicts shape LG agro-adaptive performance.

Against this backdrop, the present study addresses a critical analytical problem: the misalignment between the formal decentralization of agro-adaptive responsibilities and the practical capacity of LG institutions to coordinate and implement climate smart agricultural interventions. The primary objective is to systematically assess LG agro-adaptive governance performance through a comparative, phase-wise analysis guided by the research question: To what extent do LG agro-adaptive policies and practices operate effectively and equitably across disaster phases in southwest coastal Bangladesh? The significance of this study to contributes empirically to the limited body of literature critically evaluating decentralized agro-adaptive governance beyond policy rhetoric together with it provides policy-relevant insights into the structural and operational constraints shaping LG agricultural extension effectiveness in high-risk coastal settings. In doing so, the research advances ongoing debates on how developing countries can move from nominal agro-adaptive compliance toward genuinely resilient local agricultural governance in an era of escalating climate risk.

METHODOLOGY

2.1 Study area and participant selection

Empirical data were generated through twenty-two Informant Interviews (KIIs) conducted across six climate-exposed coastal upazilas located in Bagerhat, Khulna, and Satkhira districts. These three districts were purposively selected based on their acute and compound vulnerability to cyclones, salinity intrusion, and recurrent coastal flooding, rendering them analytically appropriate and ecologically representative sites for examining decentralized agro-adaptive governance under conditions of heightened climate stress. The participant pool comprised Upazila Agriculture Officers (UAOs), Union Parishad representatives with agricultural coordination responsibilities, members of Upazila and Union Disaster Management Committees, Department of Agricultural Extension (DAE) field staff, and local NGO agricultural program coordinators. This heterogeneous respondent composition was intentional, enabling triangulation of institutional perspectives across governance tiers and across state and non-state actors. The decision to conduct twelve KIIs reflects a depth-oriented qualitative strategy that privileges contextual richness and expert institutional insight over numerical breadth, consistent with established practice in critical governance research.

2.2 Data collection procedures and instruments

Primary qualitative evidence generated through KIIs was systematically complemented by structured content analysis of Bangladesh's principal agro-adaptive and disaster governance instruments. Each KII lasted between 45 and 60 minutes and was conducted face-to-face in Bengali, the respondents' working language, using a semi-structured interview guide aligned with the four AAM dimensions. With prior informed consent, all interviews were audio-recorded; where recording was declined, detailed handwritten notes were taken instead. Recordings were transcribed verbatim in

Bengali within one week of data collection and subsequently translated into English by the researcher, with translation accuracy cross checked against the original audio. Transcripts were anonymized prior to coding, and field notes capturing contextual observations were appended to support interpretive accuracy during analysis.

The policy corpus comprised the National Agricultural Policy (2018), the Bangladesh Delta Plan 2100, the Coastal Zone Policy (2005), the National Adaptation Plan (NAP, 2023–2025), the Disaster Management Act (2012), the National Disaster Management Policy (2015), and the Standing Orders on Disaster (SOD, 2019). These seven documents were selected because, collectively, they constitute the legal, operational, and strategic foundation of decentralized agro-adaptive governance in Bangladesh, spanning legislative mandates, strategic planning frameworks, and operational procedural instruments. Content analysis was conducted through structured thematic coding organized around four analytical categories, summarized in Table 1.

2.3 Methodological rigor and triangulation

Methodological rigor is strengthened through systematic triangulation of data sources and analytical methods. KIIs provide grounded institutional narratives from agricultural governance actors operating across different administrative tiers, while document analysis establishes the formal normative benchmark against which those accounts are critically assessed. This dual source strategy serves multiple functions: it mitigates perception bias inherent in any single method; it facilitates movement beyond descriptive institutional reporting toward systematic critique of policy–practice misalignments; and it enables identification of structural patterns that may not be visible from either source in isolation. The critical comparative orientation further situates identified implementation gaps within broader governance questions concerning agricultural

authority, accountability, resource alignment, and social equity. Thematic saturation has been monitored iteratively across the interview data, with preliminary findings reviewed against documentary evidence to ensure analytical consistency.

Global agricultural and disaster governance has progressively shifted from reactive emergency relief toward proactive, risk informed resilience strategies, with frameworks such as the Sendai Framework for Disaster Risk Reduction, the FAO's Climate-Smart Agriculture approach, the Paris Agreement, and the SDGs collectively positioning local governments as the principal implementation vehicle for agricultural adaptation (Majlingova and Kádár, 2025). Yet formal adoption of these instruments does not guarantee operational competence at the local level, particularly where fiscal decentralization and administrative capacity remain uneven. Effective agro-adaptive governance therefore depends on coherent alignment between legally devolved authority, adequate fiscal and technical capacity, and robust accountability mechanisms capable of preventing politicization and elite capture (Mumtaz and Puppim de Oliveira, 2023).

