

Navigating The Deluge: A Secondary Research Analysis of Social Vulnerability and Economic Inequity in the Kerala Floods

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I.INTRODUCTION

When the waters of the Arabian Sea and the overflowing rivers of the Western Ghats met in August 2018, the world watched a "disaster" unfold. But to an economist or a sociologist, the disaster was not the rain; it was the failure of human systems to protect those at the margins. Floods are indeed common across the globe, yet their devastation is increasingly tied to the dangerous intersection of climate change, rapid, unplanned urbanisation, and deep-seated economic inequities (Wisner et al., 2004). While the climate provides the spark, the social context provides the fuel. Global data now shows that economic losses from disasters exceed US\$300 billion annually, proving that our vulnerability is a human creation (UNDRR, 2022).

Kerala is a unique landscape, a narrow strip of land defined by 44 rivers and a steep gradient that drops from the mountains to the sea. Historically, the state has been celebrated for the "Kerala Model" of development, ranking first in India on the Human Development Index (HDI) with a 94% literacy rate and a poverty rate of only 7% (Government of Kerala, 2019). However, this macro-level success masked a fragile reality. In August 2018, the state received rainfall 42% above the seasonal average, a deluge that affected all 14 districts and displaced 1.4 million people (Government of Kerala, 2019). The total disaster effects were estimated at INR 26,720 crore, a figure representing nearly 15% of the state's Gross State Domestic Product (Government of Kerala, 2019). Yet, the impact was not uniform. The flooding laid bare significant inequalities tied to informal employment, insecure housing, and social exclusion (Wisner et al., 2004). This study looks beyond the technical explanations of dam management and

rainfall to analyse the "social construction of vulnerability" during the 2018–2019 period. We argue that engineering fixes alone are insufficient; only a rights-based framework that addresses land ownership, gender burdens, and caste exclusion can build true resilience. The study is divided into six sections. Section 1 is about socio-economic determinants of flood vulnerability, Section 2 focuses on the spatial inequality and marginal settlements, Section 3 is about the caste-based dimensions of disaster impact, Section 4 focuses on the gendered impacts of the flood, Section 5 is about the disaster management approaches and policy gaps, and finally Section 6 is the interpretation of results.

II.OBJECTIVES

1. To analyse how socio-economic factors shaped differential vulnerability and recovery outcomes during the 2018-2019 Kerala floods.
2. To examine the spatial concentration of flood risk and disaster impacts among marginalised communities
3. To evaluate the adequacy of existing disaster management approaches in Kerala and assess the necessity of a rights-based resilience framework for achieving disaster justice and inclusive recovery

III.METHODOLOGY

This research utilises a secondary research analysis, from the sources that include the Government of Kerala, UNDRR, GFDRR, UN reports, NIDM and CSSC, as well as authentic peer-reviewed journals and published articles, to investigate the intersection of social vulnerability and economic inequity during Kerala floods

IV.RESULTS AND DISCUSSION

I. SOCIO-ECONOMIC DETERMINANTS OF FLOOD VULNERABILITY

Disasters are not equalisers; they are amplifiers of existing poverty. In Kerala, the Post-Disaster Needs Assessment (PDNA) identified a critical split in impact: total "damages" to physical assets were INR 10,557 crore, while "losses" in economic flow reached INR 16,163 crore (Government of Kerala, 2019). This massive gap in losses indicates that the flood did more than destroy buildings; it erased the daily income of millions of informal workers.

To understand the sheer stress this placed on households, we look at real-time economic indicators. Research from the Centre for Development Studies (CDS) utilised nighttime light intensity and Automated Teller Machine (ATM) transactions as proxies for consumer demand (Beyer et al., 2022). The data revealed that ATM transactions, the primary source of liquidity for the poor, declined significantly during the disaster months, with a slow recovery that took six months to fully rebound (Beyer et al., 2022). While wealthier individuals could rely on digital banking or credit, the landless labourers in districts like Alappuzha were trapped. Without cash, their ability to buy food and medicine was instantly cut off.

