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Localised Resilience Through An Equity Lens- A Review of Critical Infrastructure Research in Developing Countries

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Abstract

This literature review synthesizes current academic and policy research on critical infrastructure resilience (CIR) with a specific focus on equity, inclusivity, and localization in the Global South. While traditional resilience frameworks emphasize robustness and recovery, less attention has been given to how socially and spatially marginalized communities experience, contribute to, and are excluded from resilience-building processes. This review identifies dominant themes, theoretical framings, methodological approaches, and empirical gaps in CIR literature. The study finds that while resilience discourse has increasingly adopted systems-based and community-centered language, the operationalization of equity and inclusivity in infrastructure planning remains fragmented. The paper concludes with recommendations for future research pathways that center justice, participation, and locally grounded knowledge.

1. Introduction

Unequal exposure and resilience are highly relevant in the Global South, where poor and vulnerable individuals experience disproportional exposures to climate hazards through exposure bias based on living in exposed areas. This tends to generate poverty traps, affecting health, education, and livelihoods. Coastal Bangladesh, for example, has poorer households that bear a disproportionate brunt from flooding. Developing nations such as Iran have greater vulnerability from population growth that is decoupled from urban planning, and constrained infrastructure exacerbates effects. In Nairobi, dependence on centralised water networks ironically heightened the vulnerability of informal settlement residents, whereas multiple local sources promoted more resilience, and so implying centralised networks may increase dependence. Traditionally, importing European technologies without regard to local needs usually didn't work. In Brazil, neoliberal agribusiness-oriented policies exacerbate regional inequalities despite intensive use of water for agriculture. Informal settlements in the urban South are extremely vulnerable to climate extremes, aggravating poverty, and state responses tending to be insufficient. Developing resilience is thwarted by an insufficiency of resources, information, and proper infrastructure.

A literature review strategy is well-adapted to this research because of the interdisciplinary and dynamic quality of the study of critical infrastructure resilience (CIR), particularly when viewed through the prisms of equity, inclusivity, and localization in the Global South. Current research on CIR cuts across a wide range of fields—ranging from urban planning, engineering, disaster risk reduction, and social justice—to which these fields are typically subject in disciplinary bubbles. A scoping review facilitates a systematic integration of this dispersed body of knowledge, assisting in the determination of how the most important concepts are being defined, geographically and thematically where the research is most concentrated, and

what gaps continue to exist in existing understanding. Furthermore, with increasing policy focus on "just resilience" in international frameworks (e.g., Sendai Framework, SDG 11), the literature review also offers a timely chance to track new discourses, assess their inclusivity, and guide more aligned future research agendas that better reflect marginalized communities' lived experiences in developing parts of the world. The research can be divided into two research questions:

- What are the dominant trends and frameworks in literature addressing equity and inclusivity in CIR?
- How is localized resilience conceptualized and operationalized in the Global South?

Scope

This scoping review synthesizes peer-reviewed articles from the period 2000 to 2025 discussing equity, inclusivity, and localized resilience in critical infrastructures in the Global South. It is carried out with a multidisciplinary approach that converges urban planning, disaster risk reduction, development studies, and social justice. The spatial focus is on developing nations, and the thematic concern of the review is the relation between infrastructural resilience and vulnerable groups. The research traces thematic tendencies, hegemonic paradigms, conceptual developments (for example, SETS, LTS, community-based adaptation), and geographical patterns in literature. The review seeks to reveal the degree to which social justice, contextual diversity, and local knowledge systems are integrated in resilience practice.

Limitations

Although systematic, this review has some limitations. First, it is based only on the literature available in the Scopus database, which may leave out studies available elsewhere in other repositories or grey literature. Second, no consideration was given to non-English publications, possibly leaving out important local knowledge generated in local languages. Third, the analysis is limited to peer-reviewed articles, and therefore would likely miss operational learning from NGOs, grassroots networks, or governmental reports. Moreover, the scoping process methodology, as effective as it is for large-scale trend identification, falls short of the critical appraisal thoroughness of a comprehensive systematic review or meta-analysis. Last, thematic coding was also vulnerable to interpretative constraints due to the range of conceptualizations of resilience and equity across disciplines and settings.