Building on this, the study adopts Asia as a Method (AAM) as its analytical framework. Rather than measuring local governance against universalized Western models, AAM treats Asian institutional and historical contexts as valid reference points in their own right, generating theory from within the region's own governance experience rather than through externally derived benchmarks (Kester, 2023). Using this lens, the study disaggregates local government agro-adaptive governance into four institutional dimensions: Authority (devolution of agronomic decision-making), Systems (coordination between extension agencies and local bodies), Implementation (translation of adaptation mandates into field-level support), and Accountability (enforceability of inclusion mandates for smallholder, women, and marginalized farmers). Overall, the integration of purposive expert interviews, structured policy analysis, and phase-wise comparative framing within the AAM analytical architecture provides a robust methodological foundation for examining the policy implementation interface in a complex, multi-actor agro-adaptive governance system operating under escalating climate risk.

Table 1. Coding framework for content and key informant interview analysis

Analytical Category	Coding Focus	Illustrative Codes	Primary Source(s)
Authority and Decentralization	Formal and substantive devolution of agronomic planning and decision-making authority to local government bodies	delegated planning authority ministry approval dependency Union-level decision space	KIIs DM Act (2012) NAP (2023–2050)
Fiscal Arrangements	Funding mechanisms, fund-flow control, and budgetary autonomy for agro-adaptive programming	fund disbursement delays central approval bottleneck contingency fund access	KIIs NPDM (2016–2020) NAP (2023–2050)
Institutional Coordination	Coordination protocols linking the DAE, Union/Upazila Disaster Management Committees, and allied agencies	overlapping mandates duplication of resources inter-agency liaison gaps	KIIs SOD (2019)
Social Inclusion and Equity	Enforceability of inclusion mandates for smallholder, women, and marginalized farming communities	symbolic participation gender-responsive financing elite capture	KIIs National Agricultural Policy (2018) NAP (2023–2050)

Note. DAE = Department of Agricultural Extension; DM Act = Disaster Management Act; NAP = National Adaptation Plan; NPDM = National Plan for Disaster Management; SOD = Standing Orders on Disaster.

Source: Authors' compilation, 2026

2.4 Ethical Considerations

Prior to data collection, oral and written consent has been collected from all respondents, each of whom was informed that the study is purely academic in purpose. To ensure confidentiality, no identifying information, including respondents' names, has been recorded together with the study adheres to the ethical standards established and complies with the principles of human research ethics outlined. Furthermore, formal ethical approval was granted by the Research and Innovation Centre of Khulna University.

FINDINGS

3.1 Comparative Analysis of Agro-Adaptive Policy Directives and Local Practice

A detailed comparative reading of Bangladesh's agricultural and disaster risk governance instruments, from the National Agricultural Policy (2018) through the National Adaptation Plan (NAP, 2023–2025), reveals a persistent tension between policy aspirations and field-level implementation, highlighting both the strengths of a progressive legal framework and the weaknesses in LG operational agro-adaptive capacity. Collectively, these policies establish a comprehensive architecture for decentralized, participatory, and proactive agricultural climate adaptation, formally positioning LG institutions (LGIs) as primary actors in agro-preparedness, input distribution, emergency response, and post-disaster crop recovery (Mansoor & Shahzad, 2025; Shrestha et al., 2025). For example, the National Agricultural Policy (2018) mandates that Upazila Agriculture Offices coordinate with Union Parishad bodies to develop sub-district agricultural adaptation plans integrating salinity-tolerant variety promotion, integrated crop-shrimp farming systems, and community seed banks (Jamal et al., 2023). Similarly, the NAP (2023–2025, Sections 4.2–4.4) reinforces the importance of ring-fenced funding for

climate adaptation projects, explicitly calling for locally tailored resilience measures and iterative learning through monitoring and evaluation mechanisms (Meraj et al., 2026).

Despite these robust legal instruments, KIIs and field observations underscore significant implementation gaps in agro-adaptive fiscal and technical capacities. While the policies provide clear directives for financial decentralization, LGIs often lack genuine autonomy over actual agro-adaptive fund utilization. The NPDM (2016–2020, Article 3.2) and NAP (2023–2025, Section 4.3.1) stipulate that local disaster and adaptation funds should be directly controlled by Union and Upazila committees to support contingency actions (Meraj et al., 2026; Shamsuzzoha et al., 2025b). In practice, however, LGIs remain largely dependent on central ministry approvals and political discretion, causing delays in fund disbursement and reducing the ability to implement context-specific agricultural initiatives. An Upazila Agriculture Officer in Satkhira explained:

"We receive seed allocation quotas from the district office, but we have no flexibility to adjust based on local salinity or flood conditions. Everything requires central approval, which defeats the purpose of community-based adaptation."

