

Climate-Resilient Inclusive Banking in State-Owned Commercial Banks: a Five-Level Governance Model for Bangladesh

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KEYWORDS: climate risk; sustainable finance; state-owned banks; adaptation finance; financial inclusion; bank governance; Bangladesh

JEL Classification: G21; G28; G32; H81; Q54; Q56

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Published: 17 October-2026

DOI: [10.55677/GJEFR/03-2026-Vol03E10](https://doi.org/10.55677/GJEFR/03-2026-Vol03E10)

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ABSTRACT

Purpose: Bangladesh needs its banks to finance climate adaptation while protecting both vulnerable borrowers and bank balance sheets from physical and transition risks. State-owned commercial banks (SOCBs) have national reach and public mandates, yet they carry some of the weakest asset quality in the system. This paper asks how SOCBs can integrate climate risk management with inclusive lending without excluding the communities most exposed to climate hazards.

Design/methodology/approach: The study uses a structured policy review and institutional design method. It analyzes Bangladesh Bank's sustainable finance, environmental and social risk, disclosure and climate risk instruments (2020–2025), recent supervisory statistics, the World Bank's Country Climate and Development Report, international standards (NGFS, BCBS, TCFD, IFRS S2) and peer-reviewed research on climate-related credit risk and state bank governance.

Findings: Taxonomy-based green classification is necessary but insufficient. In April–June 2026, SOCBs channeled about 1.6 percent of their term-loan disbursement to green finance, against roughly 12.1 percent for the system. With non-performing loans near 44 percent of SOCB credit, climate lending without location-aware underwriting, verified adaptation and governance safeguards risks creating new distressed assets.

Originality/value: The paper proposes a Climate-Resilient Inclusive Banking (CRIB) model that assigns decisions, evidence and inclusion safeguards across five levels: board, portfolio, product, branch and customer.

Implications: The model offers SOCB boards and Bangladesh Bank a practical route to implement the 2025 climate risk guideline, separate policy-directed from commercial exposure, and report adaptation outcomes rather than disbursement volumes alone.

Cite the Article: Sultana, N., Islam, Md. A., Hasan, Md. B., Alamm, Md. S., Sumaiya, U., (2026). Climate-Resilient Inclusive Banking in State-Owned Commercial Banks: a Five-Level Governance Model for Bangladesh. *Global Journal of Economic and Finance Research*, 3(10), 619- 633. <https://doi.org/10.55677/GJEFR/03-2026-Vol03E10>

1. INTRODUCTION

Bangladesh is one of the countries where climate change most directly shapes the economy. Floods, tropical cyclones, heat stress, salinity intrusion and riverbank erosion recur across its deltaic geography, and the modeling literature records rising trends in several of these extremes (Dastagir, 2015). The World Bank's Country Climate and Development Report (CCDR) estimates that Bangladesh will need at least USD 12.5 billion, about 3 percent of GDP, in the medium term for climate action. It also projects that one-third of agricultural GDP may be lost by 2050 because of climate variability and extreme events, that a severe flood could reduce GDP by as much as 9 percent, and that average tropical cyclones already cost the country about USD 1 billion a year (World Bank, 2022a, 2022b). These figures describe a financing gap, but they also describe a credit risk problem. Every hazard that destroys a harvest, floods a workshop or interrupts a supply chain also impairs a loan.

Banks therefore face a dual task. They must finance adaptation and the low-carbon transition, and they must manage the credit, operational and market effects of climate change on their own portfolios (Basel Committee on Banking Supervision [BCBS], 2021; Network for Greening the Financial System [NGFS], 2020). Bangladesh Bank has moved steadily on both fronts. It has set sustainable finance targets and a taxonomy (Bangladesh Bank, 2020), required environmental and social due diligence (Bangladesh Bank, 2022), mandated climate-related disclosure aligned with IFRS S2 (Bangladesh Bank, 2023), and in November 2025 issued a dedicated guideline on climate risk management that asks boards to define a climate risk appetite and banks to prepare transition and adaptation plans (Bangladesh Bank, 2025b).

State-owned commercial banks sit at an awkward point in this agenda. They have wide branch networks in rural and coastal districts, long relationships with agriculture and small enterprises, and responsibility for many government payment and lending programs. In principle, they can reach borrowers that private banks overlook. In practice, they carry some of the weakest balance sheets in the system. Bangladesh Bank data reported in the press show that SOCB non-performing loans stood at 44.6 percent of their credit in June 2025 and 44.44 percent in December 2025 (M. M. Hasan, 2025, 2026), and the banking sector's capital to risk-weighted assets ratio fell to 3.08 percent at the end of 2024 (Bangladesh Bank, 2025a). SOCBs also lag private banks in green lending. In the April–June 2026 quarter, their green finance amounted to roughly 1.6 percent of their term-loan disbursement, compared with about 12.1 percent for banks and finance companies combined (calculated from Bangladesh Bank, 2026).

This combination creates a specific design problem. A public mandate does not remove the need for credit discipline. Poor project selection, weak monitoring or politically directed lending can turn climate finance into the next generation of non-performing assets. Yet a purely defensive response, in which banks withdraw credit from hazard-prone districts, would leave the most exposed households and firms less able to adapt and would increase long-run losses (Hallegatte et al., 2017). Existing work on green banking in Bangladesh concentrates on disclosure, policy targets and aggregate disbursement (Azad et al., 2022; Bose et al., 2018; Khairunnessa et al., 2021). Research on climate-related financial risk focuses mainly on advanced economies and listed borrowers (Giglio et al., 2021; Javadi & Masum, 2021). Research on state bank governance rarely addresses climate (La Porta et al., 2002; Micco et al., 2007). Few studies ask how a state-owned bank in a highly exposed, lower-middle-income economy should organize decisions so that climate risk management and inclusion reinforce rather than undermine each other.

The paper addresses three research questions:

- **RQ1:** What do Bangladesh's current regulatory instruments require of banks on climate risk, sustainable finance and inclusion, and where do implementation gaps remain for SOCBs?
- **RQ2:** What does the literature on climate-related credit risk and state bank governance imply for how SOCBs should finance adaptation?
- **RQ3:** How can decision rights, evidence and inclusion safeguards be organized across the levels of an SOCB so that climate finance improves resilience without concentrating unmanaged risk?

