



CLIMATE CHANGE AND THE RISE OF INFORMALITY IN RURAL LABOUR MARKETS: A CROSS-COUNTRY STUDY OF NEPAL, BANGLADESH, AND INDONESIA¹

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ABSTRACT

This paper investigates the link between climate-induced disruptions and the expansion of informal labour in rural areas across Nepal, Bangladesh, and Indonesia. Using case-study methodology and comparative policy analysis, the research highlights how climate vulnerability exacerbates labour market insecurities and pushes rural workers—especially in agriculture and low-skill sectors—into informal and unstable employment. The findings aim to support the design of integrated labour-climate strategies that promote resilience, formalisation, and sustainable development in Asia-Pacific economies.

Introduction. In recent decades, the intersection of climate change and labour market dynamics has emerged as a pressing policy issue, especially in the Global South. For agrarian economies like Nepal, Bangladesh, and Indonesia, where a significant portion of the population relies on climate-sensitive rural livelihoods, the disruptive effects of climate change are reshaping the socio-economic fabric of rural communities. Prolonged droughts, erratic rainfall, rising sea levels, and extreme weather events are not only threatening agricultural productivity but also undermining the viability of formal employment in rural areas.²

These climate-related disruptions interact with existing vulnerabilities in the rural labour market—such as limited access to education, poor infrastructure, weak regulatory frameworks, and underdeveloped social protection systems—to push a growing segment of the rural population into informal employment. Informal jobs are typically characterized by low wages, lack of job security, hazardous working conditions, and exclusion from legal or social protections.³ In the context of environmental degradation, the shift toward informal labour represents both a coping strategy for households and a structural failure of the state to provide adequate employment alternatives and social security.

¹ This publication/ research was supported by a MSCA-SE scheme within the HORIZON Programme (grant acronym: PRELAB, GA: 101129940)

² Hallegatte, S., Rentschler, J., & Rozenberg, J. (2016). *Shock waves: Managing the impacts of climate change on poverty*. World Bank. <https://doi.org/10.1596/978-1-4648-0673-5>

³ International Labour Organization (ILO). (2018). *Women and men in the informal economy: A statistical picture* (3rd ed.). Geneva: ILO. https://www.ilo.org/global/publications/books/WCMS_626831/lang--en--index.htm

Research Significance. The rise of informality in rural labour markets is not merely an economic phenomenon; it is deeply embedded in broader issues of environmental justice, governance, and sustainable development. While previous studies have separately explored the impacts of climate change and informal employment, limited attention has been paid to how these two challenges reinforce one another in climate-vulnerable rural settings.

This research addresses this critical knowledge gap by investigating how climate-induced stressors contribute to the expansion of informality in rural labour markets in Nepal, Bangladesh, and Indonesia. These countries represent highly relevant case studies given their high exposure to climate hazards, large rural populations, and elevated levels of informal employment.

Understanding the causal linkages between climate events and informal employment patterns is essential for crafting coherent and effective policy responses. It is particularly timely in light of ongoing international debates surrounding climate justice, decent work, and the transition to a green economy under frameworks such as the Paris Agreement and the Sustainable Development Goals (SDGs), notably SDG 8 on decent work and SDG 13 on climate action.⁴

Research Objectives. This study pursues the following core objectives:

1. To examine how climate change is affecting rural labour dynamics in Nepal, Bangladesh, and Indonesia.
2. To identify key structural factors and institutional weaknesses that facilitate the shift toward informality in rural labour markets.
3. To provide comparative insights into national responses and gaps in policy interventions.
4. To propose policy recommendations that support rural resilience, promote formalisation, and align labour market reform with climate adaptation strategies.

Structure of the Paper. The paper is structured as follows. Section 2 develops the conceptual framework and reviews the relevant literature on climate vulnerability, informal labour, and rural development. Section 3 outlines the methodology employed, including case selection, data sources, and analytical techniques. Section 4 presents the country contexts, focusing on the interplay between climate hazards and labour systems in Nepal, Bangladesh, and Indonesia. Section 5 examines the specific impacts of climate change on rural livelihoods, followed by Section 6, which explores patterns of informality across key rural sectors. Section 7 undertakes a comparative analysis of the structural drivers of informal employment. Section 8 critically evaluates existing policy responses and identifies key gaps. Section 9 puts forward policy recommendations, and Section 10 concludes with reflections on future research and policy needs.

