Between Knowledge and Neglect: Climate Governance and Generational Vulnerability Among Smallholders in Amritsar, Punjab

Pavittarbir Saggu
Sri Guru Gobind Singh College, Chandigarh

As climate stress intensifies across South Asia, smallholder farmers remain at the forefront of both ecological vulnerability and policy neglect. This article examines the differentiated experiences of climate change among smallholder farming households in Amritsar district, Punjab, with particular attention to generational divides in perception, adaptation, and engagement with state-led schemes. Drawing on qualitative fieldwork across two villages, the study reveals that younger and older farmers frame climate change through distinct lenses—shaped by media access, risk preferences, and household power. However, both groups face similar structural constraints, including limited credit, elite capture of subsidies, and distrust in state institutions. The article argues that Punjab's climate governance framework fails to account for these social and generational cleavages, thereby reinforcing disillusionment and adaptation fatigue. By foregrounding intra-household dynamics and uneven policy delivery, this study calls for a more inclusive, participatory, and socially embedded approach to climate adaptation in rural South Asia.

1. Introduction

Punjab, historically celebrated as India's breadbasket, faces a paradoxical crisis. Despite its rich agricultural heritage and substantial state support, its farming communities are increasingly caught in the crosshairs of climate variability, ecological degradation, and economic precarity. The region's dependence on groundwater-intensive, high-input farming systems—initially spurred by the Green Revolution—has rendered it highly vulnerable to shifting climate patterns, including erratic rainfall, rising temperatures, and groundwater depletion.

This article examines the climate vulnerability of smallholder farmers in Amritsar district, Punjab, with a specific focus on inter-generational

perceptions and adaptive practices. It argues that generational differences in climate risk perception intersect with resource access, state policy, and social stratification, producing distinct trajectories of adaptation and vulnerability. Through qualitative fieldwork in two villages—Wadala Khurd and Tarpai—the study uncovers how younger and older farmers perceive and respond to climate change differently, and how state policies fail to accommodate these divergences.

This analysis engages with broader South Asian development debates around rural climate governance, smallholder marginalization, and the socio-political dimensions of adaptation. Drawing on scholarship that views climate adaptation not merely as a technical process but as a socially mediated one (Adger et al., 2009; Mertz et al., 2009), the article contributes to understanding the disjuncture between local experiences of climate stress and the scalar design of adaptation policy.

By foregrounding the lived experiences of smallholders across generations, the article brings attention to two underexplored areas: (a) how generational positionality shapes the framing of climate risk, and (b) how such perceptions inform or constrain adaptive behavior in the face of state-led schemes. In doing so, it makes a case for inter-generationally sensitive and resource-conscious adaptation frameworks rooted in local socio-ecological realities.

2. Rural Punjab and the Climate Question

Punjab's agrarian landscape is both emblematic of India's Green Revolution success and illustrative of its ecological contradictions. Once heralded as the nation's grain basket, the state now finds itself on the frontlines of agrarian distress exacerbated by climate change. The intensification of agriculture—monoculture cropping, excessive reliance on chemical inputs, and a groundwater-dependent irrigation regime—has made Punjab's farming system highly susceptible to climate variability (Shah, 2009; Kumar, Singh and Kingra, 2019).

Over the past two decades, the region has experienced erratic rainfall patterns, shifting monsoon onset, extended dry spells, and rising summer temperatures. Smallholder farmers, whose livelihoods are directly tied to seasonal cycles, report increasing crop losses, particularly in wheat and paddy cultivation (Bhagat, Das and Mohapatra, 2020). Simultaneously, the declining water table—falling by nearly 1 meter annually in some districts—compounds the vulnerability, especially for those lacking

access to private tubewells or high-efficiency irrigation systems (Shah, 2009).

Yet, despite this escalating risk, Punjab's climate adaptation efforts remain state-driven, standardized, and largely technocratic, failing to recognize the differentiated experiences of risk among farmers (Gulati, Sharma and Sharma, 2012; Datt, 2014). National-level policies such as the National Action Plan on Climate Change (NAPCC) and its subsidiary State Action Plans (SAPCCs) emphasize technological innovation, awareness campaigns, and compensation schemes. However, these interventions often bypass the realities of smallholder constraints and reinforce dependence on expensive inputs, mechanization, or insurance products that are either inaccessible or poorly targeted (Jha, Srinivasan and Kasyap, 2019).