The paper makes three contributions. First, it maps Bangladesh's sustainable finance and climate risk instruments from 2020 to 2025 against SOCB performance data, showing where classification, disbursement and risk management diverge. Second, it combines the political and development views of state bank ownership with institutional theory's account of ceremonial compliance to explain why SOCB climate finance can grow on paper without reducing risk. Third, it proposes the Climate-Resilient Inclusive Banking (CRIB) model, a five-level governance framework with explicit decision rights, evidence requirements and safeguards against exclusion, and an outcome-based reporting logic that separates disbursement from resilience.

The remainder of the paper is organized as follows. Section 2 reviews the literature and sets out the theoretical lens. Section 3 describes the method. Section 4 presents the findings on the policy framework, SOCB performance and implementation gaps. Section 5 presents the CRIB model. Section 6 discusses the results against the literature, Section 7 sets out implications, Section 8 notes limitations and future research, and Section 9 concludes.

2. LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 Climate change as a source of financial risk

A substantial body of work now treats climate change as a source of financial risk rather than only an environmental externality. Physical risks arise from acute events, such as floods and cyclones, and from chronic changes, such as heat and sea-level rise.

Transition risks arise from policy, technology and market shifts toward a low-carbon economy (BCBS, 2021; Monasterolo, 2020). The Basel Committee describes how these drivers reach banks through familiar channels: credit risk through borrower income and collateral values, market risk through asset repricing, liquidity risk through deposit withdrawals and drawdowns, and operational risk through damage to the bank's own facilities (BCBS, 2021).

Early contributions framed the systemic stakes. Battiston et al. (2017) showed that indirect exposures through financial networks can amplify climate-policy shocks, and Campiglio et al. (2018) argued that central banks and regulators need analytical frameworks to assess these effects before they can act on them. Dafermos et al. (2018) modeled how climate damage can erode firm profitability and raise default rates, with feedback to financial stability. Bolton et al. (2020) introduced the idea of "green swan" events, emphasizing that radical uncertainty limits the usefulness of backward-looking risk models. Reviews by Krogstrup and Oman (2019), D'Orazio and Popoyan (2019) and Giglio et al. (2021) summarize the policy options and the empirical evidence, and conclude that disclosure, risk management and macroprudential tools are complements rather than substitutes.

2.2 Climate risk and bank credit

Empirical studies show that lenders already respond to climate exposure, though unevenly. Javadi and Masum (2021) find that firms in locations more exposed to climate change pay higher spreads on bank loans. Nguyen et al. (2022) document that mortgages on properties exposed to sea-level rise carry higher interest rates. On the transition side, Huang et al. (2021) find that Chinese banks raised loan pricing for polluting firms after an environmental policy change, which suggests that lenders price regulatory risk when it becomes salient.

Evidence on disasters and bank stability is more directly relevant to Bangladesh. Klomp (2014) finds, in a large cross-country sample, that natural disasters increase the likelihood that banks move closer to default. Noth and Schüwer (2023) show that U.S. banks with business in disaster-affected areas experience weaker stability measures and higher non-performing assets. Cortés and Strahan (2017) find that banks increase lending in disaster-hit markets and fund it by reducing credit elsewhere, which means that disaster exposure travels through bank balance sheets to unaffected regions. Berg and Schrader (2012) show, using microfinance data from Ecuador, that volcanic eruptions raise loan demand while access to credit becomes more restricted, and that relationship lending can soften this restriction. Möllmann et al. (2020) demonstrate that remotely sensed vegetation health indices help explain default risk in agricultural microfinance, which points to location data as a practical underwriting input.

Bangladesh offers specific evidence on repayment design. Shoji (2010) studied a contingent repayment system that allowed microfinance borrowers to reschedule payments during natural disasters. After the 2004 flood, rescheduling reduced the probability that borrowers skipped meals by 5.1 percent, with larger protective effects for landless households and women. The finding matters for SOCBs because it shows that well-designed flexibility after a verified shock can protect welfare without abandoning repayment discipline.

2.3 Adaptation finance and inclusion

Adaptation finance differs from mitigation finance in ways that matter for banks. Its benefits are often local, its revenue effects are indirect, and its success is measured by losses avoided rather than emissions reduced. Bhandary et al. (2021) review evidence on climate finance policy and conclude that instrument effectiveness depends heavily on design and local institutional capacity. The IPCC Working Group II assessment stresses that adaptation is most effective when it addresses the drivers of vulnerability and is accompanied by finance that reaches exposed communities (IPCC, 2022). Hallegatte et al. (2017) show that poor households lose a larger share of their wealth in disasters and recover more slowly, and that access to finance, insurance and social protection reduces these well-being losses.

In Bangladesh, adaptation practice is extensive but uneven. Chowdhury et al. (2022) review current adaptation practices and identify inadequate finance, weak institutional coordination and limited local capacity as persistent constraints. Recent work also explores how Islamic social finance and financial technology could support resilience. Alamm et al. (2025) propose combining FinTech with Islamic social finance and microfinance to mobilize resources for climate adaptation and inclusion, and Nipa et al. (2026) examine how Islamic FinTech can support disaster risk financing through faster, more targeted transfers. Zahid (2026) discusses how Islamic FinTech and AI-based tools can support climate-resilient agriculture in South Asia. These studies point to instruments that a public bank can partner with, although their empirical effects on loan performance remain to be tested.

2.4 Green banking in Bangladesh

Bangladesh is often cited as an early mover in central-bank-led green finance. Khairunnessa et al. (2021) trace the development of green banking in the country and conclude that Bangladesh Bank's regulatory role has been central to the progress made. Bose et al. (2018) find that institutional pressure, particularly Bangladesh Bank's green banking guidelines, together with corporate governance characteristics, explains variation in green banking disclosure. Azad et al. (2022) examine disbursement against targets for 2021 and report that banks and non-bank financial institutions together achieved 3.16 percent against a 5 percent green finance target and 9.32 percent against a 20 percent sustainable finance target. SOCBs performed weakest on green finance, at 0.25 percent of the 5 percent target. This literature establishes that policy has shaped behavior, but it focuses on volumes and disclosure rather than on whether financed activities reduce risk.