A Union Parishad chairman from Bagerhat further observed:

"We prepare agro-adaptation plans as required by the Union Disaster Management Committee guidelines, but without guaranteed agricultural emergency funds, most salinity management initiatives remain on paper."

This demonstrates a critical structural weakness: agricultural adaptation decentralization exists in principle but is not matched by operational fiscal authority,

fundamentally undermining local agronomic agency.

Inclusivity in agro-adaptive governance is a recurrent theme across policies, yet its practical realization for smallholder and women farmers remains inconsistent. The National Agricultural Policy (2018) explicitly targets women farmers for extension services and agricultural training, while the NAP (2023–2025, Article 4.4) emphasizes gender-responsive adaptation financing and empowerment through leadership roles in agricultural planning (Meraj et al., 2026). These provisions are commendable, signaling recognition that social equity enhances agrarian resilience. Nevertheless, KIIs reveal that in many coastal upazilas, women farmers' participation in agricultural adaptation planning committees is largely symbolic. A DAE field officer in Khulna reflected:

"Women are supposed to be part of the upazila-level crop planning meetings, but in practice, male farmers' representatives dominate decisions about variety selection and input allocation. Women rice farmers rarely influence what seeds are distributed."

This exposes a weakness in enforcement and accountability, highlighting the need for training, mentorship, and monitoring frameworks that transform inclusive agricultural mandates into substantive engagement opportunities for marginalized farming communities.

Furthermore, policy frameworks also underscore inter-agency coordination as a pillar of effective agro-adaptive management. The Standing Orders on Disaster (SOD, 2019, Articles 4.3 and 5.2.4) envisage multi-agency coordination encompassing the DAE, Union Disaster Management Committees, and Bangladesh Water Development Board for agricultural emergency response. In practice, however, coordination challenges persist. KIIs from Khulna and Satkhira report overlapping

responsibilities, duplication of resources, and confusion during agricultural emergencies. An NGO agricultural program coordinator in Bagerhat observed:

"After Cyclone Remal, both the Union Parishad disaster committee and the DAE distributed emergency seed packets to some of the same households, while other severely affected farming communities received nothing. There is no joint database or coordination platform."

This indicates that policy design alone cannot ensure effective agricultural coordination, particularly where human capacity, clarity of roles, and real-time communication mechanisms are inadequate (Shamsuzzoha et al., 2025b).

5.2 Structural Contradictions and Policy Paradoxes in Local Agro-Adaptive Governance

Bangladesh's agro-adaptive governance framework, anchored in the National Agricultural Policy (2018), the Bangladesh Delta Plan 2100, the Coastal Zone Policy (2005), and the NAP (2023–2025), provides a robust legal vision for decentralized, inclusive, and climate-resilient local agricultural governance. LGIs are designated as primary actors across all agro-adaptive phases. The Delta Plan 2100 institutionalizes adaptive agricultural management through hotspot-specific investment programs targeting the southwest coastal zone, including protection and restoration of coastal polders critical for smallholder rice cultivation viability (General Economics Division, 2018). The SOD (2019, Articles 4.1–4.3) operationalizes these responsibilities by defining roles in agricultural early warning, emergency seed mobilization, and agro-recovery coordination (Shamsuzzoha et al., 2025b), while the NAP (2023–2025) emphasizes locally tailored adaptation programs of action (LAPA) and ring-fenced financing to enhance LGI

agronomic autonomy (Meraj et al., 2026). In practice, however, local actors face severe resource and agronomic capacity constraints. A District Agriculture Officer from Bagerhat stated:

"We are supposed to have Union-level seed banks and soil salinity monitoring systems. But the Union Parishads have no dedicated agricultural budget line and no trained personnel for salinity assessment. The UAO covers five to six unions alone."

These insights highlight that, while policies establish clear agricultural responsibilities and procedural frameworks, LGIs cannot fully operationalize pre-disaster agro-preparedness, creating uneven risk reduction across unions and upazilas.

During disaster phases expose further contradictions between policy prescriptions and agro-adaptive realities. Although the SOD (2019, Articles 4.3 and 5.2.4) mandates agricultural emergency response coordination, including rapid seed replacement protocols, livestock emergency feeding, and fisheries loss assessment (Shamsuzzoha et al., 2025b), KIIs reveal functional bottlenecks rooted in institutional fragmentation between DAE extension staff and Union Parishad disaster management bodies. A Union Parishad Secretary from Satkhira explained:

"The Standing Orders tell us to coordinate with the UAO for agricultural emergency response, but the UAO has no emergency budget and no transport during flooding. We end up improvising with whatever seeds or inputs we can source from local agro-dealers."