A significant gap in current discourse is the lack of attention to the social dimensions of climate vulnerability, particularly how age, landholding size, knowledge systems, and perceptions influence adaptive behavior. While some farmers adapt through changes in cropping patterns, diversification, or off-farm employment, others—especially older or resource-poor cultivators—resist change due to perceived uncertainty or attachment to traditional practices (Mertz et al., 2009; Mortimore and Adams, 2001). This highlights the need to move beyond binary categories of "adapted" vs. "non-adapted" and toward a more grounded understanding of how structural and cognitive barriers shape adaptation.

Punjab's case, thus, offers a critical lens through which to interrogate climate governance in South Asia. It raises questions about whose knowledge counts, whose vulnerabilities are visible to the state, and how adaptation policies can be made responsive to diverse agrarian experiences.

3. Methodology and Field Site Description

This study is based on qualitative fieldwork conducted in Amritsar district, located in northwestern Punjab, India. Amritsar was selected as a representative site due to its diverse agrarian landscape, varying landholding patterns, and acute exposure to climate-induced stressors such as declining groundwater levels, erratic rainfall, and rising input costs. Though Amritsar is more commonly associated with its religious

and borderland significance, its rural economy remains predominantly agrarian.

Two villages were purposively selected to reflect intra-district contrasts: Wadala Khurd, in the Rayya Block of Baba Bakala Tehsil, and Tarpai, located in the Majitha Block. These villages differ in cropping patterns, irrigation access, and demographic profile, but share common vulnerabilities related to smallholder dependence, climate unpredictability, and limited state support. Wadala Khurd has a higher reliance on tube well irrigation and wheat-paddy monoculture, while Tarpai showed more diversity in mixed cropping and reliance on communal water infrastructure.

The fieldwork was conducted over a three-month period and used semi-structured interviews with 30 farmers, stratified across two key variables: age and landholding size. The age groups were divided into older farmers (50–65 years) and younger farmers (28–49 years). Landholding categories followed commonly accepted rural thresholds: smallholders (1–2 hectares), medium (2–5 hectares), and large (>5 hectares). This stratification enabled the study to examine how generational knowledge and resource access interact in shaping perceptions and strategies for climate adaptation.

Interviews were conducted in Punjabi and later translated into English. A flexible interview guide was used to explore perceptions of weather change, sources of information, responses to recent climatic events, and engagement with government programmes. Field notes and informal conversations were recorded to supplement structured responses. Triangulation was applied by cross-verifying individual interviews with community observations and visible infrastructure conditions (e.g., canal access, borewell usage).

The sample is not statistically representative, but this is consistent with the study's qualitative design, which prioritizes depth over breadth (Small, 2009). The analysis adopts a contextualist approach, treating adaptation not as a rational decision-making model, but as a practice embedded in social memory, inter-generational power, and structural constraint (Mertz et al., 2009; Singh, Rai and Singh, 2018). All participants gave verbal consent, and their identities have been anonymized.

By grounding the analysis in the everyday knowledge of farmers and focusing on intra-household generational divergence, the methodology aligns with growing calls for localized and socially embedded climate adaptation research in the Global South.

4. Generational Perceptions of Climate Change

Fieldwork revealed a marked generational divide in how farmers in Amritsar perceive climate change, interpret weather irregularities, and assess appropriate responses. While erratic weather patterns were widely acknowledged, the interpretive frameworks through which they were understood diverged sharply between age groups—shaped by differing experiences, information sources, and institutional trust.

4.1 Cycles and Fatalism: Older Farmers' Interpretive Framework

Older farmers (50–65 years) typically located climate variability within a natural or cyclical worldview. Many downplayed the novelty of current climatic changes, citing earlier experiences of unpredictable monsoons, summer heatwaves, or unseasonal rainfall. Phrases like *"it has always been this way"* or *"weather comes and goes"* were common.

For this group, climate change was neither anthropogenic nor urgent. Several attributed changing seasons to divine will, referencing religious or spiritual beliefs rather than environmental data. While these farmers had rich experiential knowledge of weather cycles, their interpretive lens often discouraged innovation. Adaptation, in this context, meant *enduring* change, not transforming practices. These findings reflect broader patterns seen in rural South Africa and the Sahel, where older farmers equated climate variability with continuity rather than disruption (Gbetibouo, 2009; Mortimore and Adams, 2001).