2.5 State-owned bank governance

The literature on government ownership of banks offers two competing views. The development view holds that state banks can correct market failures, finance socially valuable projects and stabilize credit in downturns. The political view holds that state banks serve the objectives of politicians, which leads to misallocation and losses. La Porta et al. (2002) find that government ownership of banks is more common in poorer countries and is associated with slower subsequent financial development and growth. Sapientza (2004) shows that Italian state-owned banks charged lower rates and that their lending reflected the electoral strength of affiliated parties. Dinç (2005) finds that government-owned banks in emerging markets increase lending in election years, and Micco et al. (2007) show that state banks in developing countries are less profitable, with the gap widening around elections.

Other evidence supports a qualified development view. Andrianova et al. (2012) find that the negative association between government ownership and growth weakens once institutional quality is taken into account. Bertay et al. (2015) show that lending by state banks is less procyclical than that of private banks, and Brei and Schclarek (2013) find that public banks expanded lending during crises while private banks contracted. For climate finance, this countercyclical capacity is valuable: after a flood or cyclone, the borrowers who most need credit are often the ones private lenders retreat from.

Bangladesh's experience illustrates the political view's risks. Robin et al. (2018) note that before financial reform, government ownership and interference directed credit to selected sectors at subsidized rates. M. N. Hasan and Khan (2021) identify connected-party lending, weak board oversight and political interference as drivers of SOCB non-performing loans. Uddin et al. (2023) find that politically affiliated directors without substantial ownership stakes increase non-performing loans in Bangladeshi banks, and Hossain et al. (2025) find that more active boards and larger audit committees help reduce non-performing loans.

2.6 Theoretical lens

The paper combines three perspectives. The first is the development-versus-political view of state ownership. It predicts that SOCB climate finance will add value where mandates are clear, pricing reflects risk and boards are insulated from directed lending, and will destroy value where these conditions fail (La Porta et al., 2002; Andrianova et al., 2012). The second is institutional theory. Meyer and Rowan (1977) argue that organizations adopt formal structures to gain legitimacy and may decouple those structures from day-to-day activity. Applied here, a sustainable finance unit, a green taxonomy report or a climate checklist can become ceremonial, satisfying the regulator while credit decisions remain unchanged. Delmas and Burbano (2011) show that weak monitoring and unclear rules encourage such gaps between claims and practice. The third is the climate risk transmission framework, which links hazards to credit outcomes through borrower cash flow, collateral and operational continuity (BCBS, 2021; Battiston et al., 2017).

Together these perspectives lead to a working proposition. Climate finance in an SOCB will reduce risk and support inclusion only when decision rights sit with the functions that control exposure, when evidence is required at each level, and when outcomes, not labels, are reported and audited.

3. METHODOLOGY

3.1 Research design

The study uses a structured policy review combined with institutional design. It does not estimate an econometric model and does not use bank-level confidential data. Its aim is to derive a governance framework that is consistent with Bangladesh's regulations, international supervisory guidance and the empirical literature, and that can later be tested with portfolio data. This design suits a question about how to organize decisions rather than about the size of an effect.

3.2 Sources and search strategy

Three groups of sources were analyzed. The first group comprises Bangladesh's regulatory and statistical documents: the Sustainable Finance Policy for Banks and Financial Institutions (Bangladesh Bank, 2020), the Guidelines on Environmental and Social Risk Management (Bangladesh Bank, 2022), the Guideline on Sustainability and Climate-related Financial Disclosure (Bangladesh Bank, 2023), the Guideline on Climate Risk Management for Banks and Finance Companies (Bangladesh Bank, 2025b), the Quarterly Review Report on Sustainable Finance for April–June 2026 (Bangladesh Bank, 2026), the Financial Stability Report 2024 (Bangladesh Bank, 2025a), the National Financial Inclusion Strategy (Financial Institutions Division, 2021) and the World Bank CCDD (World Bank, 2022a, 2022b). Asset quality figures for 2025–2026 that have not yet appeared in an official annual report were taken from national newspapers that attribute them to Bangladesh Bank data and are identified as such. The second group comprises international standards and supervisory guidance: NGFS (2020), BCBS (2021, 2022), the Task Force on Climate-related Financial Disclosures (TCFD, 2017) and IFRS S2 (International Sustainability Standards Board [ISSB], 2023). The third group comprises peer-reviewed and scholarly literature on climate-related financial risk, disasters and bank lending, adaptation finance, green banking in Bangladesh and state bank governance.

Literature was identified through targeted searches of general and scholarly search engines, RePEc/IDEAS, publisher platforms and the Crossref and DOI registries, using combinations of terms such as “climate risk” AND “bank lending”, “natural disasters” AND “bank stability”, “government ownership” AND “banks”, “green banking” AND “Bangladesh”, and “state-owned commercial

banks” AND “non-performing loans”. Searches covered publications from 2000 to 2026, with earlier classics retained where they define a concept used in the analysis. Sources were included if they (a) were peer-reviewed articles, books from recognized academic or official publishers, or official regulatory documents; (b) addressed climate-related financial risk, adaptation finance, green or sustainable banking, or state bank governance; and (c) could be verified through a DOI, publisher page or official website. Opinion pieces, unverifiable reports and sources without accessible bibliographic details were excluded. The review is purposive rather than exhaustive, and no claim of systematic coverage is made. The final corpus includes 14 regulatory, supervisory and statistical documents, three newspaper reports of Bangladesh Bank data and 41 scholarly sources.

3.3 Analytical procedure

The analysis proceeded in three steps. First, each regulatory instrument was coded for its requirements on governance, risk identification, product eligibility, monitoring, disclosure and inclusion. Second, SOCB performance data on sustainable finance and asset quality were compared with system-wide figures to locate implementation gaps. Third, the requirements and gaps were mapped to five organizational levels: board, portfolio, product, branch and customer. For each level, the analysis identified the decision to be made, the evidence needed, the main inclusion risk and the feedback loop to the level above. Proposed controls were then assessed against three criteria: prudential relevance, feasibility within an SOCB’s current capacity, and ability to produce a measurable resilience outcome.