Conceptual Framework and Literature Review. Informal employment, as defined by the International Labour Organization, refers to work that lacks formal arrangements, legal protection, and access to social security. In rural settings, informality is often deeply embedded within subsistence agriculture, casual labour, and seasonal migration. While some

⁴ United Nations (UN). (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. <https://sdgs.un.org/2030agenda>

rural informality arises from traditional socio-economic arrangements, it is increasingly driven by external shocks and structural weaknesses in labour governance.⁵

Informality in rural labour markets is distinct from urban informality in several ways. First, rural informal workers are more likely to be engaged in agriculture, fishing, and forestry—sectors that are highly vulnerable to climate variability. Second, rural areas typically suffer from institutional underdevelopment, including weak enforcement of labour regulations, limited unionisation, and poor infrastructure.⁶ Third, informal work in rural areas is often characterised by low productivity and high precarity, with limited opportunities for upward mobility.⁷

The concept of informality must also be understood through a structural lens: it is not merely the absence of formality, but rather a function of state neglect, economic marginalisation, and social exclusion. This perspective is particularly relevant for understanding how climate stressors aggravate existing vulnerabilities.

Climate Change as a Labour Market Disruptor. Climate change is increasingly recognised not only as an environmental crisis but also as a socio-economic stressor that affects livelihoods, labour markets, and human security. Rural economies, especially in low- and middle-income countries (LMICs), are disproportionately impacted by climate variability due to their heavy dependence on natural resources and climatic conditions.

The Intergovernmental Panel on Climate Change highlights several pathways through which climate change affects rural livelihoods:

- Direct impacts on agricultural productivity: Changes in rainfall patterns, prolonged droughts, and temperature extremes reduce crop yields and destroy livestock.
- Increased frequency of extreme events: Floods, cyclones, and landslides displace communities, destroy assets, and interrupt economic activity.
- Degradation of natural ecosystems: Soil erosion, salinisation, and deforestation diminish the long-term viability of rural occupations.

These environmental changes have immediate effects on rural employment by destroying jobs, reducing work hours, and increasing occupational health risks. In the longer term, climate stress contributes to labour displacement, migration, and a growing reliance on unregulated employment as a survival strategy.⁸

Labour Market Informality and Climate Vulnerability: The Nexus. The intersection between climate change and informal employment is receiving growing academic attention. Research shows that climate shocks push formal and semi-formal workers into the informal sector, particularly in agriculture, construction, and small-scale manufacturing.⁹ This is

⁵ Chen, M. A. (2012). The informal economy: Definitions, theories and policies. *WIEGO Working Paper No. 1*. <https://www.wiego.org/publications/informal-economy-definitions-theories-and-policies>

⁶ Meagher, K. (2013). Unlocking the informal economy: A literature review on linkages between formal and informal economies in developing countries. *WIEGO Working Paper No. 27*. <https://www.wiego.org/publications/unlocking-informal-economy-literature-review>

⁷ Fields, G. S. (2019). Employment in low-income countries: Beyond informality. *IZA Journal of Labor Policy*, 8(1), 1–20. <https://doi.org/10.2478/izajolp-2019-0002>

⁸ World Bank. (2021). *Social protection and jobs responses to COVID-19 and climate crises: Lessons for adaptive systems*. <https://openknowledge.worldbank.org/handle/10986/36709>

⁹ Rentschler, J., & Bazilian, M. (2017). Climate change and infrastructure, resilience and informality. *World Bank Policy Research Working Paper No. 8285*. <https://doi.org/10.1596/1813-9450-8285>

especially evident in regions with weak labour market institutions and inadequate climate adaptation measures.