Furthermore, "tenure insecurity" emerged as a primary barrier to recovery. In the low-lying plains, many families live in "kutchra" (mud) or semi-permanent homes on land without formal titles (Government of Kerala, 2019). When these homes were destroyed, the lack of legal documentation made these families ineligible for formal insurance or rehabilitation aid (NIDM, 2020). This illustrates that vulnerability is defined by institutional barriers as much as by water levels. From a sustainable development angle, these socio-economic effects seriously undermine progress toward important global goals. Income losses and disruption from flooding threaten SDG 1 (No Poverty) by pushing vulnerable households into even greater economic instability. Meanwhile, the widespread disruption of informal jobs and small enterprises jeopardises SDG 8 (Decent Work and Economic Growth) by weakening the foundation of inclusive and resilient local economies.

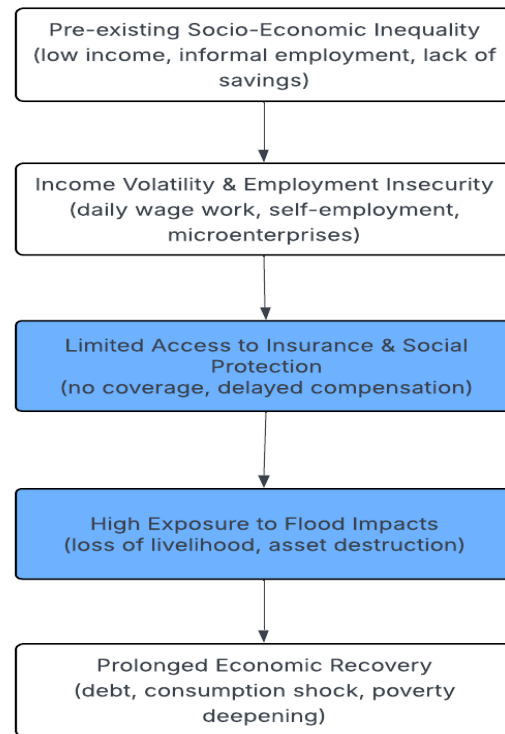


Figure 1

II. SPATIAL INEQUALITY AND THE FAILURE OF DATA-BASED PLANNING

The 2018 floods were a "compound" disaster: riverine flooding in the midlands, landslides in the high ranges, and polder flooding in Kuttanad (GFDRR, 2019). Spatial inequality ensures that marginalised groups are pushed to live in these fragile "geographies of exclusion" where land is cheap, but danger is extreme (Pelling, 2003). Nearly 14.5% of Kerala's land is flood-prone, but in districts like Alappuzha, this exceeds 50% (Government of Kerala, 2019). Perhaps the most damning evidence of institutional failure is the "data lag" in local governance. Between 1990 and 2005, scientific agencies produced high-resolution maps of all 941 panchayats, including landslide-prone maps at a 1:50,000 scale (Bose, 2025). However, not a single panchayat has updated these maps in the past 35 years (Bose, 2025). This failure forced officials to rely on secondary satellite data that was completely "inadequate for field-level decision-making" during the 2018 crisis (Bose, 2025). As a result, ad-hoc infrastructure projects are still being sanctioned on hillsides and floodplains without

integrating information on natural drains or catchment areas (Bose, 2025). This lack of "land literacy" means that even the most well-funded reconstruction efforts under the Rebuild Kerala program risk repeating the same mistakes. We are building on a foundation of obsolete maps, ensuring that the next major rainfall will follow the same destructive path through marginalised settlements. From a sustainable development view, this uneven exposure undermines

the goals of creating inclusive and resilient communities. Concentrating flood risk in marginalised neighbourhoods runs counter to the aims of SDG 11 (Sustainable Cities and Communities), which calls for safe housing, inclusive urban growth, and disaster-resilient infrastructure. Additionally, the higher exposure faced by socially excluded groups highlights ongoing inequalities that hinder progress toward SDG 10 (Reduced Inequalities).