3.4 Positionality and data use

The first author is employed by an SOCB. To avoid conflicts of interest and any use of confidential information, the analysis relies only on publicly available documents and statistics. No internal data, documents or views of any individual bank are presented, and figures for SOCBs are reported only at the group level as published by Bangladesh Bank or attributed to Bangladesh Bank data.

4. FINDINGS

4.1 Bangladesh’s regulatory architecture has moved from targets to risk management

Bangladesh Bank’s framework has developed in clear stages (Table 1). The Sustainable Finance Policy, issued through SFD Circular No. 05 of 31 December 2020, established a sustainable finance taxonomy covering green finance, sustainable agriculture, sustainable cottage, micro, small and medium enterprises (CMSMEs) and socially responsible finance. It requires each bank to set up a Sustainable Finance Committee and a Sustainable Finance Unit, and it calculates green finance targets on term-loan disbursement and sustainable finance targets on total loan disbursement (Bangladesh Bank, 2020). Bangladesh Bank’s own policy chronology records that the policy was updated through SFD Circular No. 03 of 22 October 2023 (Bangladesh Bank, 2026).

Table 1. Bangladesh Bank instruments relevant to climate-resilient banking, 2020–2025

Instrument	Reference and date	Core requirement	Relevance for SOCB climate finance
Sustainable Finance Policy for Banks and Financial Institutions	SFD Circular No. 05, 31 Dec 2020; updated by SFD Circular No. 03, 22 Oct 2023	Taxonomy (green, sustainable agriculture, sustainable CMSME, socially responsible finance); targets; Sustainable Finance Committee and Unit	Defines what counts as green or sustainable, but does not test whether financed activities reduce exposure
Guidelines on Environmental & Social Risk Management (ESRM)	SFD Circular No. 03, 26 Jun 2022	Exclusion screening, E&S due diligence, high/medium/low risk rating, escalation, monitoring	Builds transaction-level screening; climate hazards are embedded in E&S assessment rather than treated as a separate credit risk
Policy on Green Bond Financing	SFD Circular No. 05, 20 Sep 2022	Framework for green bond issuance and investment	Provides a potential funding channel for green assets
Guideline on Sustainability and Climate-related Financial Disclosure	SFD Circular No. 06, 26 Dec 2023	Disclosure based on IFRS S1 and S2, incorporating TCFD; first disclosure for financial year from January 2024; phased over three years	Requires public reporting of governance, strategy, risk management and metrics
Guideline on Climate Risk Management for Banks and Finance Companies	SFD Circular No. 01, 6 Nov 2025	Board-defined climate risk appetite; physical and transition risk assessment; transition and adaptation plans; scenario analysis and stress testing feeding ICAAP/ILAAP; semi-annual reporting	Moves climate from a reporting topic to a prudential risk; implementation capacity becomes the binding constraint

Sources: Bangladesh Bank (2020, 2022, 2023, 2025b, 2026).

The ESRM Guidelines of June 2022 set out an eight-step process that runs from exclusion-list screening through due diligence, risk rating, environmental and social action plans, escalation, monitoring and reporting. They apply size thresholds for smaller borrowers, for example BDT 2.5 million for agricultural finance involving agro-chemicals and BDT 3 million for small enterprises, while requiring due diligence for all large enterprise and infrastructure proposals. High-risk transactions require approval at board or executive committee level (Bangladesh Bank, 2022). The guidelines refer to floods, cyclones and climate resilience, but climate hazards are assessed within the broader environmental and social review rather than as a distinct driver of borrower repayment capacity.

The December 2023 disclosure guideline requires all scheduled banks and finance companies to disclose sustainability and climate-related information based on IFRS S1 and IFRS S2, fully incorporating the TCFD recommendations, starting with the financial year beginning January 2024 and phased over three years (Bangladesh Bank, 2023). This aligns Bangladesh with the international disclosure architecture (ISSB, 2023; TCFD, 2017).

The most important recent step is the Guideline on Climate Risk Management of November 2025. It requires banks to identify and assess physical risks, such as floods, cyclones, heat stress and drought, and transition risks over short, medium and long horizons. Boards must define a climate risk appetite explicitly, responsibilities must be allocated across the three lines of defense, and banks must prepare transition and adaptation plans aligned with Bangladesh's Nationally Determined Contributions, together with counterparty engagement plans. Banks must also conduct climate scenario analysis and stress testing and incorporate the results into their internal capital and liquidity adequacy assessments (Bangladesh Bank, 2025b). These requirements closely follow the BCBS (2022) principles for climate-related financial risk and the NGFS (2020) supervisory guide.

The direction of travel is therefore clear. Regulation now expects climate to be managed as a financial risk at board level. What the instruments cannot supply is the internal machinery that converts a board statement into underwriting, monitoring and recovery decisions at thousands of branches.

4.2 SOCBs lag in green finance and carry the weakest asset quality

Table 2 compares SOCB sustainable finance activity with the system in the April–June 2026 quarter, using the most recent Quarterly Review Report on Sustainable Finance.

Table 2. Sustainable and green finance disbursement, April–June 2026 (BDT crore)

Indicator	SOCBs	All banks and finance companies
Total loan disbursement	13,066.97	341,427.39
Term-loan disbursement	5,482.90	50,747.91
Green finance disbursement	86.87	6,158.20
Sustainable finance disbursement	2,012.88	96,004.31
Green finance as % of term-loan disbursement	1.6	12.1
Sustainable finance as % of total loan disbursement	15.4	28.1
SOCB share of system green finance (%)	1.4	—
SOCB share of system sustainable finance (%)	2.1	—

Source: Bangladesh Bank (2026), Table 4.2.1. Percentages calculated by the authors.

Three observations follow. First, SOCBs' green finance ratio of about 1.6 percent of term-loan disbursement is far below the system average of about 12.1 percent. For the first half of 2026 as a whole, the system ratio was 12.17 percent, and sustainable finance was 30.98 percent of total loan disbursement (Bangladesh Bank, 2026). Second, SOCBs account for about 3.8 percent of the quarter's total loan disbursement but only 1.4 percent of green finance. Their under-representation in green finance is therefore not only a result of smaller lending volumes. Third, the gap is persistent. Azad et al. (2022) reported that SOCBs achieved only 0.25 percent of the 5 percent green finance target in 2021. Over five years, SOCB green finance has remained marginal despite the expansion of the regulatory framework.