Resource mobilization is frequently delayed due to central approval requirements, and agricultural emergency support remains under-managed due to insufficient trained personnel. These experiences demonstrate that policy clarity

does not guarantee functional effectiveness during agrarian crises, especially when coordination, accountability, and human resource constraints persist.

Post-disaster agro-adaptive recovery further exposes structural contradictions. The NAP (2023–2025) and the National Agricultural Policy (2018) both provide for rehabilitation of cropping systems, fisheries recovery, and livelihood restoration through structured compensation and replanting programs (Mansoor and Shahzad, 2025; Meraj et al., 2026). Yet field evidence indicates that equity remains severely limited, and support often depends on bureaucratic discretion rather than systematic mechanisms. A Union Parishad member from Khulna stated plainly:

"The crop compensation list exists on paper, but who gets selected depends heavily on the chairman's relationship. Marginal farmers and sharecroppers are rarely on the list, even when they suffer the greatest crop losses."

Similarly, a Union Parishad member from Satkhira observed:

"Committees include women and ethnic community members, but participation is largely symbolic. Decision-making still rests with senior male officials regarding which farming communities receive recovery support."

These statements underscore the gap between inclusive agro-adaptive policy intentions and practical outcomes, demonstrating that post-disaster agricultural recovery interventions frequently fail to reach the most vulnerable smallholder farming households equitably, despite formal mandates across the National Agricultural Policy, Delta Plan 2100, and NAP frameworks. The persistence of these inequitable outcomes across multiple policy cycles suggests not merely implementation failure but a

structural misalignment between formal governance architecture and the political economy of local agricultural resource distribution.

3.3 Temporal Unevenness in Local Agro-Adaptive Governance Performance

Across all three disaster phases, structural contradictions reveal a broader pattern of temporal unevenness in local agro-adaptive governance performance. Pre-disaster agricultural preparedness exhibits procedural robustness: Union and Upazila-level crop contingency planning templates are institutionally established, salinity-tolerant variety catalogues are circulated by the DAE, and community seed bank guidelines are formally codified under the National Agricultural Policy. An Upazila Disaster Officer from Khulna captured this paradox:

"We have the forms and the plans, but without a dedicated agricultural budget line at Union level, pre-season salinity planning and seed bank maintenance simply cannot happen. We are always waiting for approvals that come too late."

During disaster response governance benefits from the vertical command channels established through the SOD (2019), and early warning dissemination for farming communities represents a genuine institutional strength developed through decades of cyclone preparedness investment (Shamsuzzoha et al., 2025b). However, agricultural-specific response, particularly rapid crop assessment, emergency seed procurement, and livestock rescue coordination—suffers from severe role ambiguity and financial bottlenecks between DAE extension staff and Union Parishad disaster bodies.

Post-disaster agro-adaptive recovery is the governance phase most vulnerable to political mediation, patron–client resource allocation, and institutional fragmentation. Without transparent beneficiary selection

systems for crop compensation, accessible mechanisms for sharecropper loss registration, and ring-fenced post-disaster agricultural recovery financing at the Union level, the formal agro-adaptive policy architecture systematically fails to deliver equitable livelihood recovery outcomes for the most exposed coastal farming communities (Samad et al., 2026).

DISCUSSION

This study critically examined the effectiveness and equity of LG agro-adaptive governance policies and practices across the disaster phases in southwest coastal Bangladesh. Rather than presuming that formal agricultural and disaster policy frameworks ensure functional agro-adaptive preparedness, the research adopted a critical institutional policy approach complemented by the AAM analytical lens—Authority, Systems, Implementation, and Accountability—to assess how governance arrangements operate in agricultural practice. The findings indicate that although Bangladesh has developed a comparatively sophisticated formal agro-adaptive governance architecture, its local-level operationalization remains uneven, phase-specific, and structurally constrained. Effectiveness is most evident in procedural seed distribution and early warning dissemination (Bean et al., 2024), whereas anticipatory salinity planning depth, inter-agency coordination, and post-disaster agrarian recovery equity are significantly weaker (Mondal et al., 2026; Yasmin, 2025), revealing patterned rather than uniform agro-adaptive performance across the disaster cycle.