In Bangladesh, for instance, repeated flooding and riverbank erosion have forced rural workers to migrate to cities and accept informal jobs in brick kilns and garment factories under exploitative conditions. Similarly, in Nepal, landslides and glacial melt are making farming unsustainable in mountainous regions, pushing men to migrate to informal construction jobs in India and the Gulf.¹⁰

Indonesia's archipelagic geography exposes rural fishing communities to climate-induced sea-level rise, with many resorting to informal service work or internal migration.

The climate-informality nexus is also gendered: women in rural areas, already facing limited access to assets and credit, are more likely to be pushed into informal domestic or agricultural labour when climate shocks reduce household income.¹¹

Existing Literature Gaps. While the individual literatures on informal employment and climate change are robust, their intersection remains underexplored in most academic and policy circles. Most research tends to focus on either urban informality or rural agricultural change, often overlooking the transformation of rural labour systems in response to climate stressors.

Furthermore, there is limited comparative analysis across countries facing similar climate-labour vulnerabilities. Studies are often constrained by national silos, despite the regional nature of many environmental and labour market dynamics in South and Southeast Asia.

This study contributes to closing these gaps by:

- Offering a comparative lens across three countries (Nepal, Bangladesh, and Indonesia);
- Highlighting the structural, policy, and institutional drivers that connect climate change and rural informality;
- Recommending integrated frameworks for climate adaptation and labour formalisation.

Methodology. This study employs a comparative qualitative case study methodology to explore how climate-induced disruptions influence the growth of informal labour markets in rural areas of Nepal, Bangladesh, and Indonesia. Case study research is particularly appropriate for capturing the complexity of socio-economic and environmental interactions within specific national contexts.¹² The cross-country comparative design enhances analytical depth by highlighting both shared patterns and country-specific divergences.

Given the exploratory nature of this research, a qualitative approach enables the identification of mechanisms, institutional dynamics, and community responses that may not be visible through quantitative methods alone.¹³ In particular, this approach allows for in-

¹⁰ Gurung, M. (2021). Climate change and labour migration from the Nepalese highlands. *Himalaya, the Journal of the Association for Nepal and Himalayan Studies*, 41(2), Article 8. <https://digitalcommons.maclester.edu/himalaya/vol41/iss2/8>

¹¹ Huq, S., Reid, H., & Murray, L. A. (2015). Gender and climate change: Women as agents of change. In B. Denton (Ed.), *Climate change and human development* (pp. 89–106). Zed Books.

¹² Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). SAGE Publications.

¹³ Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.

depth engagement with policy documents, secondary data, and scholarly literature relevant to labour and climate sectors in the three countries.

Nepal, Bangladesh, and Indonesia were selected based on several shared and contrasting features:

- All three countries exhibit high levels of rural informality, with informal labour constituting over 65% of total rural employment.
- They are identified as climate-vulnerable by the Global Climate Risk Index due to frequent exposure to extreme weather events, sea-level rise, or glacial melting.¹⁴
- They differ in geography, political economy, and institutional development, offering a rich basis for comparative analysis.

This triangulation of similarity and difference enables both cross-cutting generalisations and context-specific insights into how climate change shapes labour outcomes.

Academic journals, working papers, and NGO reports were reviewed to contextualize findings and capture lived experiences of rural informal workers under climate stress. This helped supplement official statistics with empirical field-based perspectives, especially regarding marginalised populations (e.g., women, indigenous communities, smallholder farmers).

Nepal: Climatic Fragility and Labour Market Pressures. Nepal is a landlocked country located in the Himalayan region, marked by diverse topography ranging from lowland Terai to high-altitude mountainous zones. This geographic complexity makes it highly vulnerable to a wide range of climate hazards, including glacial lake outburst floods (GLOFs), landslides, erratic monsoons, and prolonged droughts.¹⁵ According to the Global Climate Risk Index, Nepal ranks among the top 10 countries most affected by climate events over the past two decades.¹⁶

Over 65% of the population resides in rural areas, with agriculture employing about 60% of the total workforce—most of whom are informally employed (CBS Nepal, 2021). Climate variability has directly undermined agricultural productivity through increasing frequency of floods, shifting rainfall patterns, and degradation of arable land.