Asset quality explains part of this pattern and also defines the risk of correcting it carelessly. Bangladesh Bank data reported in *The Daily Star* show that SOCBs held about Tk 1,52,755 crore of defaulted loans in June 2025, equal to 44.6 percent of their credit, when the banking sector ratio stood at 34.6 percent (M. M. Hasan, 2025). In December 2025, SOCB defaulted loans were Tk 1,46,107.59 crore, or 44.44 percent of their disbursed amounts, while the sector ratio had fallen to around 31 percent from about 36 percent in September (M. M. Hasan, 2026). The same report attributes much of the sector-wide decline to a loan rescheduling facility rather than to cash recovery, so the improvement should be read with caution. Reporting on the first half of 2026 indicates that non-performing loans in five state-owned banks rose by Tk 6,304 crore to about Tk 151,000 crore at the end of June (Dhaka Tribune, 2026). The Financial Stability Report 2024 reports that the banking sector's capital to risk-weighted assets ratio fell to 3.08 percent at the end of 2024 and identifies SOCBs among the clusters with weak capital positions (Bangladesh Bank, 2025a).

These figures carry two implications. SOCBs have little capacity to absorb new losses, so climate lending that later defaults would deepen an existing capital problem. At the same time, a bank with weak capital tends to shrink risk-weighted assets, and the easiest way to do so is to stop lending to exposed rural borrowers. Without deliberate design, prudential repair and climate inclusion pull in opposite directions.

4.3 Classification is not risk reduction

The taxonomy defines eligible activities, which is essential for comparability and for preventing the most obvious forms of greenwashing. But a loan can qualify under the taxonomy and still fail to reduce the borrower's exposure. A solar irrigation pump financed in a district facing repeated flooding may be eligible and yet be destroyed in the next flood if it is not installed on raised ground. Conversely, a conventional working-capital loan paired with a verified business continuity plan, such as raised storage or a backup supply arrangement, may protect livelihoods more than a labeled green asset. Delmas and Burbano (2011) observe that gaps between environmental claims and practice grow when monitoring is weak and rules are unclear, and institutional theory predicts that units created to satisfy external expectations can operate apart from core decisions (Meyer & Rowan, 1977).

The disbursement data reinforce this point. Quarterly reports record what has been lent under each category, and the ESRM process records risk ratings. Neither records whether financed adaptations were installed, whether they worked, or how the loans performed after a hazard. Bangladesh Bank (2026) reports, for example, that utilization of banks' Climate Risk Fund across the system was only BDT 4.38 crore during April–June 2026, which suggests that dedicated climate-response resources remain small relative to the scale of exposure. Without outcome data, neither the bank nor the supervisor can tell whether climate finance is building resilience or merely relabeling existing credit.

4.4 Portfolio risk depends on location

Sector codes alone cannot distinguish a resilient enterprise from an identical business exposed to salinity or repeated flooding. The empirical literature shows that location-specific climate exposure affects loan pricing and performance (Javadi & Masum, 2021; Nguyen et al., 2022) and that disasters weaken bank stability through local loan books (Klomp, 2014; Noth & Schüwer, 2023). Möllmann et al. (2020) demonstrate that freely available satellite indices add predictive power for agricultural loan defaults. For SOCBs, whose branch networks cover coastal, char and flood-plain districts, the practical starting point is a branch- and district-level exposure map that overlays outstanding credit by sector with hazard information. The aim is prioritization, not automatic rejection: the map shows where adaptation finance and monitoring effort will matter most.

The 2025 guideline's requirement for scenario analysis and stress testing (Bangladesh Bank, 2025b) is difficult to meet without such mapping. Sophisticated climate scenario models used in advanced economies require granular data that SOCBs may not hold. A proportionate approach, consistent with BCBS (2022), begins with simple sensitivity analysis on the most exposed district-sector concentrations and refines it as data quality improves.

4.5 Product design must follow adaptation cash flows

Adaptation investments often generate benefits by avoiding losses rather than by raising revenue. Raised storage, efficient irrigation, saline-tolerant seed, cooling for perishable goods, flood protection, distributed renewable energy and business continuity investments all reduce the probability or severity of income loss. Their repayment capacity therefore depends on how often the hazard occurs and how much loss is avoided. Tenor, grace periods and installment schedules should reflect this logic, for instance by aligning repayments with harvest cycles or by including a pre-agreed rescheduling option triggered by a verified hazard event. Shoji's (2010) evidence from Bangladesh shows that contingent rescheduling after a flood protected household consumption, especially for landless households and women. Berg and Schrader (2012) show that relationship lending preserves access to credit after disasters. These findings support a design in which flexibility is written into the contract in advance rather than granted case by case afterwards. Ex ante flexibility protects borrowers and limits discretionary restructuring, which in an SOCB context can be used to conceal deterioration. Instruments discussed in the Islamic finance literature, such as profit-and-loss-sharing structures, social finance funds and FinTech-enabled disaster transfers, may complement such contracts where Shariah-compliant products are offered (Alamm et al., 2025; Nipa et al., 2026).

4.6 Branch capability and customer protection are binding constraints

Branches originate, monitor and recover most SOCB loans to farmers and small enterprises. A lengthy climate checklist that officers cannot verify becomes ceremonial compliance. The ESRM thresholds already exempt many small loans from full due diligence (Bangladesh Bank, 2022), so for the borrowers most exposed to climate hazards the branch officer's judgment is often the only climate assessment. Training should therefore focus on observable vulnerability, a short list of eligible measures, the documentation needed to verify installation and clear escalation rules.

Customers also need protection. Climate labels must not justify hidden fees, unsuitable debt or coercive bundling of insurance. The National Financial Inclusion Strategy explicitly aims to improve resilience against environmental vulnerability and to support green finance (Financial Institutions Division, 2021), but inclusion goals are met only if adaptation products reach women, small farmers

and informal enterprises on affordable terms. Hallegatte et al. (2017) caution that poorer households, who hold more of their wealth in vulnerable assets, suffer larger relative losses, which makes affordability and fair restructuring central rather than peripheral.