These findings both align with and extend existing disaster governance and agricultural adaptation scholarship. Consistent with literature (i.e., Alcántara-Ayala et al. (2025); Nipa et al. (2025) and Jaishi et al. (2025)) have focused on decentralized climate governance in climate-vulnerable settings, the study confirms persistent implementation gaps

despite progressive formal policy commitments. While prior research like Lopa et al. (2026); Turay et al. (2026) and Alcántara-Ayala et al. (2025)) have frequently attributes these shortcomings to capacity deficits, coordination failures, or resource scarcity, the present analysis demonstrates that the issue extends beyond administrative weakness. A central challenge lies in the structural misalignment between formal agricultural decentralization and effective local agro-adaptive authority. Although policy provisions formally allocate substantial responsibilities to Union Parishads and Upazila Agriculture Offices, empirical evidence shows that fiscal dependency and upward administrative oversight constrain local agronomic decision-making autonomy (Mansoor and Shahzad, 2025; Meraj et al., 2026; Shamsuzzoha et al., 2025b). This perspective reframes prevailing capacity deficit explanations by highlighting constrained local state agricultural agency as a systemic governance issue rather than merely a technical competence deficit.

The study also contributes to debates on inclusive and rights based agro-adaptive governance by interrogating the discrepancy between procedural inclusion mandates and substantive agricultural equity. Although gender-responsive agricultural extension language has been incorporated into the National Agricultural Policy and NAP, evidence from southwest coastal Bangladesh suggests that such inclusion often remains formalistic in practice (Ali & Kamraju, 2026; Nurullah et al., 2026). Authority over seed variety selection, input allocation, and agricultural recovery financing decisions remains concentrated among a limited set of institutional actors, rather than being genuinely co-produced with smallholder, women, and ethnic minority farming communities.

A key contribution lies in the phase-wise comparative analysis, which reveals temporal unevenness in local agro-adaptive governance. Existing scholarship often treats institutional effectiveness as static; by contrast, this study demonstrates systematic variation across preparedness, response, and recovery stages. Preparedness mechanisms appear procedurally robust yet unevenly resourced; response structures benefit from strong vertical command systems but suffer from agricultural-specific coordination gaps; and recovery processes are most vulnerable to political mediation and inequitable distribution (Shamsuzzoha et al., 2025b). The AAM framework proved analytically instrumental in generating these insights by facilitating disaggregated diagnostic assessment across its four dimensions, illuminating layered institutional contradictions that capacity-focused agricultural analyses frequently overlook. Because Authority, Systems, Implementation, and Accountability function as the organizing logic of the present analysis rather than as a fixed checklist, it is useful to revisit each in turn before drawing the discussion to a close. Doing so clarifies precisely where, and through what institutional mechanism, the broader policy–practice paradox identified above is produced, rather than allowing the four dimensions to remain unevenly distributed across the preceding thematic discussion.

Accordingly, authority, understood as the devolution of agronomic decision-making to Union Parishads and Upazila Agriculture Offices, is formally extensive under the National Agricultural Policy (2018) and the NAP (2023–2025) but substantively constrained by upward fiscal and administrative dependency. As the findings show, a Satkhira Upazila Agriculture Officer described fixed seed allocation quotas that cannot be adjusted for local salinity or flood conditions, while a Bagerhat Union Parishad chairman reported

that agro-adaptation plans remain unfunded in the absence of guaranteed emergency resources. Together, these accounts indicate that decision rights have been transferred without a corresponding transfer of fiscal command. Authority in this setting is decentralized in name but recentralized in practice through the approval chain governing fund release.

Systems, or the coordination architecture linking the DAE, Union and Upazila Disaster Management Committees, and allied agencies, emerges as the dimension most clearly underdeveloped relative to the other three. The Standing Orders on Disaster (2019) formally mandate multi-agency coordination, yet the duplicated seed distribution reported after Cyclone Remal—in which the Union Parishad disaster committee and the DAE reached some of the same households while others received nothing—demonstrates the absence of a shared beneficiary database or joint coordination platform (Shamsuzzoha et al., 2025b). The failure here is not one of unclear formal mandates but of missing operational infrastructure: without interoperable information systems, procedural coordination clauses in policy documents cannot translate into synchronized agricultural action on the ground.

In addition, implementation, or the translation of adaptation mandates into field-level agricultural support, is constrained primarily by personnel and logistical capacity rather than by deficiencies in policy design. A single Upazila Agriculture Officer responsible for five to six unions, lacking a dedicated agricultural budget line and trained personnel for salinity assessment, cannot operationalize the Union-level seed banks and monitoring systems that policy envisages. The same pattern recurs during disaster response, where Union Parishad staff describe improvising with locally sourced inputs because the Upazila Agriculture Office has neither an

emergency budget nor transport during flooding. Implementation therefore succeeds where tasks are routinized and low-cost—seed quota distribution, early warning relay—and falters where tasks require sustained technical judgment or rapid resource mobilization.

Accountability, conceived as the enforceability of inclusion mandates for smallholder, women, and marginalized farmers, displays the clearest gap between procedural language and substantive practice. Despite explicit provisions for women's participation in agricultural planning under the National Agricultural Policy and the NAP, a Khulna DAE field officer described male-dominated variety-selection meetings, and Union Parishad members reported compensation lists shaped by personal proximity to the chairman rather than by documented need. These accounts indicate that no enforcement or monitoring mechanism currently makes exclusion costly to local power-holders. Inclusion remains aspirational rather than actionable in the absence of independent verification of beneficiary selection.