The rural labour market in Nepal is highly fragmented and informal, characterised by smallholder farming, seasonal labour migration, and household enterprises. Due to limited industrial development and lack of rural infrastructure, young men often migrate seasonally to urban areas or abroad (notably India and the Gulf states), where they typically engage in informal construction or service jobs.¹⁷ This has created a cycle in which climate-induced livelihood insecurity drives labour outmigration, reinforcing both rural depopulation and informal urban labour trends.

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¹⁵ Ministry of Forests and Environment (MOFE), Nepal. (2022). *National climate change policy*. Government of Nepal. <https://mofe.gov.np>

¹⁶ Eckstein, D., Künzel, V., & Schäfer, L. (2021). *Global climate risk index 2021: Who suffers most from extreme weather events?* Germanwatch. <https://germanwatch.org/en/cr>

¹⁷ Gurung, M. (2021). Climate change and labour migration from the Nepalese highlands. *Himalaya, the Journal of the Association for Nepal and Himalayan Studies*, 41(2), Article 8. <https://digitalcommons.macalester.edu/himalaya/vol41/iss2/8>

Moreover, policy responses have remained reactive rather than strategic. The National Climate Change Policy (2022) and the Labour Act (2017) mention climate adaptation and informal employment but lack meaningful integration across sectors.

Bangladesh: Coastal Exposure and Labour Displacement. Bangladesh's geographical concentration along low-lying river deltas renders it extremely vulnerable to sea-level rise, cyclones, and riverbank erosion. Climate-induced salinity intrusion in the coastal districts has significantly reduced agricultural productivity, leading to displacement of farming communities and transformation of the rural economy.¹⁸

Over 40% of Bangladesh's workforce is employed in agriculture, but this share is declining rapidly due to land degradation and climate instability. The informal sector absorbs most of the displaced rural workers, with rising employment in unregulated brick kilns, fisheries, and seasonal urban construction work. Migration—both seasonal and permanent—has become a key survival strategy, especially for the poor and landless.

Bangladesh's National Adaptation Programmes of Action (NAPAs) have acknowledged the need for climate-resilient employment strategies, but implementation remains limited. For instance, although coastal embankment projects and climate-resilient agricultural schemes exist, they are often disconnected from rural employment and labour formalisation goals.

Gender dimensions are especially prominent in Bangladesh. As men migrate, women are left behind with limited resources and increasing workloads, often engaging in informal household industries or agricultural wage labour under exploitative terms.¹⁹

Indonesia: Climate-Linked Livelihood Insecurity in the Archipelago. Indonesia, comprising over 17,000 islands, faces a diverse range of climate hazards including rising sea levels, coastal erosion, droughts, and forest fires—especially in Kalimantan, Sumatra, and Java. The country's vulnerability is further exacerbated by urbanisation pressures, deforestation, and dependency on extractive industries.²⁰

Approximately 40% of Indonesians live in rural areas, where agriculture, fisheries, and forestry constitute the main sources of livelihood. However, these sectors are increasingly affected by climate variability, with rural communities facing declining fish stocks, soil degradation, and water scarcity (BPS, 2021).

Indonesia's informal labour rate remains high, at around 59% nationally and even higher in rural provinces. Climate shocks—such as floods or El Niño-induced droughts—reduce the demand for formal agricultural labour and trigger shifts to informal, temporary occupations such as petty trade, motorcycle taxi services, and artisanal mining.

Policy frameworks such as the National Medium-Term Development Plan (RPJMN 2020–2024) and Indonesia's Nationally Determined Contributions (NDCs) mention employment and climate resilience but do not fully integrate labour market planning with climate adaptation at the rural level.

¹⁸ Neelormi, S., Ahmed, A. U., & Rauf, A. (2019). Climate change, migration and informal labour markets in Bangladesh. *Bangladesh Journal of Political Economy*, 35(2), 15–37.