4.7 Governance determines whether public mandates help or harm

The political-view literature warns that directed lending in state banks can produce misallocation (Dinç, 2005; Sapienza, 2004), and Bangladesh's own evidence links political board affiliation and weak oversight to non-performing loans (M. N. Hasan & Khan, 2021; Uddin et al., 2023). Climate programs, which often come with subsidies, refinancing lines and public visibility, are vulnerable to the same pressures. The development-view evidence, however, shows that state banks can lend countercyclically when private banks retreat (Bertay et al., 2015; Brei & Schclarek, 2013). The governance task is to preserve the second effect while containing the first. This requires that every policy-directed or subsidized climate program specify eligible customers, risk sharing, pricing, expected outcomes and responsibility for losses, and that board reporting separate commercially priced climate finance from policy-directed exposure and guaranteed lending.

5. THE CLIMATE-RESILIENT INCLUSIVE BANKING (CRIB) MODEL

5.1 Structure of the model

The CRIB model organizes climate risk management and inclusive adaptation finance across five levels. Each level has a decision, an evidence base, an inclusion safeguard and a feedback loop to the level above (Table 3).

Table 3. The five-level CRIB governance model

Level	Core decision	Required evidence	Inclusion safeguard	Feedback
Board	Climate risk appetite, limits by sector and geography, approval of policy-directed programs, disclosure integrity	Approved appetite statement, concentration limits, program terms with risk-sharing and loss allocation, assurance results	Explicit statement that hazard exposure alone is not grounds for exclusion; access targets for priority groups	Receives outcome and distribution reports; revises appetite annually
Portfolio	Material hazard concentrations, review triggers, stress-test scope	Branch- and district-level exposure map, sector-location matrix, simple sensitivity tests	Monitoring of credit withdrawal from high-hazard districts	Reports concentrations, trends and stress results to the board
Product	Eligible adaptation measures, tenor and repayment design, pricing on residual risk	Technical eligibility list, cash-flow logic, contingent rescheduling terms, partner arrangements	Affordability tests; standardized evidence for small loans	Reports uptake, arrears and verified outcomes by product
Branch	Borrower diagnosis, verification of installation, escalation of exceptions	Short diagnostic form, site evidence (photographs, invoices, visit notes), exception register	Officer discretion to recognize borrower-level mitigation; appeal route	Reports exceptions, verification rates and post-shock performance
Customer	Informed choice, consent, restructuring and complaints	Plain-language terms, consent records, complaint log and resolution	Fair treatment after verified shocks; no hidden fees or tied products	Customer outcomes and complaints inform product redesign

Figure 1 presents the five levels of the model and the flows between the

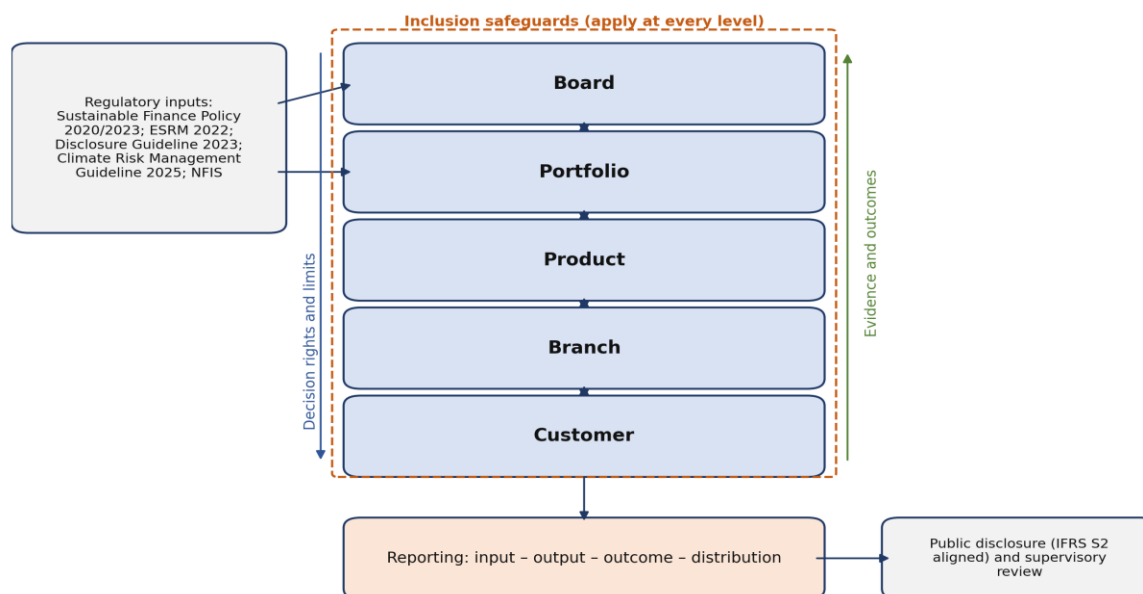


Figure 1. The Climate-Resilient Inclusive Banking (CRIB) model

Source: Authors' own elaboration.

5.2 Board level

The board owns the climate risk appetite required by the 2025 guideline (Bangladesh Bank, 2025b). In the CRIB model, the appetite statement does three things. It sets concentration limits by sector and geography, so that management cannot expand lending in a single hazard zone without board approval. It states that climate exposure alone is not a ground for exclusion, which commits the bank to financing feasible adaptation. And it requires that every policy-directed climate program come with written terms on eligibility, risk sharing, pricing and loss responsibility before the bank participates. This last element addresses the political-view risk directly (Dinç, 2005; Uddin et al., 2023). The board also receives the outcome and distribution reports described in Section 5.7 and is accountable for the integrity of climate disclosures under the 2023 guideline.

5.3 Portfolio level

The risk management function builds and maintains a sector-location exposure map. In the first year this can use existing branch codes, district identifiers and sector classifications combined with publicly available hazard maps. Over time, borrower-level geolocation and remote-sensing indicators can be added (Möllmann et al., 2020). The map supports three uses: setting review triggers when concentrations in high-hazard districts exceed a threshold; selecting portfolios for simple stress tests; and monitoring whether credit is being withdrawn from exposed districts faster than risk justifies. The last use is an inclusion safeguard, because it detects silent de-risking.