2. Methodology

This research employs a scoping review methodology under the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses – Scoping Review) framework to systematically chart the literature that has been written on equity, inclusivity, and localized infrastructure resilience in the Global South. The main database employed in locating literature was Scopus due to its broad interdisciplinary, peer-reviewed literature coverage. Literature that was included met the following criteria: (i) years published between 2000 and 2025, (ii) developing country focus, and (iii) peer-reviewed journal article classification. The review did not include non-English language articles and grey literature in order to maintain quality consistency and academic rigour. The studies were analyzed using a thematic coding method to discern prevailing trends, conceptual frameworks, geographic patterns, and recurring methodological trends pertaining to the discourse around critical infrastructure resilience.

3. Thematic Trends in CIR Literature

a. Emerging equity lens: From universal resilience to differentiated impacts

An emerging equity lens is well-supported, as it brings into focus a significant change in observing and responding to climate threats and development challenges. The shift departs from a one-size-fits-all vision

of resilience towards strategies that recognize and specifically address the different experiences and needs of diverse populations and regions (Gandidzanwa C.P. et al., 2024).

Climate risks such as flood, cyclone, and erosion disproportionately affect poor and vulnerable individuals and communities globally (Akomea-Frimpong I. et al., 2021). This is not least because exposure bias means that poorer people tend to occupy more exposed areas. Cumulative climate effects can increase vulnerability in the long run, hindering asset accumulation, damaging health, education, and work prospects, and inducing temporary or permanent out-migration, potentially generating a poverty trap. It has been witnessed in coastal Bangladesh, a frontline of climate change impacts. Urban floods, for example, target socially vulnerable populations disproportionately, such as children, the elderly, disabled, poor, and minorities, making them more prone to injury and mortality (Leta B.M. et al., 2023). Small Island Developing States (SIDS) have higher economic risk than the world average, with projected average annual loss between 0.75% and 6.5% of GDP by 2030. This is due to their small population, remoteness, high cost of transportation, and sensitive ecosystems (Galaitsi S.E. et al., 2023).

National development plans may be undermined by climate effects, with strategically focused interventions needed in the most vulnerable due to inevitably limited resources (Amaral M.H. et al., 2025). Climate risk estimate differences in floodplains and coastal areas can defeat attempts at focusing adaptation efforts on the most vulnerable. Command and control style strategies, commonly techno-imperative and controlled by external forces, have been faulted for being ineffective in enhancing the long-term adaptive capacity of the poor and vulnerable (Mahmud S. et al., 2022). Measuring resilience in terms of one dimension (e.g., ecosystem, infrastructure, livelihoods, economy, welfare) or particular capacities (coping, adaptive) is usually not enough for multi-hazard complex environments (Islam M.A. et al., 2021). The Large Technical Systems (LTS) framework is very restrictive when applied to the Global South, where the waterscapes in cities are usually fragmented and multiplexed (Akallah J.A. et al., 2020). The availability of piped water, for instance, exposed the inhabitants in informal settlements to water scarcity more than they were when they had access to an abundance of various sources. Application of identical weighting factors across all indicators in resilience estimation can mislead decision-makers (Atrachali M. et al., 2019).

High-resolution spatial analysis that includes direct household exposure and access to essential services are now becoming possible even in data-constrained areas, enabling policymakers to target and prioritize pro-poor development. Targeting the resilience interventions in a few of the highest risk areas (e.g., 33% or one-third of the coastal subdistricts of Bangladesh) would protect 50–85% of progress attained on SDG 3, 4, 7, 8, and 13 indicators (Adshead D. et al., 2024). Local levels of resilience should be geared to the specific characteristics of local populations and constructed at local levels. This process is enhanced by quantitative analysis supplemented with thorough qualitative analysis at local levels (Rathnayaka B. et al., 2023). Policies are required that are focused on ensuring equitable distribution of resources taking into consideration the uniqueness of every area to ensure equity and social inclusion (Amaral M.H. et al., 2025). In the water-food nexus, the goal is to foster more sustainable and equitable dynamics and to comprehend who loses and who gains in a system. In Brazilian research, for instance, a focus on more equity and governance is encouraged, including the least advantaged in decision-making. Community-based adaptation (CBA) is advocated as a mainstream strategy for climate resilience. It focuses on solutions based on local knowledge, needs, and priorities, involving active participation of local stakeholders (Mahmud S. et al., 2022). The relevance of overcoming current social and economic disparities experienced by women and other marginalized groups is being more and more regarded as