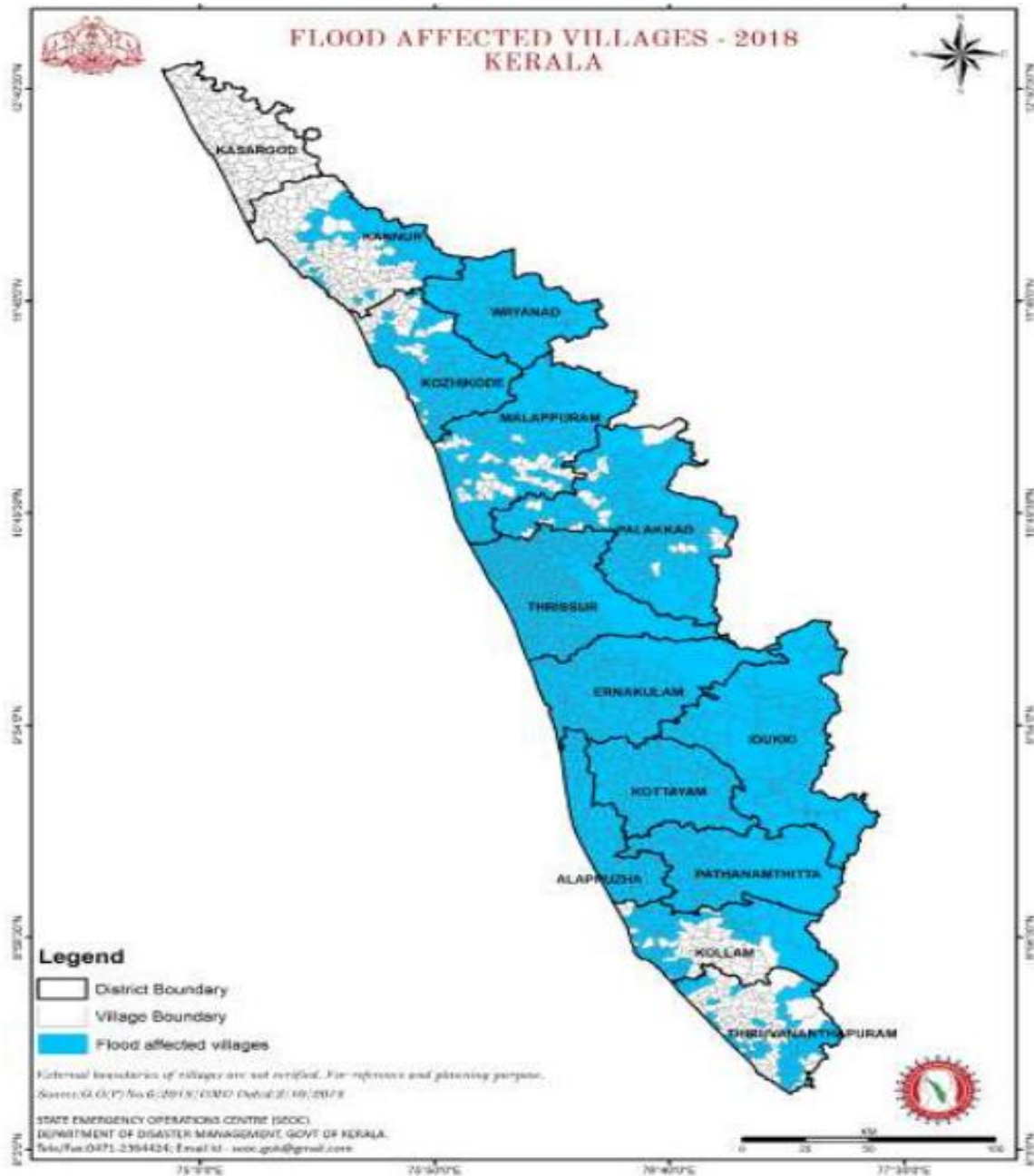


Figure 2. 2018 FLOOD AFFECTED VILLAGES, SOURCE.SDMA

Post-Flood Situation-Based Planning Need in Each District as Estimated by the Scheduled Caste Department, Government of Kerala