¹⁹ Huq, S., Reid, H., & Murray, L. A. (2015). Gender and climate change: Women as agents of change. In B. Denton (Ed.), *Climate change and human development* (pp. 89–106). Zed Books.

²⁰ Bappenas. (2020). *Indonesia's low carbon development initiative: A pathway to sustainable development*. Ministry of National Development Planning. <https://lcdi-indonesia.id>

In some areas, especially in East Nusa Tenggara and Papua, climate-induced displacement has caused tensions over access to land and jobs, further complicating rural labour dynamics.²¹

These shocks directly reduce crop yields, destroy infrastructure, kill livestock, and degrade natural ecosystems on which rural populations depend for sustenance and income. For example, the 2020 monsoon floods in Bangladesh inundated over 40% of the country's landmass, displacing nearly 5 million people and leading to widespread loss of employment and assets in rural regions.²² In Nepal, erratic monsoon rainfall and glacial melting have altered sowing and harvesting cycles, diminishing land productivity and creating new uncertainties for subsistence farmers. Indonesia, meanwhile, experiences repeated forest fires in dry seasons that not only affect rural incomes through ecological destruction but also cause severe health and air pollution crises, affecting productivity.

Agricultural Insecurity and Loss of Traditional Livelihoods. Agriculture is the dominant sector of rural employment across the three countries. Yet it is the most climate-sensitive, with even minor temperature or rainfall fluctuations significantly affecting yields of rice, maize, jute, and other staple crops. Studies show that rice yields in Bangladesh fall by up to 10% for every 1°C rise in average temperature. Similarly, in Nepal, maize and millet production has become increasingly erratic due to shifting precipitation patterns.²³

The growing unpredictability of crop cycles has pushed smallholder farmers—who constitute the majority of rural households—into distress. Many either abandon agriculture altogether or reduce investment in land cultivation. This transition away from land-based livelihoods increases dependence on seasonal wage labour, informal service work, or unsafe migration.²⁴

In coastal Indonesia, sea-level rise is contaminating freshwater supplies and inundating arable lands. In provinces like Central Java and Aceh, traditional paddy farming is giving way to informal aquaculture and charcoal production—often unregulated and environmentally degrading.

Climate events often lead to the destruction of productive and household assets—farmlands, tools, storage, livestock—which in turn triggers spirals of indebtedness and loss of social mobility. According to the World Bank, over 75% of disaster-induced displacement in South Asia affects rural areas.

Displacement caused by floods, salinity intrusion, and riverbank erosion is especially acute in Bangladesh, where millions are forced to migrate to peri-urban or urban fringes every year. However, this migration is often undertaken without access to decent jobs or housing, driving displaced populations into highly informal, exploitative, and insecure work environments.

²¹ Asian Development Bank (ADB). (2021). *Indonesia: Climate risk country profile*. <https://www.adb.org/publications/climate-risk-country-profile-indonesia>

²² ReliefWeb. (2020). *Bangladesh monsoon floods – Situation report No. 5*. <https://reliefweb.int/report/bangladesh/bangladesh-monsoon-floods-situation-report-no5-24-august-2020>

²³ Ministry of Forests and Environment (MOFE), Nepal. (2022). *National climate change policy*. Government of Nepal. <https://mofe.gov.np>

²⁴ Adams, H., & Upreti, B. R. (2020). Migration, informality and climate change in South Asia. *Journal of South Asian Development*, 15(2), 180–202. <https://doi.org/10.1177/0973174120928483>

In Nepal, climate-induced asset loss is a key factor behind youth labour migration to India and the Gulf. This migration often takes the form of informal labour contracts, which leave workers without legal recourse or social protection.

In Indonesia, forest fires and droughts have displaced indigenous communities and disrupted traditional fishing practices. Climate-linked land degradation has particularly affected ethnic minorities and rural women, exacerbating existing socio-economic inequalities.²⁵

Health and Productivity Loss. Beyond immediate economic impacts, climate change has indirect effects on rural labour productivity through deteriorating health conditions. Prolonged exposure to heat, poor air quality due to forest fires, and the spread of waterborne diseases after floods significantly reduce work capacity.