being pivotal to climate vulnerability solutions. New planning frameworks and disaster response frameworks highlight the importance of integrating larger societal needs and values, such as equity, well-being, and sustainability, into resilience formulations (Galaitsi S.E. et al., 2023; Srivastava S. et al., 2024). This entails addressing existing imbalances and upholding procedural justice by way of cooperative community determination of resource allocation.

The notion of resilience has progressed from merely returning to the original state towards the understanding that disturbed systems do not necessarily regain a prior stable condition but could move to new equilibria (multiple equilibrium resilience) (Chi J. et al., 2024). Social-ecological resilience explicitly accounts for dynamic interactions between social and ecological change, leading to a better theoretical articulation of social issues. Resilience is increasingly understood as a multifaceted capacity encompassing stability, recoverability, and transformability, with transformability referring to the capacity to transition to a more desirable, lower-risk state (Murshed S. et al., 2024). The emphasis is shifting towards recognizing interdependencies among social, ecological, and technology systems (SETS framework) in measuring vulnerability because alterations in one system have implications on others. This framework helps in realizing the interconnectedness among environment, infrastructure, and equitable distribution of hazards in society (Leta B.M. et al., 2023).

This change can be seen in the creation of overall evaluation index systems for resilience with various dimensions such as political, economic, ecological, social, and market factors rather than focusing solely on internal project factors (Chi J. et al., 2024). Bhutan's community tourism programmes, for example, have been found to enhance the livelihoods and resources of participating households, including the poor, by diversifying income streams away from climate-vulnerable agriculture, hence building household resilience (Mahmud S. et al., 2022). In essence, the move from a universal view of resilience to one with an equity lens and differentiated impacts is a recognition that vulnerability is not uniform, but deeply intertwined with socio-economic disparities and local contexts. Effective resilience building, therefore, necessitates understanding these nuances and implementing tailored, participatory solutions that prioritize the needs of the most vulnerable and aim for a more just distribution of resources and opportunities.

b. Localization: Shift toward place-based and community-centered frameworks

The localization trend, a move towards place-based and community-led approaches, is a key development in the management of climate impacts and development challenges. This follows directly from the failures of the universal, top-down approach and the acknowledgment of differentiated effects across heterogeneous populations (Akallah J.A. et al., 2020). This trend follows some rationales identified by scientific literature.

Command and control strategies, being techno-centric and externally oriented, have been at fault for not enhancing the poor and vulnerable's long-term adaptive capacity (Mahmud S. et al., 2022). The Large Technical Systems (LTS) paradigm is very much limited in its application to the Global South, where waterscapes in urban areas are usually diverse and fractured. For example, bringing piped water into Nairobi centralized and made inhabitants in informal settlements more susceptible to lack compared to when they used several informal sources, showing the insufficiency of one large-scale solution (Akallah J.A. et al., 2020). Past work primarily centered on building risk and resilience metrics to measure hazard threats to infrastructure, yet knowledge about household-level infrastructure service disruption is still limited. National development strategies may be disrupted by the effects of climate, and specific interventions for the most vulnerable are required by inevitably limited resources. Evaluating resilience on a single parameter (e.g., ecosystem, infrastructure, livelihoods, economy, welfare) or targeted

capacities (coping, adaptive) is usually too limited for multi-hazard compound environments (Islam M.A. et al., 2021; Adshead D. et al., 2024). Application of the same weightings for all indicators in resilience assessment may be deceptive (Leta B.M. et al., 2023).