District	No. of people affected	No. of people in camps	No. of houses completely destroyed	No. of houses partially destroyed	Loss of own land	No. of damaged toilets	No. of damaged wells
Thiruvananthapuram	885	0	75	320	0	128	13
Kollam	2,521	2,061	5	14	0	0	22
Pathanamthitta	6,651	5,125	234	1,413	1	963	0
Alleppey	20,867	19,163	166	1,470	0	1,639	6,012
Kottayam	9,159	7,466	331	1,167	0	0	0
Idukki	1,637	1,393	65	234	0	0	0
Ernakulam	17,301	10,324	373	2,878	0	4,811	384
Thrissur	21,709	10,174	971	2,311	69	1,676	9
Palakkad	1,350	0	265	618	0	333	202
Malappuram	3,034	2,153	71	476	23	398	135
Kozhikode	2,999	2,443	12	52	0	125	1
Wayanad	976	621	57	248	72	81	22
Kannur	69	16	6	20	0	0	0
Kasargod	0	0	1	2	0	0	0
Total	89,158	60,939	2,632	11,223	165	10,154	6,800

Source: Data collected from SC Department, Government of Kerala

Figure 3. Source: Government of Kerala, 2019

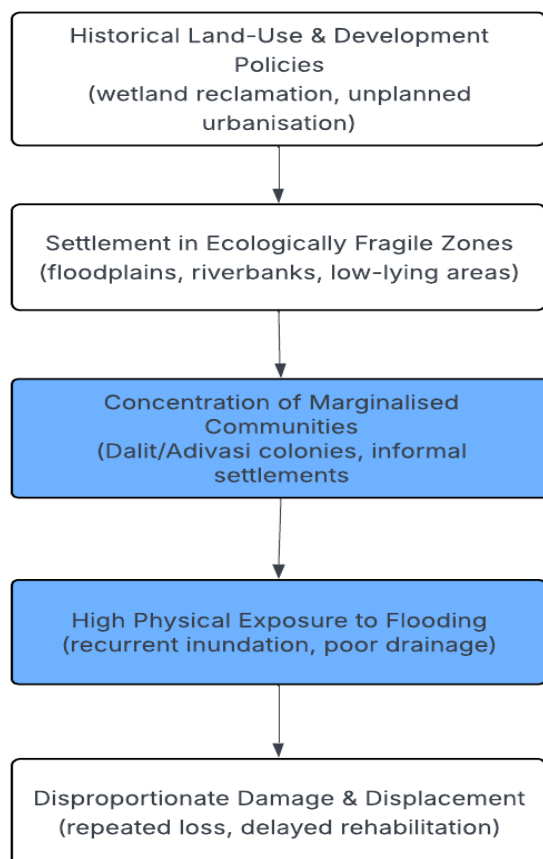


Figure 4

III. CASTE-BASED DIMENSIONS OF DISASTER IMPACT

In India, disaster vulnerability is inextricably linked to caste-based hierarchies. While a flood might seem blind to social status, the "experience of loss" is dictated by where one is allowed to live and whose voice is heard by the state (Thorat et al., 2010). During the 2018 deluge, Dalit and Adivasi communities were "double victims" first of the environment, and then of a recovery process that mirrored their historical exclusion (NCDHR, 2019). Qualitative research in 21 villages across Kottayam and Wayanad found that Dalit and Adivasi settlements were overwhelmingly located in floodplains and fragile mountain slopes (CSSC, 2020). In the Paniya tribal village of Kolathara, families endured poor economic conditions that were exacerbated when they lost months of agricultural wages during the 2018 and 2019 seasons (Gayathri, 2021). Recovery was hampered by "everyday caste discrimination" (Thorat et al., 2010). Bureaucratic requirements for rehabilitation aid often demanded formal land titles or "pucca" house structures (CSSC, 2020). For communities historically denied land rights, this created a cycle of "delayed rehabilitation" (NIDM, 2020). While the state government celebrated the rescue of 65,000 lives by the fishing community (Government of Kerala, 2019), the long-term recovery of Dalit and Adivasi families

remains stalled by a lack of tenure-sensitive policy. From a political economy standpoint, the differing impacts of the Kerala floods highlight how disasters serve as social stress tests, revealing and exacerbating existing inequalities. The fact that Dalit and Adivasi communities bear a heavier flood risk shows that vulnerability is not a matter of personal choice, but rather the result of historical dispossession, occupational marginalisation, and spatial exclusion. These factors directly hinder progress toward SDG 10 (Reduced Inequalities) and SDG 16 (Peace, Justice, and Strong Institutions), as the unequal aftermath of disasters reveals failures in inclusive governance and fair access to state support.