5.4 Product level

Product teams define a short list of eligible adaptation measures for each priority segment, with technical criteria drawn from the taxonomy and from partners such as agricultural extension services, engineers and insurers. Each product specifies the cash-flow logic linking the measure to repayment capacity, a tenor matched to the asset's useful life, and a contingent rescheduling clause triggered by an independently verifiable hazard event. Pricing and collateral decisions consider residual risk after feasible adaptation, so that a vulnerable borrower with a credible risk-reduction plan can be more financeable than an apparently lower-risk borrower whose exposure is unrecognized. Small loans use standardized evidence; larger exposures require technical assessment. Where the bank offers Shariah-compliant windows, profit-and-loss-sharing and asset-backed structures can be designed around the same adaptation logic (Alamm et al., 2025; Zahid, 2026).

5.5 Branch level

Branches receive a one-page diagnostic tool, targeted training and clear authority. The diagnostic records the borrower's main hazard, the proposed adaptation, its expected effect and how installation will be verified. Verification can combine site visits, invoices, photographs with location stamps and customer records. Branch officers may recognize borrower-level mitigation that a district map would miss, and every such exception is recorded in a register reviewed by the second line. Remote data can reduce cost, but it should be checked against field evidence and used only with customer consent.

5.6 Customer level

Customers receive plain-language explanations of cost, benefits, obligations and the conditions under which rescheduling is available. Consent is recorded for data collection and for any bundled insurance. A complaint channel with tracked resolution provides a final check on mis-selling. After a verified shock, borrowers with viable businesses receive proportionate restructuring under pre-agreed terms, while repeated restructuring without an adaptation plan triggers review rather than automatic rollover.

5.7 Outcome-based reporting

The CRIB model distinguishes four reporting layers (Table 4). Disbursement is an input, an installed system is an output, and reduced downtime, lower water use, protected income or reduced loss is an outcome. A fourth layer reports the distribution of outcomes by geography, gender and enterprise size. Without this distinction, banks can meet volume targets without demonstrating resilience. Public reporting should state definitions, baselines and limitations, and a bank should not claim that an entire loan amount equals avoided climate loss.

Table 4. Measuring climate finance beyond disbursement

Layer	Example indicators	Management use	Link to disclosure
Input	Amount approved and disbursed by product and district; staff trained	Resource allocation and target monitoring	Metrics on climate-related financing
Output	Adaptation measures verified as installed; share of loans with completed verification	Implementation control and audit sampling	Evidence for taxonomy classification
Outcome	Reduced downtime, water use or verified loss after hazard events; arrears and recovery compared with similar non-adapted borrowers	Credit and adaptation effectiveness; pricing calibration	Climate risk management effectiveness
Distribution	Outcomes by district hazard class, gender and enterprise size	Inclusion and concentration control	Social impact and fair treatment

5.8 Implementation roadmap

In the first year, an SOCB can establish the board appetite statement, select two or three priority portfolios, build an initial exposure map from existing data and define baseline outcome measures before disbursement. It can pilot two or three adaptation-linked products in districts where hazard, economic activity and branch capacity justify focused learning. In years two and three, verified results can inform underwriting, pricing, recovery and staff incentives. Incentives should reward valid classification and verified outcomes, not disbursement volume alone. Partnerships with extension services, engineers, insurers and local government can strengthen technical assessment without transferring the bank's accountability. Pilot evaluation should compare repayment, arrears, verified loss and recovery between financed adaptations and similar borrowers without the measure, while recognizing selection bias.

6. DISCUSSION

The findings support the working proposition set out in Section 2.6. Bangladesh's regulatory framework now asks banks to treat climate as a financial risk, but SOCB data show that classification and disbursement have not translated into material green lending, and that the balance sheets on which such lending would rest are fragile. The CRIB model responds by placing decision rights where exposure is created and by requiring evidence at each level.

The analysis extends the green banking literature on Bangladesh. Earlier studies emphasized regulatory leadership and disclosure (Bose et al., 2018; Khairunnessa et al., 2021) and documented shortfalls against targets (Azad et al., 2022). This paper shows that the shortfall is concentrated in SOCBs and persists in 2026, and argues that volume targets alone cannot close it because the binding constraints are capital, governance and branch capability. It also moves the focus from whether banks lend green to whether that lending changes exposure.

The model is consistent with the international supervisory consensus. The BCBS (2022) principles and the NGFS (2020) guide expect board oversight, integration into risk management and proportionate scenario analysis, and IFRS S2 requires disclosure of governance, strategy, risk management and metrics (ISSB, 2023). The CRIB model translates these expectations into the organizational reality of a state-owned bank with a large rural branch network and limited data. Its emphasis on proportionate, location-based mapping before complex modeling follows the uncertainty argument of Bolton et al. (2020): when risks are radically uncertain, simple and transparent tools that inform decisions may be more useful than precise but fragile models.

The paper also contributes to the debate on state bank ownership. The political view and the development view are often presented as alternatives (La Porta et al., 2002; Andrianova et al., 2012). Climate adaptation shows why they should be treated as conditions

to manage within the same institution. SOCBs' countercyclical capacity (Bertay et al., 2015; Brei & Schclarek, 2013) is valuable precisely when climate shocks hit, but the same institutional features that permit countercyclical lending also permit directed lending that becomes non-performing (M. N. Hasan & Khan, 2021; Uddin et al., 2023). The CRIB model's requirement that policy-directed programs carry written risk-sharing and loss-allocation terms, and that board reports separate them from commercial lending, is a practical way to keep the development benefit while limiting political misallocation.

Institutional theory helps explain why SOCB climate finance could grow on paper without reducing risk. Formal structures such as sustainable finance units and taxonomy reports confer legitimacy, and Meyer and Rowan (1977) predict that they will be decoupled from core activity when they conflict with efficiency or established routines. The CRIB model reduces the scope for decoupling by linking each formal requirement to a decision, evidence that can be audited and an outcome indicator. The literature on greenwashing suggests that such verification is the main defense against the gap between claims and practice (Delmas & Burbano, 2011).