Climate risks disproportionately affect poor and vulnerable individuals and groups globally as a result of elements such as exposure bias, when poorer people inhabit more exposed areas (Adshead D. et al., 2024). Chronic exposure to climate effects can exacerbate vulnerability in the long term, stifling the accumulation of assets and affecting health, education, and labor opportunities, potentially trapping the poor in poverty (Amaral M.H. et al., 2025). Urban flooding, for instance, disproportionately impacts socially vulnerable populations such as children, the elderly, the disabled, the poor, and minorities, putting them at higher risk of injury and death. Citizens of informal settlements typically struggle to negotiate with the local government to have access to risk-mitigating infrastructure because they are illegal (Leta B.M. et al., 2023). Small Island Developing States (SIDS) are disproportionately exposed to the economic hazards of climate change because of their small size, distance from markets, high shipping costs, and vulnerable ecosystems (Galaitsi S.E. et al., 2023).

Resilience is region-specific, not a single-fits-all policy. Thus, assessment frameworks have to be adjusted to specific regional conditions (Murshed S. et al., 2024). Policies are required that put a premium on equitable resource distribution, bearing in mind the idiosyncrasies of every region, so that equity and social inclusion are facilitated (Galaitsi S.E. et al., 2023). The water-food nexus issues bring into relief the necessity for more integrated policy-making to achieve greater human development justice as well as greater natural resource exploitation distributive justice, with who loses and who gains in a system (Amaral M.H. et al., 2025).

Community-based adaptation (CBA) is being marketed as a mainstream measure for climate resilience. It focuses on solutions that are locally driven, based on local knowledge, needs, and priorities to encourage local stakeholders' active participation (Mahmud S. et al., 2022). This entails direct involvement of communities throughout projects' lifecycle and by all concerned local stakeholders, with a special focus on training and capacity building at the local level. Examples demonstrate that community-driven projects have the potential to work well and be affordable substitutes for top-down infrastructure projects, drawing on local knowledge, resources, and volunteers. These projects are designed to tackle current social and economic disparities between women and other marginalized groups as the core of climate vulnerability solutions.

Spatial analysis at high resolution, including direct household exposure and access to essential services, is becoming possible even in data-constrained areas, enabling decision-makers to target and prioritize pro-poor development. Measures of resilience should be defined specifically for the local population's unique features and need to be developed at local levels. The method is strengthened by quantitative analysis supplemented with comprehensive qualitative assessment in local communities (Leta B.M. et al., 2023). This entails the integration of local knowledge, scientific data, and international experiences to plan projects and optimize the utilization of local materials and resources (Mahmud S. et al., 2022). Oral history approaches are spotlighted to document people's day-to-day experiences as active users and producers, subverting traditional technological system views.

New planning and disaster response frameworks aim to include more comprehensive societal needs and values, such as equity, well-being, and sustainability, in resilience formulations. Multiple dimensions such as political, economic, ecological, social, and market aspects are now included in comprehensive evaluation index systems for resilience, going beyond merely internal project factors (Chi J. et al., 2024).

The Social-Ecological-Technological Systems (SETS) framework is used to measure vulnerability by comprehending interdependencies among social, ecological, and technological systems and helping us understand the interdependence of environment, infrastructure, and just distribution of hazards in society. Resilience Analysis Protocol (RAP), based on resilience thinking, is a site-specific tool that captures socio-ecological history, as well as current challenges and future scenarios, through participatory processes (Mahmud S. et al., 2022).

An equitable reaction has a holistic approach with regard to historical disadvantage, differential access to resources, and vulnerable members of society. Prioritization of reactions and recovery through a distributional equity perspective addresses imbalances prior to the reaction and makes all parties' endpoints following recovery more even (Galaitsi S.E. et al., 2023). Resource distribution ought to be determined by communities collectively so that procedural justice is ensured. This is also true of resource allocation, e.g., in the water-food nexus, where the impetus is to mainstream the least advantaged in decision-making. This emergent equity perspective recognizes that resilience-building is not a one-size-fits-all technical solution, but a profoundly social and context-specific endeavor that has to empower the most vulnerable. It's more like a tailor making a made-to-measure suit than selling an off-the-rack one; authentic resilience is individually tailored to the specific contours of a community's strengths and vulnerabilities, making sure everyone, particularly the most marginal, is adequately provisioned to meet future challenges (Adshead D. et al., 2024).