Many older respondents also expressed skepticism toward government messaging or scientific explanations, dismissing them as abstract or politically motivated. This mistrust limited their engagement with agricultural extension schemes or climate advisories.

4.2 Awareness and Risk: Younger Farmers' Sense of Crisis

Younger farmers (28–49 years), by contrast, tended to interpret climate change as a growing crisis. Most referenced visible changes such as shorter winters, delayed rainfall, and intensified heat. Importantly, they linked these shifts to human activity—industrialization, vehicular pollution, deforestation, and stubble burning—demonstrating an awareness shaped by mobile media, YouTube videos, social media content, and government awareness campaigns (Sahu and Mishra, 2013; Wheeler, Zuo and Bjornlund, 2013).

This cohort exhibited higher anxiety about the future of farming and showed greater willingness to consider new approaches, such as sowing-time adjustments, new seed varieties, or shifts to less water-intensive crops. However, their enthusiasm was tempered by practical limits: lack of access to finance, fear of crop failure, or opposition from older household members. As one farmer explained, *"I want to change things, but my father doesn't believe it's necessary."*

This dynamic reflects a tension between knowledge and authority. In many joint families, younger members managed day-to-day cultivation, while land titles and decision-making power remained with older generations—leading to intra-household negotiation or conflict around adaptation choices.

4.3 Why Perception Gaps Matter for Policy

This generational divergence is more than academic—it has direct implications for climate governance. Current schemes like KVKs and subsidy programs often assume a uniform audience, overlooking the fact that what farmers believe determines what they do. As Mertz et al. (2009) argue, adaptation planning that ignores social differentiation—including generational worldviews—risks limited uptake and trust.

Moreover, many schemes are delivered digitally or via government messaging—formats more accessible to younger farmers. Yet decision-making in many Punjabi farms remains gerontocratic, meaning adaptation logic is filtered through older perceptions. Without accounting for these internal gaps, well-designed policy can fail at the household level.

5. Adaptive Strategies and Structural Constraints

While generational perceptions of climate change differed significantly, the ability of farmers to act on those perceptions was shaped even more profoundly by landholding size, access to resources, and institutional support. Across both age groups, farmers employed a range of coping strategies in response to climate stress—but these were neither equally available nor equally effective.

5.1 Adaptation by Landholding: Unequal Capacities

Smallholder farmers (owning 1–2 hectares) reported the most constrained adaptive responses. Faced with erratic rainfall and rising input costs, their

adjustments were often reactive and driven by compulsion rather than strategy. Common responses included:

- Shifting to less water-intensive crops, such as maize or fodder.
- Supplementing income through dairy, construction work, or shopkeeping.
- Reducing input usage (fertilizer or pesticide), even at the risk of lower yields.

These coping mechanisms were short-term and risk-averse—reflecting what Thomas et al. (2007) refer to as "incremental adaptation under constraint." As one smallholder in Tarpai stated, *"We don't adapt; we survive. Change is expensive."*

Medium and large landholders, by contrast, had more room to experiment. Some had:

- Installed drip or sprinkler irrigation systems.
- Shifted sowing dates in response to changing rainfall patterns.
- Invested in hybrid or drought-tolerant seeds.

However, these adaptations came with economic risks, and adoption was far from universal. Many farmers still hesitated to adopt techniques with uncertain outcomes, especially in the absence of trustworthy information or financial buffers.

5.2 Age, Risk Appetite, and Experimentation

Age interacted with landholding in complex ways. Younger farmers were more inclined to try new techniques, particularly when they had some control over household decisions. In large farming families, sons often managed a portion of land independently, creating opportunities to pilot new methods—what some respondents called *"testing fields."*

In contrast, older farmers—even when aware of climate risks—preferred tried-and-tested approaches. Their resistance stemmed not from ignorance, but from a combination of:

- Financial conservatism
- Past negative experiences with failed experiments
- Emotional attachment to familiar techniques

This generational tension often created internal conflict. A younger farmer explained: *"My father says: 'Why try something risky when the old way still works?' But the old way is failing."*

5.3 Structural Barriers That Undermine Adaptation

Even where willingness existed, deep structural barriers impeded effective adaptation:

- Limited access to affordable credit for irrigation upgrades or machinery.
- Low penetration of crop insurance, with many farmers unaware or disillusioned.
- Weak extension services, often biased towards wealthier or more networked farmers.
- Elite capture of government schemes, especially in the allocation of subsidized equipment or seeds (Gulati, Sharma and Sharma, 2012).