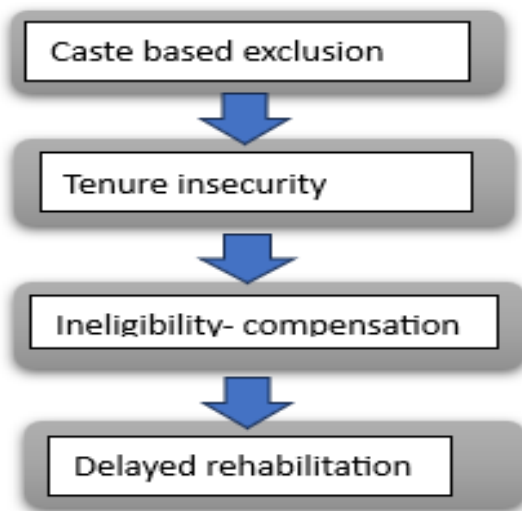


Figure 5

V. GENDERED IMPACTS OF THE FLOOD

The floods in Kerala were deeply gendered. Women, who make up a significant portion of the state's informal workforce in petty trade and self-help group microenterprises, saw their small-scale assets washed away (Government of Kerala, 2019). These "micro-losses" were often invisible in aggregate government reports, which focused on large infrastructure like roads and bridges (Government of Kerala, 2019). Once in relief camps, women faced an explosion of the "care penalty" (Bradshaw, 2013). They were primarily responsible for the emotional and physical care of children, the elderly, and the sick in overcrowded environments (UN Women, n.d.). This unpaid labour prevented them from re-entering the workforce, even as their families faced mounting debts. Furthermore,

post-disaster assessments found that many camps lacked essential sanitation, private spaces, and menstrual hygiene products, which led to significant "humiliation and frustration" (UN Women, n.d.).

This reflects a "technocratic bias" in disaster management. We have mastered the art of physical rescue, but we have failed to protect the dignity and economic agency of women during the long years of recovery (Enarson, 2012). From a sustainable development standpoint, the gendered impacts of the Kerala floods pose significant challenges to SDG 5 (Gender Equality) and SDG 3 (Good Health and Well-being). The erosion of women's livelihoods, combined with the expansion of unpaid care work and health risks, undermines progress toward gender-equitable economic participation and social protection. The Kerala experience thus underscores the necessity of integrating gender-sensitive and rights-based approaches into disaster preparedness and recovery, recognising women not merely as vulnerable victims but as central agents of resilience and community recovery.

VI. DISASTER MANAGEMENT APPROACHES AND POLICY GAPS

Kerala's response to the 2018 floods involved various levels of governance from state emergency operations to relief efforts at the panchayat level, blending immediate humanitarian actions with broader rebuilding efforts. At the state level, the Kerala State Disaster Management Authority kicked off emergency operations, coordinated rescue and relief, and laid the groundwork for recovery through the Post-Disaster Needs Assessment and the Rebuild Kerala Development Programme. These initiatives aim to develop a resilient recovery policy that focuses on effective reconstruction, improving infrastructure resilience, and fostering risk-informed development in the medium term. The policies and programs rolled out post-flood include the established Kerala State Disaster Management Plan, which set the legal and operational groundwork for district plans the Post Disaster Needs Assessment that measured damages and guided budget allocations the Rebuild Kerala Development Programme, outlining medium-term resilience and reconstruction goals state Government Orders providing emergency cash and housing aid (Prathyuthaanam and related schemes) through district

administrations and Local Self Government Institutions (LSGIs) and technical and financial support from the World Bank for the Resilient Kerala Program that aimed to turn RKDP principles into viable projects. Together, these efforts created a multi-layered recovery framework: national and international partners gauged the needs, the state rolled out programs based on those needs, and local governments were assigned the task of putting reconstruction and community resilience initiatives into action.