4. Equity and Inclusivity in CIR

The current body of literature on infrastructure resilience tends to have a technocratic bias, favoring universal, top-down, and techno-centric solutions that only emphasize physical infrastructure and abstract indicators (Akallah J.A. et al., 2020; Adshead D. et al., 2024; Islam M.A. et al., 2021; Rathnayaka B. et al., 2023). Such a bias is being questioned on numerous grounds, as it tends to ignore highly important human, social, and contextual considerations in many cases, resulting in meager success in constructing true resilience, particularly in vulnerable populations and least developed countries. Existing attempts at infrastructure resilience have primarily focused on building risk and resilience metrics to determine hazard threats to infrastructure, with a strong limited understanding of household-level infrastructure service disruption (Adshead D. et al., 2024). This limited scope does not properly quantify the real effect on households' access to basic services.

The Large Technical Systems (LTS) paradigm, which serves as the foundation for most centralized infrastructure strategies, is heavily constrained when applied to the Global South where cityscapes tend to be heterogeneous and fragmented (Akallah J.A. et al., 2020). Critically, this model ignores the everyday use of technology and different social groups' experiences of their material environments, and therefore does not give insight into the multifaceted urban environment For instance, the provision of piped water in Nairobi made residents of informal settlements more exposed to water scarcity than when they had relied on several informal sources, thus illustrating how a technocratic approach can unintentionally decrease resilience (Akallah J.A. et al., 2020).

Much of the literature on Public-Private Partnership (PPP) project resilience has focused on internal factors (e.g., leadership skills) and ignored the overwhelming effect of external factors like political, economic, social, environmental, and market conditions (Chi J. et al., 2024). Government and international organization recovery efforts tend to take the form of short-term measures that offer minimal support but do not extend prolonged health or education services that are essential to long-term resilience,

transformation, and building back better. This implies a reliance on short-term technical solutions over a more integrated, sustainable development approach.

In opposition to these constraints, there is an increasing trend toward localized, place-based, and community-focused approaches that provide a more informed and effective model of resilience. Bottom-Up, Participatory Frameworks promote community-based adaptation (CBA), prioritizing solutions based on local knowledge, needs, and priorities, and creating active involvement of local stakeholders throughout the project cycle (Mahmud S. et al., 2022, Piper L. et al., 2025). This entails direct community participation in program design and implementation. Successful localization incorporates scientific data as well as indigenous knowledge to formulate interventions that are socially and culturally compatible and optimize the utilization of local resources and materials (Mahmud S. et al., 2022; Galaitsi S.E. et al., 2023). This can be supported by quantitative analysis supplemented with deeper qualitative evaluations within local communities (Adshead D. et al., 2024). More recent models, like the Social-Ecological-Technological Systems (SETS) framework, propose to give a holistic approach to vulnerability assessment by effectively integrating social, ecological, and technological factors (Leta B.M. et al., 2023).

5. Localised resilience approaches in Global south

Localized resilience strategies are increasingly popular in disaster risk reduction and climate change adaptation literature as a reaction to the criticisms of a common technocratic inclination that tends to ignore human, social, and context-specific realities (Akallah J.A. et al., 2020, Murshed S. et al., 2024, Islam M.A. et al., 2021). These localized resilience strategies focus on bottom-up, participatory tactics developed to the specific features of local populations and their environments (Adshead D. et al., 2024, Atrachali M. et al., 2019 , Mahmud S. et al., 2022). They combine indigenous and local knowledge, draw on informal solutions, and favor equitable and sustainable development over standardized, top-down technical solutions.

The shortcomings of Large Technical Systems (LTS) are most starkly apparent in the Global South, where urban landscapes tend to be fragmented and diverse (Akallah J.A. et al., 2020). These systems often do not cater to the poorest segments of society and actually end up making them more vulnerable. For example, in Nairobi, the provision of centralized piped water exposed inhabitants of informal settlements to more risk of water shortages than when they had access to many informal sources (Akallah J.A. et al., 2020). This indicates that provision of LTS can raise comfort levels but at the same time make communities more susceptible to vulnerability by creating dependency.