The state's ₹2,000/acre incentive for not burning crop residue was a frequent source of frustration. Smallholders consistently described it as insufficient to cover tractor or labor costs, making compliance economically irrational.

Younger farmers, in particular, expressed disappointment in government rhetoric vs. ground realities. Many had participated in workshops or digital campaigns but felt that promises outpaced delivery. This widened the gap between awareness and agency—a key theme in the political economy of climate governance (Adger et al., 2009).

5.4 Implications for Policy

The assumption that raising awareness will automatically drive adaptation is deeply flawed. This section shows that adaptation is socially differentiated and structurally constrained. It is influenced not only by agro-ecological conditions, but also by who has access to state support, who trusts institutions, and who controls decision-making power within households.

Understanding these dynamics is essential if adaptation policies are to succeed. The next section deepens this critique by exploring how the design and delivery of state interventions reproduce disillusionment, especially among smallholders and youth.

6. The Politics of Policy: Failure and Disillusionment

Punjab's climate governance landscape is marked not just by technocratic overreach but by systemic disjunctures between policy design and everyday agrarian realities. Farmers in Amritsar described state interventions—particularly those related to awareness, insurance, and crop residue management—as poorly targeted, procedurally opaque, and socially unequal in their effects. The result is not merely weak implementation, but a pervasive climate of disillusionment.

6.1 Krishi Vigyan Kendras (KVKs): Outreach or Abstraction?

The Krishi Vigyan Kendras (KVKs), intended as a decentralized outreach platform, were inconsistently experienced by respondents. While some medium and large landholders praised KVK camps for introducing new technologies or pest-control methods, smallholders and older farmers frequently dismissed them as inaccessible, irrelevant, or promotional.

One elderly farmer remarked:

"They talk about machines and sprays that I cannot afford. So why should I go?"

Others questioned the motivations of extension agents, viewing them as aligned with agribusiness interests, pushing branded inputs over context-sensitive advice. These findings echo wider critiques of India's agricultural extension system, which has been described as "input-driven, top-down, and elite-focused" (Datt, 2014).

6.2 Stubble Burning Schemes: Incentives That Don't Work

The state's incentive of ₹2,000 per acre for non-burning of crop residue was viewed as inadequate and impractical. Farmers across both study villages stated that this amount did not cover machine rental, labor, or diesel costs associated with mechanical residue removal.

One respondent explained:

"I need ₹3,500 just to get it done. Why would I spend more than I get?"

In practice, many farmers—especially smallholders—continued to burn residue, despite knowing its environmental harms. Some attempted manual removal but abandoned it after delays or lack of compensation. Others claimed that machines were reserved for politically connected

farmers, reinforcing elite capture of adaptation support (Gulati et al., 2012).

6.3 Crop Insurance: Enrolled but Uninsured

Disillusionment was deepest around the Pradhan Mantri Fasal Bima Yojana (PMFBY). Most farmers were enrolled by default via linked bank accounts, but few understood the claim process, and even fewer received payouts.

Typical complaints included:

- Opaque assessment procedures
- Rejection of claims despite visible crop loss
- Delayed or missing compensation
- Lack of local grievance redressal

Younger farmers, in particular, expressed frustration. Many had initially supported PMFBY as a safety net but later viewed it as performative policy—useful on paper, broken in practice. These findings reflect broader national-level patterns of low claim ratios and procedural opacity in PMFBY implementation (Jha, Srinivasan and Kasyap, 2019).

6.4 Scalar Disconnects and Governance Failures

What unites these policy experiences is a profound scalar mismatch. Schemes are designed at the national or state level with little or no consultation with intended beneficiaries. As one respondent said: *"They make policies in Chandigarh or Delhi, but no one asks what we actually need."*

The schemes assume a homogenous 'farmer', ignoring:

- Internal household dynamics
- Generational differences in perception and authority
- Resource asymmetries between large and small farmers
- Varying degrees of digital literacy or institutional trust

None of the respondents reported being consulted or informed during scheme design, confirming the top-down nature of Punjab's adaptation framework. This leads to partial adoption, symbolic compliance, or active resistance—undermining the very goals these policies claim to achieve.

As Adger et al. (2009) argue, social limits to adaptation are not just cognitive or informational—they are political, institutional, and embedded in systems of governance.