Read together, these four dimensions are not independent weaknesses but a single, mutually reinforcing pattern of institutional decoupling. Constrained Authority limits the fiscal basis available for Implementation; underdeveloped Systems compound Implementation shortfalls precisely when rapid inter-agency action is most needed; and the absence of Accountability removes the corrective pressure that might otherwise narrow these gaps across successive policy cycles. This integrated reading reframes the policy–practice paradox not as four unrelated deficits but as a structurally coherent pattern of decoupling between formal mandate and operational capability, a pattern that consistent with the phase-wise analysis above, converges most visibly in the post-disaster recovery phase, where authority, systems, implementation, and

accountability gaps are exposed simultaneously.

Importantly, the study does not characterize Bangladesh's local agro-adaptive governance as uniformly deficient. Institutional maturity is evident in early warning dissemination and emergency seed distribution, reflecting the country's extensive experience in cyclone risk management (Shamsuzzoha et al., 2025a). Overall, the study advances theoretical discussions on decentralized climate governance in the Global South by demonstrating that agro-adaptive effectiveness and equity depend less on progressive policy language than on coherent alignment among authority, resources, and accountability across governance levels (de Macedo et al., 2023; Sharma et al., 2026). It therefore reframes local agro-adaptive governance reform as a challenge of institutional alignment rather than solely technical capacity enhancement, an empirically grounded perspective applicable to similarly climate-exposed and administratively centralized coastal agricultural contexts across South and Southeast Asia.

Policy Implications

The findings suggest that strengthening agro-adaptive governance in southwest coastal Bangladesh requires moving beyond formal policy expansion toward functional institutional alignment at the local level. *Firstly*, agricultural fiscal decentralization must be operationalized through predictable, ring-fenced, and rapidly disburseable Union-level agro-adaptation funds so that Union Parishad bodies can coordinate agricultural emergency response without excessive central approval delays. *Secondly*, agro-adaptive capacity development should shift from one-off DAE training events toward embedded technical support systems, including dedicated Union-level agricultural adaptation cells, digital early-warning integration with crop-specific

response protocols, and professionalized community seed bank management teams. *Thirdly*, inclusion mandates for smallholder, women, and ethnic minority farmers require enforceable accountability mechanisms such as mandatory representation thresholds in agricultural adaptation planning committees, public disclosure of seed and input beneficiary lists, and community monitoring of crop compensation programs to transform symbolic participation into substantive farming community agency.

Limitations and Future Research

This study is subject to several limitations that should inform future research trajectories. Empirically, the analysis draws primarily on qualitative data from selected coastal districts in southwest Bangladesh; the findings may not fully capture intra-regional variation or conditions in other hazard-prone agricultural regions of the country. Future research should therefore pursue mixed-method designs combining qualitative governance analysis with quantitative agricultural service delivery indicators, crop loss compensation tracking, and longitudinal budget execution monitoring at the Union and Upazila levels. Comparative studies across coastal and inland agricultural districts would help determine whether the identified governance gaps are structurally embedded or geographically contingent. Moreover, future work could extend the AAM framework through network or political economy analysis to better capture informal power relations among extension officers, agro-input dealers, and Union Parishad representatives that shape local agro-adaptive governance outcomes.

CONCLUSION

This study critically examined the effectiveness and equity of LG agro-adaptive governance across the pre-disaster, during-disaster, and post-disaster

phases in southwest coastal Bangladesh. The analysis demonstrates that although Bangladesh has developed an advanced and normatively progressive agricultural adaptation governance framework, a persistent implementation paradox remains: LG institutions are formally empowered to coordinate community-based agro-adaptation but are operationally constrained by fiscal dependency, agronomic technical deficits, formalistic inclusion of marginalized farming communities, and fragmented inter-agency coordination between DAE extension services and Union Parishad disaster management bodies. Agro-adaptive effectiveness appears strongest in procedural seed distribution and early warning dissemination for farming communities, while equity deficits and coordination failures become more pronounced in recovery and resource distribution processes.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