On the other hand, decentralized systems and local drivers present a more resilient option. Neighborhoods that have a "patchwork quilt" of numerous, decentralized sources of water (e.g., rivers, rainwater, wells) have greater resilience compared to those relying on a sole centralized system. This multiple source system gives flexibility, where if one fails, others can plug the gap . Informal settlements in Nairobi have, for decades, had to depend on boreholes, wells, and other de-centralized water solutions, designing and replicating their own water provision outside the centralized one (Akallah J.A. et al., 2020). Rainwater harvesting is one such traditional knowledge-based technology that has been employed by communities in Nepal to support agriculture during dry periods (Mahmud S. et al., 2022).

Small-scale solar systems (Solar Home Systems - SHSs) provide affordable and environmentally friendly substitute power supplies in off-grid settlements of developing nations such as Bangladesh (Mahmud S. et al., 2022). SHSs are distributed and modular, which means that they are highly resistant to entire-system failure and not dependent on disruptions to external supplies during crises, thereby enabling households

to preserve energy access and communication. Ecosystem-based adaptation (EBA) measures, which are decentralized in nature, are promoted ahead of grey infrastructure-based approaches to water management for developing nations. They are cost-effective, control water quality, and modulate water supply during events of an extreme nature (Gandidzanwa C.P. et al., 2024). The theory of "self-help" by residents, i.e., cooperatives and community organizations buying land and establishing supply infrastructures, defies the top-down industrialization model and encourages local agency in decision-making (Akallah J.A. et al., 2020). This practice enables residents as active producers and users, as opposed to being passive consumers.

Informal settlements in the Global South, though normally described as having "deficient supplies and intransigent problems" and regarded as areas of marginality with extreme vulnerability, can be highly resilient . This defies the traditional perspective that existence outside big networks is necessarily fragile . Inhabitants of informal settlements usually create special coping mechanisms and exhibit adaptive measures due to necessity, for example, developing alternative solutions for water and sanitation services. They are melting pots for sociotechnical creativity (Akallah J.A. et al., 2020). In spite of their inherent resilience, informal settlements are beset with numerous challenges, such as a deficiency in legal land tenure and political marginalization (Shankar R. et al., 2025, Piper L. et al., 2025). Governments at the local level can deny risk-reducing infrastructures because the "illegality" of these settlements is perceived. State responses tend to be limited and can require formalization, which does not always factor in local knowledge and preferences. The accommodation of indigenous and local knowledge is uniformly emphasized as important for establishing effective, socially, and culturally aligned climate change adaptation efforts, particularly in the Global South (Mahmud S. et al., 2022, Atrachali M. et al., 2019 , Panpakdee C. et al., 2021, Piper L. et al., 2025, Leal Filho W. et al., 2024). This knowledge, frequently developed over time through generations, offers a "safety net" to sustain communities in relation to environmental variation and plays an important role in community resilience (Mahmud S. et al., 2022).

Localization is most effective when scientific data are integrated with local knowledge to create interventions that are "socially and culturally compatible" and optimize local resources (Mahmud S. et al., 2022). This multi-stakeholder engagement closes the gap between science, governance, and local knowledge, increasing understanding across scales (Smith M.D. et al., 2024). Local knowledge, when combined with a "bottom-up" flow of information, has greater capacity to respond to particular community needs and exposure (Mahmud). Organized documentation of local knowledge using approaches such as Climate Vulnerability and Capacity Analysis (CVCA) enables comprehension of local adaptations and vital institutions (Mahmud S. et al., 2022). One enduring challenge to the translation of resilience-by-design (RBD) to higher institutional levels is the challenge of translating community experience and understanding into higher-order institutional culture (Galaitsi S.E. et al., 2023). Even with robust local awareness and practices of resilience, these are not always translated into public institutions, and individuals and communities are relied upon to continually carry the load of resilience.

6. Gaps and challenges in literature

Local resilience strategies, though imperative for successful adaptation in the Global South, experience several gaps and deficiencies within the literature and in operational use. Such issues cut across methodological, theoretical, policy, and practical spectrums, frequently compounded by the singular socio-economic and environmental conditions prevailing in the developing world.