7. Discussion: Climate Governance and the South Asian Frame

The case of Amritsar reveals patterns that are both locally specific and regionally resonant. While the analysis is grounded in a particular geography, the issues it highlights—perception gaps, policy failure, elite capture, and structural exclusion—are emblematic of broader dynamics in South Asian climate governance.

7.1 From Case to Pattern: What Punjab Reveals

First, the study shows that climate perception is not uniform. It varies along generational lines, shaped by education, institutional trust, and access to media. Younger farmers, influenced by digital communication and peer networks, frame climate change as an urgent, anthropogenic crisis. Older farmers interpret it through experiential or spiritual frameworks, often resisting external prescriptions.

This challenges dominant policy narratives that treat farmers as a single behavioral category. It echoes scholarship on social differentiation in adaptation (Mertz et al., 2009; Adger et al., 2009), affirming that effective adaptation strategies must account for intra-community heterogeneity, especially inter-generational worldviews.

Second, the case highlights a scalar mismatch between policy design and local realities. State and national interventions—whether insurance, awareness camps, or residue management—are designed with technocratic assumptions and delivered through bureaucratic routines. They overlook household power dynamics, resource disparities, and implementation bottlenecks at the village level.

This finding mirrors critiques across South Asia: from irrigation failures in Nepal to stubble management inefficiencies in Haryana, or cyclone resilience programs in Bangladesh, the underlying theme remains the same—climate governance is top-down, fragmented, and politically mediated (Shah, 2009; Jha, Srinivasan and Kasyap, 2019).

7.2 Climate Governance as Political and Relational

Your findings reinforce the argument that climate adaptation is not just technical or behavioral—it is political. Farmers' ability to respond is shaped by:

- Access to credit and technology
- Trust in institutions
- Control over land and decision-making
- Networks that mediate access to schemes

The case of Amritsar confirms what scholars have termed the "governance deficit" in adaptation—where policy ambitions are routinely undercut by on-ground delivery failures and social hierarchies. This is particularly visible in elite capture, where large landholders secure disproportionate access to machines, subsidies, or government attention, while smallholders navigate uncertainty with little support (Gulati, Sharma and Sharma, 2012).

Moreover, the generational conflict around adaptation—where younger farmers seek change and older ones resist it—illustrates that governance must be understood within the household as much as between the state and society.

7.3 What This Contributes to Climate and Development Literature

This article contributes to three critical debates:

1. Adaptation as Socially Differentiated: It extends adaptation research by showing how generational positioning shapes not only perception but adaptive behavior—a theme underexplored in Indian and South Asian climate literature.
2. Climate Governance as Unequal Delivery: It challenges assumptions that technical solutions alone can enable adaptation. Without reforming how adaptation is delivered, technocratic fixes may fail or deepen existing inequality.
3. Development as Relational and Contextual: It affirms the JSAD vision that development in South Asia must be understood through the everyday practices, negotiations, and exclusions experienced by people. Your study of Amritsar does just that: it centers smallholders not as passive victims or mere data points, but as agents navigating broken systems with limited tools.

8. Conclusion: Toward Inclusive and Responsive Climate Adaptation

Punjab's agricultural sector stands at a crossroads. As climatic unpredictability intensifies and agrarian distress deepens, the region's

smallholder farmers—once central to the Green Revolution—now find themselves increasingly marginalized by both environmental stress and governance failure. This study has shown that the crisis is not merely ecological, but fundamentally social and political.

Through qualitative fieldwork in Amritsar, this article has demonstrated that generational differences in climate perception, landholding-based inequality, and policy design failures intersect to shape uneven experiences of vulnerability. While younger farmers tend to frame climate change as an urgent and anthropogenic threat, older farmers often interpret it through cyclical or fatalistic lenses. But perception alone does not determine action. Structural constraints—access to credit, institutional trust, and intra-household power—ultimately shape what adaptation looks like in practice.

State-led adaptation schemes in Punjab—whether via KVKs, insurance programmes, or residue management incentives—have failed to account for these internal variations. Their technocratic orientation, elite capture, and lack of participatory design mechanisms have generated a pervasive sense of disillusionment among smallholders, especially younger ones. These findings echo broader critiques of climate governance across South Asia, where the scalar disconnect between policy makers and rural communities continues to erode policy legitimacy and efficacy.

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