REFERENCES

- Alcántara-Ayala, I., Velásquez-Espinoza, G., & de Jesús, A. M. (2025). From Mandates to Mechanisms: Institutional Vulnerability, Decentralized Governance, and the Challenges of Local Disaster Risk Reduction Implementation. *International Journal of Disaster Risk Science*, 16(5), 709-723. <https://doi.org/10.1007/s13753-025-00673-y>
- Bean, H., Hasinoff, A., & Fields, S. (2024). Defining public warning failure. *Journal of Contingencies and Crisis Management*, 32(3), e12602. <https://doi.org/https://doi.org/10.1111/1468-5973.12602>
- Choudhury, M., Wu, H., & Shahidullah, A. K. M. (2024). Improving the feedback loop between community- and policy-level learning: Building resilience of coastal communities in Bangladesh. *Sustainable Development*, 32(2), 1508-1524. <https://doi.org/https://doi.org/10.1002/sd.2686>
- de Macedo, L. S. V., Jacobi, P. R., & de Oliveira, J. A. P. (2023). Paradiplomacy of cities in the Global South and multilevel climate governance: evidence from Brazil. *Global Public Policy and Governance*, 3(1), 86-115. <https://doi.org/10.1007/s43508-023-00060-7>
- Guja, M. M., & Bedeke, S. B. (2025). Smallholders' climate change adaptation strategies: exploring effectiveness and opportunities to be capitalized. *Environment, Development and Sustainability*, 27(8), 17927-17956. <https://doi.org/10.1007/s10668-024-04750-y>
- Hossain, S. A., Rashid, M. M., Islam, R. N., & Sony, M. M. A. A. M. (2026). Social Transformation Through

- Disaster Adaptation. In *The Palgrave Handbook of Global Social Problems* (pp. 1-21). Springer Nature Switzerland. https://doi.org/10.1007/978-3-030-68127-2_745-1
- Islam, M. M., & Islam, A. R. M. T. (2026). Strengthening climate resilience in coastal Bangladesh: Analyzing the role of NGOs in adaptation governance from an intersectionality lens. *Progress in Disaster Science*, 29, 100498. <https://doi.org/https://doi.org/10.1016/j.pdisas.2025.100498>
- Jaishi, M., Sharma, G. P., Nepali, P. B., Gauchan, D., Neupane, H., & Dhakal, R. (2025). Improving Agriculture Service Delivery by Local Governments in Nepal: A Municipal Perspective. In D. Panday, P. Khanal, B. R. Upreti, & J. Timsina (Eds.), *Agriculture Sector Transformation in Nepal: A Roadmap* (pp. 45-66). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-91717-2_3
- Jamal, M. R., Kristiansen, P., Kabir, M. J., & Lobry de Bruyn, L. (2023). Challenges and Adaptations for Resilient Rice Production under Changing Environments in Bangladesh. *Land*, 12(6), 1217.
- Kashem, M. A. (2025). Exploring climate change and sustainability issues in Bangladesh through system dynamics. *Discover Sustainability*, 6(1), 1073. <https://doi.org/10.1007/s43621-025-01652-5>
- Kester, K. (2023). Revisiting 'Asia as method' in education research: problems and prospects. *Asia Pacific Education Review*, 24(2), 181-186. <https://doi.org/10.1007/s12564-023-09863-z>
- Lopa, F. G., Sarker, S., & Rayma, R. R. (2026). Coastal Flood-Driven Settlement Dynamics and Local Governance Challenges in Chattogram Division of Bangladesh. *Geographies*, 6(1), 25.
- Majlingova, A., & Kádár, T. S. (2025). From Risk to Resilience: Integrating Climate Adaptation and Disaster Reduction in the Pursuit of Sustainable Development. *Sustainability*, 17(12), 5447.
- Mansoor, A., & Shahzad, L. (2025). Climate Change in Agriculture: Impacts, Adaptation, and Mitigation. In H. S. Jatav, V. D. Raiput, & T. Minkina (Eds.), *Ecologically Mediated Development: Promoting Biodiversity Conservation and Food Security* (pp. 281-311). Springer Nature Singapore. https://doi.org/10.1007/978-981-96-2413-3_13
- Meraj, G., Hashimoto, S., Kanga, S., Kumar, P., Singh, S. K., Mahmood, H., & Avtar, R. (2026). Science-policy integration for ecosystem-based disaster risk reduction: comparative governance frameworks and a pathway for South Asia. *Sustainability Science*. <https://doi.org/10.1007/s11625-026-01806-y>
- Mondal, B. K., Sikder, B. B., Bhattacharjee, B., Shahrujjaman, S. M., & Khan, M. S. (2026). Water security challenges in coastal Bangladesh: a multi-dimensional approach. *Sustainable Water Resources Management*, 12(2), 28. <https://doi.org/10.1007/s40899-026-01341-9>
- Mumtaz, M., & Puppim de Oliveira, J. A. (2023). A framework for analyzing the implementation of climate adaptation policies in the agriculture sector at the subnational level. *Environmental Science & Policy*, 147, 126-137. <https://doi.org/https://doi.org/10.1016/j.envsci.2023.06.002>