Finally, the model reconciles climate risk management with inclusion. Defensive de-risking is a rational response for a capital-constrained bank, but it would increase long-run losses for exposed communities (Hallegatte et al., 2017). The evidence that contingent repayment protected Bangladeshi borrowers after floods (Shoji, 2010) and that relationship lending preserves access after disasters (Berg & Schrader, 2012) suggests that the alternative is not unconditional lending but designed lending: finance tied to feasible adaptation, with flexibility agreed in advance and outcomes verified afterwards.

7. IMPLICATIONS

7.1 Theoretical implications

The paper offers an integrated lens that combines the political and development views of state ownership, institutional theory's concept of decoupling and the climate risk transmission framework. This lens explains why regulatory progress on sustainable finance can coexist with low and possibly low-quality climate lending in state banks. It also yields testable propositions: SOCB climate portfolios with board-level appetite limits, verified adaptation and separated policy-directed exposure should show lower post-shock arrears than portfolios without them, and outcome-based reporting should reduce the share of taxonomy-eligible loans whose financed measure is not installed.

7.2 Practical implications for SOCBs

SOCB boards can use the CRIB model to implement the 2025 climate risk guideline in a way that fits their capacity. Immediate steps include adopting a climate risk appetite with geographic concentration limits, building a branch-district exposure map, defining baseline outcome indicators for two or three pilot products, and creating an exception register for branch-level judgments. Credit, treasury, operations and recovery functions, not only the sustainable finance unit, should own climate decisions. Internal audit should sample both taxonomy classification and physical installation. Staff incentives should move from disbursement volume to verified outcomes.

7.3 Policy implications for Bangladesh Bank and government

Bangladesh Bank can strengthen the link between its instruments by asking banks to report verified outputs and outcomes alongside disbursement in the quarterly sustainable finance returns, and by publishing aggregate results by bank cluster. Supervisory review of the 2025 guideline could pay particular attention to whether SOCBs are withdrawing credit from high-hazard districts, which would signal de-risking rather than risk management. The government, as owner, can make SOCB participation in climate programs conditional on written terms for eligibility, pricing, risk sharing and loss allocation, and can support data infrastructure, such as shared hazard maps, that all banks can use. Since the National Financial Inclusion Strategy's period ended in June 2026 (Financial Institutions Division, 2021), its successor offers an opportunity to integrate climate resilience targets with inclusion targets explicitly.

8. LIMITATIONS AND FUTURE RESEARCH

The study is a policy design analysis, not an empirical portfolio study. It does not estimate expected credit losses or capital effects for any bank, and it does not test whether the CRIB model improves outcomes. The SOCB figures are group aggregates from Bangladesh Bank publications, and asset quality figures for 2025–2026 are taken from press reports attributing them to Bangladesh Bank data rather than from an official annual report; they should be updated when the next Financial Stability Report is published. The calculation of green finance shares relies on the categories and definitions used in Bangladesh Bank's quarterly report. Climate hazard maps contain uncertainty and can stigmatize whole districts, so the model's mapping step must allow borrower-level evidence and appeal. The literature review is purposive rather than systematic, and some relevant work, particularly in Bengali or in unpublished supervisory analyses, may have been missed.

Future research should build sector-location exposure maps using anonymized loan data and test whether adaptation-linked loans perform differently from comparable loans after hazard events. Longitudinal designs are necessary because resilience benefits and credit outcomes emerge over several seasons and shocks. Researchers could also examine how insurance, government guarantees and Islamic social finance instruments interact with SOCB lending, whether higher-risk classifications disproportionately reduce

credit to women, small farmers or informal enterprises, and how the board-level requirements of the 2025 guideline are implemented in practice across bank clusters.

9. CONCLUSION

Bangladesh's climate exposure makes climate risk a credit risk for every bank, and its regulatory framework now treats it as such. State-owned commercial banks have the reach to finance adaptation where it is most needed, but they enter this agenda with marginal green lending and some of the weakest asset quality in the system. Expanding climate lending without changing how decisions are made would risk creating a new layer of non-performing assets, while retreating from exposed districts would shift climate costs onto the most vulnerable borrowers.

The Climate-Resilient Inclusive Banking model offers a way through this dilemma. It assigns climate decisions to the board, portfolio, product, branch and customer levels; requires evidence at each level; protects inclusion through explicit safeguards; and reports outcomes rather than disbursement alone. It turns sustainable finance policy into accountable decisions and avoids a false choice between prudence and access by financing feasible risk reduction. Testing the model with portfolio data, and comparing repayment, loss and resilience outcomes for adapted and non-adapted borrowers, is the next step.

Declarations

Funding: The authors received no specific funding for this study.

Competing interests: Niger Sultana is employed by Sonali Bank PLC, a state-owned commercial bank in Bangladesh. Md. Aminul Islam, Md. Baharul Hasan and Ummey Sumaiya are affiliated with Islami Bank Bangladesh PLC, and Md. Shahed Alamm is employed by Bangladesh Finance PLC. The study uses only publicly available documents and statistics; no internal or confidential data of any institution were used. The views expressed are the authors' personal views and do not represent the views or policies of their employers. Md. Shahed Alamm is a co-author of two works cited in this article (Alamm et al., 2025; Nipa et al., 2026). The authors declare no other competing interests.

Ethics approval: Not applicable. The study used publicly available documents and did not involve human participants or identifiable personal data.

Data availability: All materials analyzed in this study are publicly available from the sources listed in the reference list. The percentages in Table 2 were calculated by the authors from Bangladesh Bank (2026).

Author contributions: Niger Sultana: conceptualization, methodology, writing (original draft). Md. Aminul Islam and Md. Baharul Hasan: literature review, policy document analysis. Md. Shahed Alamm: framework design, review and editing. Ummey Sumaiya: data compilation, review and editing. All authors read and approved the final manuscript.

Use of generative AI: During the preparation of this work, the authors used Claude (Anthropic), a generative AI tool, to assist with literature retrieval, reference checking, language editing and formatting. No data, results or references were generated by the tool without verification against the original sources. After using the tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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