One of the major issues is with the paucity of existing research techniques and data availability, especially at the local level. A narrow base of knowledge exists regarding household-level infrastructure service interruption caused by climatic hazards, and previous work has largely been concerned with the risk and resilience statistics at an aggregated level. This can compromise attempts to focus on adaptation among the most vulnerable groups. Numerous studies are limited by sparse data in areas such as coastal Bangladesh, where new geospatial data methods are needed to comprehend climate dangers on a local level . A recurring issue in measuring urban resilience is the paucity of credible data to validate models and the pragmatic difficulty of ascertaining the exact contribution of each indicator to the overall resilience value (Atrachali M. et al., 2019).

There is a scarcity of systematic reviews on determinants of farm-level adaptation in India, with less evidence available for climatic factors, perception, risk attitude behavior, climate information, and development-related policies. Reviews tend to exclude grey literature and non-farm adaptation measures. Empirical studies quantifying the resilience of slum communities using participatory methods are extremely few (He Z. et al., 2021). Limitations for IT integration for e-government involve regional differences and temporal focus, which undermine generalizability. Methodological decisions could compromise inclusivity, and contextual variables may not be exhaustively represented (Madaki A.S. et al., 2024).

Policy-making and governing structures tend to pose substantial impediments to localized resilience. Current national SDG targets are not necessarily pro-poor in their orientation or exposure bias-sensitive in poor communities, making them more likely to miss target levels (Pazhuhan M., 2023). A thorough streamlining mechanism also has to exist within government organizations in order for geospatial analysis to work. Government institutional inertia and unwillingness to alienate powerful private or communal interests could undermine systemic transformation (Prihartanto E. et al., 2024). A huge adaptation funding gap continues to exist across the world. There are also difficulties in being able to provide mechanisms for efficient communication and information flow from upper government levels to grassroots communities.

Current theoretical constructs and conceptual knowledge of resilience tend to lack the essence of fully grasping the Global South complexities.There is no universal definition of urban resilience, which complicates multi-disciplinary comprehension (Rakib M.A. et al., 2025) . The majority of resilience assessment models in Bangladesh have dealt with one aspect of resilience (e.g., ecosystem, infrastructure, livelihoods, economy) and not with the multi-dimensional and intricate concept of resilience in multi-hazard contexts (Srivastava S. et al., 2024, Murshed S. et al., 2024). Evaluation metrics for urban resilience in underdeveloped areas must be further integrated to better sense the impacts of climate, ecology, topography, religion, and humanities (Zhou R. et al., 2023).

Transforming resilience ideas into successful on-the-ground interventions is subject to many practical challenges. The serial damages and interruptions of infrastructure networks by several hazards along coastal Bangladesh impose a heavy load on the economic growth, social resilience, and advancement towards the realization of the SDGs by the country (Hancock L. et al., 2019). Cyclone shelters are unevenly distributed and in short supply, and salinized land years to recover, requiring lots of external aid. There are also few technical resources and capacity, weak data and records, limited human resources, and weak capacity for monitoring and enforcing (Galaitsi S.E. et al., 2023).

Urban spaces in the Global South tend to be heterogeneous and dispersed, and centralized systems are commonly unable to penetrate or serve effectively the poorest (Amorim E.E.R. et al., 2022). The diffusion

of European technologies into the colonies commonly did not succeed due to a failure to appreciate social and ecological differences. Literature on the effects of climate change on critical infrastructure is commonly imbalanced in favor of developing countries (Leal Filho W. et al., 2024), even though there is a pressing demand for effective adaptation measures for the developing world. Current literature on the matter heavily focuses on developed nations. South Asian cities are faced with serious challenges in developing resilience because of infrastructure deficits, weak management capacity of city governments, and accelerated land-use transformations that erode established institutions and necessitate the development of new ones (Mahmud S. et al., 2022). Urban litter clogs stormwater drainage, leading to waterlogging and urban flooding.

Technically, the literature shows that although the recognition of the necessity for localized resilience is on the rise, the journey is full of challenges. It's the problem of charting a dark, unexplored forest at night: the end point is known, but the map is partial, the compass fickle, and the trail itself in constant flux, calling for not only a superior compass, but also new means of perceiving the landscape and teamwork with those experienced in the secret paths.

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