- Muna, S. H., Baral, P. K., Biswas, A. K. M. A. A., Khatun, M. M., & Islam, M. S. (2025). Vulnerabilities and adaptabilities to the disaster affected coastal livelihoods in Bangladesh. *Heliyon*, 11(17). <https://doi.org/10.1016/j.heliyon.2025.e44231>
- Nipa, F., Lino, A. F., & Arun, T. (2025). Third-Sector Organizations as Intermediaries in Climate Action: Engaging Vulnerable Communities in Co-Production in Bangladesh. *Governance*, 38(4), e70058. <https://doi.org/https://doi.org/10.1111/gove.70058>
- Panja, A., Garai, S., Maiti, S., Bhattacharjee, S., Zade, S., Veldandi, A., Sahani, S., Dutta, S., Reddy, A. K., & Sankhala, G. (2024). Climate adaptation in agricultural sector of coastal India: a comprehensive exploration of adaptation strategies. *Mitigation and Adaptation Strategies for Global Change*, 29(8), 92. <https://doi.org/10.1007/s11027-024-10188-4>
- Reardon, T., Awokuse, T., Belton, B., Liverpool-Tasie, L. S. O., Minten, B., Nguyen, G., Qanti, S., Swinnen, J., Vos, R., & Zilberman, D. (2024). Emerging outsource agricultural services enable farmer adaptation in agrifood value chains: A product cycle perspective. *Food Policy*, 127, 102711. <https://doi.org/https://doi.org/10.1016/j.foodpol.2024.102711>
- Shamsuzzoha, M., Biswas, A. K. M. A. A., Hasan, M. M., Faisal, M., Hazra, P., Ghosh, R. C., Rasheduzzaman, M., Debnath, P., Rahman, M. A., & Shaw, R. (2025a). Determination of Constraints in Existing DRR Coordination Mechanisms Among Different Humanitarian Actors of Coastal Bangladesh. In R. Shaw, T. Izumi, R. Djalante, & F. Imamura (Eds.), *Two Decades from the Indian Ocean Tsunami: Key Challenges and Advancements* (pp. 379-409). Springer Nature Singapore. https://doi.org/10.1007/978-981-96-2669-4_21
- Shamsuzzoha, M., Hasan, M. F., Rasheduzzaman, M., Talukder, M. F., Ahamed, T., & Shaw, R. (2025b). Bangladesh's Progress on Disaster Risk Reduction Over the Past 20 Years. In R. Shaw, T. Izumi, R. Djalante, & F. Imamura (Eds.), *Two Decades from the Indian Ocean Tsunami: Key Challenges and Advancements* (pp. 317-358). Springer Nature Singapore. https://doi.org/10.1007/978-981-96-2669-4_19
- Sharma, R. S., Manjkhola, I., Bharati, V., Sharma, A., Sukhralia, M., Chishty, S., & Mishra, V. (2026). Traditional socio-cultural practices in Himalayan food systems for climate adaptation [Original Research]. *Frontiers in Sustainable Food Systems*, Volume 9 - 2025. <https://doi.org/10.3389/fsufs.2025.1718684>
- Shrestha, S., Chapagain, P. S., Zhang, Y., Liu, L., Yan, J., Rai, S. C., Islam, M. N., & Paudel, B. (2025). Climate change adaptation: policy, practice and adaptation gaps in the agriculture sector in Bangladesh, India and Nepal. *International Journal of Climate Change Strategies and Management*, 17(1), 786-806. <https://doi.org/10.1108/IJCCSM-11-2024-0210>
- Sumari, B. K., Makula Pauline, N., Mabhuye, E. B., & Friis Hansen, E. (2026). Implications of Tanzania's central-local governmental power relationship for climate change adaptation financing at the local level. *Geografisk Tidsskrift-Danish Journal of Geography*, 1-14.

- <https://doi.org/10.1080/00167223.2026.2648239>
- Turay, A. B. S., Tirivangasi, H. M., & Zenda, M. (2026). Private sector agency in low-carbon transitions: Rethinking energy security through hybrid governance in the Global South. *Energy Research & Social Science*, 135, 104656. <https://doi.org/https://doi.org/10.1016/j.erss.2026.104656>
- Vyas, S., Barua, A., & Mallikarjuna, C. (2026). Addressing loss & damage: climate risks and flood impacts in Assam's Eastern Himalayas. *Regional Environmental Change*, 26(2), 100. <https://doi.org/10.1007/s10113-026-02535-9>
- Yasmin, J. (2025). The Sundarbans Exodus: Climate Migration and Policy Gaps in Bangladesh and India. In M. Haque, M. Begum, & F. Nawaz (Eds.), *Disasters, Climate Change and Sustainability in South Asia: Challenges and the Way Forward* (pp. 159-186). Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-04750-2_8