A key finding from both the PDNA and independent assessments is that the funding and programming for post-flood recovery were mainly directed towards physical reconstruction and infrastructure, whereas investments aimed at securing household income, social protection, and inclusion were notably lacking. A significant portion of the estimated INR 26,720 crore is allocated for damages to roads, bridges, irrigation, public infrastructure, and housing repairs, highlighting an infrastructure-heavy recovery strategy. While repairing infrastructure was crucial to restoring essential services, the scale of investments in engineering works stood in stark contrast to the more limited resources dedicated to restoring livelihoods and social protections. Guidance from global experiences indicates that having pre-arranged, shock-

responsive social protection tools - like scalable cash transfers, contingency funding, and parametric insurance - can significantly alleviate human costs and fiscal unpredictability during disasters. Kerala's approach after the 2018 floods, which mainly relied on one-off cash assistance and ad-hoc packages, reveals a gap when compared to this ideal often seen in recovery practices (Government of Kerala, 2019). Furthermore, technical annexes from the PDNA and program reviews highlighted administrative challenges such as fragmented beneficiary databases, inconsistent documentation demands (like land titles and identity proofs), and insufficiently detailed ward-level data that hindered targeted and rights-sensitive relief efforts. Beyond the state documents, critical analyses warn against an uncritical reliance on engineering solutions: technocratic disaster risk reduction strategies that focus solely on embankments, road elevation, and large infrastructure can perpetuate spatial exposure and social exclusion (David, 2020). Geospatial and planning studies have shown that changes in land use, wetland reclamation, and poor watershed management have made flooding worse in certain areas, indicating that infrastructure alone, without integrated land-use reforms and ecosystem restoration, provides limited security to vulnerable communities (Jithendhra Kumar, 2023).

Sector	Damage	Loss	Total Effect (D + L)		Total Recovery Needs	
	INR Crores	INR Crores	INR Crores	USD Million	INR Crores	USD Million
Social Sectors						
Housing, Land and Settlements	5,027	1,383	6,410	916	5,443	778
Health and Nutrition	499	28	527	75	600	86
Education and Child Protection	175	4	179	26	214	31
Cultural Heritage	38	37	75	11	80	11
SUB-TOTAL	5,739	1,452	7,191	1,028	6,337	906
Productive sectors						
Agriculture, Fisheries and Livestock	2,975	4,180	7,155	1,022	4,498	643
SUB-TOTAL	2,975	4,180	7,155	1,022	4,498	643
Infrastructure sectors						
Water, Sanitation and Hygiene	890	471	1,361	195	1,331	190
Transportation ^{a,b,c}					10,046	1,435

Sector	Damage	Loss	Total Effect (D + L)		Total Recovery Needs	
	INR Crores	INR Crores	INR Crores	USD Million	INR Crores	USD Million
Power ^{b,c}					353	50
Irrigation ^{b,c}					1,483	212
Other infrastructure ^{b,c}					2,446	349
SUB-TOTAL	890	471	1,361	195	15,659	2,236
Cross-cutting sectors						
Environment	26	0.04	26	4	148	21
Employment and Livelihoods	881	9,477	10,358	1,480	3,896	557
Disaster Risk Reduction	17	583	599	86	110	16
Gender and Social Inclusion	0.9	0	0.9	0.13	35	5
Local Governance	28	0	28	4	32	5
SUB-TOTAL	953	10,060	11,013	1,574	4,221	604
TOTAL (A)	10,557	16,163	26,720	3,819	30,715	4,389
Integrated Water Resources Management (B)	0	0	0	0	24	3
GRAND TOTAL (A+B)					30,739	4,392
GRAND TOTAL (ROUNDED OFF)					31,000	4,400
^a Recovery costs for roads from urban and rural infrastructure sections are included						
^b In Rapid Damage and Needs Assessment, the cost of damage and loss has not been quantified						
^c Estimates taken from the World Bank-Asian Development Bank Joint Rapid Damage and Needs Assessment (JRDNA)						
Note: Figures are rounded and so column totals may not add up precisely						

Figure 6: Sector-wise Summary of Disaster Effects and Recovery Needs, Source: Government of Kerala, 2019, Executive Summary

The evidence points to a clear trend: while life-saving rescue and emergency relief were effectively carried out, and physical reconstruction took precedence during recovery, these technical measures were not balanced by equivalent investments in systems that could lower household vulnerability (such as shock-responsive social protection, regularising land tenure, and large-scale livelihood programs). The PDNA itself advises enhancing social protection frameworks and livelihood programs to accompany rebuilding efforts, which acknowledges a recognised policy shortfall.

Simply rebuilding infrastructure and replacing physical assets does not automatically restore livelihoods or legal rights. Fixing homes or infrastructure does not help informal workers regain lost income, and it does not resolve issues with land titles that prevent access to compensation and rehabilitation. A focus solely on infrastructure might make spatial vulnerability worse without concurrent watershed restoration and land-use reforms.

Engineering solutions could shift risks downstream or create a false sense of security if the root causes - like wetland loss, unplanned development, and altered drainage - are not dealt with (Jithendhra Kumar, 2023). Global operational insights show that having pre-set social protection and disaster risk financing can significantly lessen household hardships and speed up recovery. The lack of such strategies in Kerala's recovery toolkit left many households turning to debt, selling off assets, and relying on informal coping mechanisms, which prolonged their recovery (World Bank, 2021).

Technical and administrative hurdles hampered equity in the recovery process. The PDNA and NIDM reports highlight three consistent governance challenges: (1) inconsistent rules for identifying beneficiaries and documentation that put tenure-insecure and marginalised households at a disadvantage; (2) uneven community involvement in recovery planning, despite guidance from RKDP and LSG; and (3) fragmented

data systems across agencies that limited real-time targeting and monitoring. Suggestions from both the PDNA and international guidelines include strengthening interoperable registries, simplifying documentation for entitlements, and ensuring community consultations are mandatory in project designs.

- Policy implications and rights-based recommendations

To address the imbalance between technical rebuilding efforts and social protections, the evidence supports several reforms: establish shock-responsive social protection mechanisms (like scalable cash transfers, contingency financing, and parametric triggers); overhaul beneficiary identification through detailed LSG-level registries that capture tenure, livelihood, and vulnerability factors; balance infrastructure spending with ecosystem-focused initiatives (like reviving wetlands and restoring watersheds) while dedicating funds to restoring livelihoods; and incorporate participatory, rights-based approaches into RKDP execution (including mandatory social and gender inclusion plans with simplified access criteria). These steps would help align Kerala's recovery practices with the Sendai priorities and international standards for achieving equitable resilience. The state has begun taking steps in this direction through RKDP and World Bank collaborations, but the documented administrative challenges and the observed bias towards technical solutions in funding point to the need for deeper policy adjustments to ensure recovery is genuinely rights-focused and inclusive.

VII.INTERPRETATION OF RESULTS

The findings of this report show that vulnerability in Kerala is not a natural occurrence but a social choice. The "Kerala Model" has reached a limit where its high HDI can no longer shield its citizens from the consequences of climate change, combined with historical social exclusion. The "rights-based" framework we advocate for, focusing on tenure security, land literacy, and gender equity, is not a luxury; it is the only way to meet our global commitments under the Sendai Framework and SDGs 1, 5, 10, 11, 13, and 16.

VIII.CONCLUSION

The floods of 2018 and 2019 were a “disaster of the century” (RGIDS, 2018). They proved that no amount of economic growth can withstand a deluge if the foundations of that growth are unequal. To truly “build back better,” Kerala must move beyond the technocratic trap. Resilience must be built within institutions and rights, ensuring that the marginalised are not just “rescued” but are given the legal and economic power to stand on their own ground.

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