Rural workers engaged in physical outdoor labour—such as farming, brick-making, or road construction—face heightened vulnerability. A recent ILO study estimates that heat stress alone could reduce total working hours in South Asia by up to 5% by 2030, equivalent to 43 million full-time jobs

These effects are not evenly distributed. Women, children, and elderly rural populations often experience higher health-related risks due to poorer access to care, social norms restricting mobility, and increased unpaid domestic labour burdens during and after climate crises.

Sectoral Composition of Informal Labour. Agriculture is the largest employer in rural areas across all three countries, and it is also the most informal. Smallholder farmers typically rely on family labour, occasional hired help, or seasonal workers without any written contracts or statutory benefits. The lack of collective bargaining mechanisms and market integration further entrenches informality.

In Bangladesh, for example, tenant farmers and agricultural day labourers are often paid in kind or via piece rates, with no formal documentation of work performed. In Indonesia's plantation sector, including palm oil and rubber, informal wage arrangements dominate, particularly among indigenous or landless populations.

Rural Construction and Infrastructure Work. Climate-induced migration has pushed many rural workers into construction work, often on public infrastructure or private real estate projects in nearby towns or urban fringes. However, rural construction work is rarely formalised. Workers are paid in cash, typically hired through subcontractors, and lack safety equipment, health insurance, or grievance redress mechanisms.

Nepal's road construction in hilly regions, partly funded by foreign aid or local governments, employs thousands of such informal workers, especially women and internally displaced persons.²⁶

In Indonesia and parts of Bangladesh, rural livelihoods also depend on artisanal fishing and forestry, both of which are experiencing high levels of informalisation. Declining fish

²⁵ Bappenas. (2020). *Indonesia's low carbon development initiative: A pathway to sustainable development*. Ministry of National Development Planning. <https://lcdi-indonesia.id>

²⁶ Gurung, M. (2021). Climate change and labour migration from the Nepalese highlands. *Himalaya, the Journal of the Association for Nepal and Himalayan Studies*, 41(2), Article 8. <https://digitalcommons.macalester.edu/himalaya/vol41/iss2/8>

stocks and encroachment by industrial actors force small-scale fishers to work under informal, often exploitative, arrangements with local middlemen.

Forestry in Kalimantan and Papua involves informal loggers and charcoal producers, many of whom are internally displaced or landless migrants. These workers operate outside any legal licensing system and often face criminalisation, despite their dependence on these sectors for survival.

Informal service work is increasingly common in rural and peri-urban zones. This includes mobile vendors, domestic work, transportation services (e.g., ojek in Indonesia), and basic repairs. These occupations typically emerge in the absence of formal employment opportunities and are characterised by income volatility, long working hours, and zero labour protections.

Post-climate-disaster environments often see a rise in such activities as coping mechanisms. For instance, in flood-prone districts of Bangladesh, displaced women often start informal home-based businesses (e.g., sewing, food sales) to replace lost agricultural income.

Gender Dimensions of Informality. Rural women are disproportionately represented in informal employment. This is due to patriarchal norms, unequal access to land and finance, and the burden of unpaid care work. Women are often relegated to informal home-based work, seasonal agricultural labour, or low-paid service jobs.

In Nepal, women-headed households affected by climate-related displacement are frequently engaged in informal agricultural work or domestic service. In Bangladesh, women from coastal regions impacted by salinity intrusion often become informal wage labourers in shrimp processing or garment subcontracting chains. In Indonesia, rural women play significant roles in informal agricultural and trading activities but are rarely included in labour policy consultations or rural development programs.²⁷

Overview of Comparative Logic. To develop effective, context-sensitive policy responses, it is essential to understand the underlying structural forces that drive informality in rural labour markets. Although climate change acts as a key trigger for informality, it operates within a broader set of economic, institutional, and socio-political dynamics. This section synthesises cross-country evidence from Nepal, Bangladesh, and Indonesia to identify both shared and country-specific drivers of informal rural employment.

In all three countries, rural labour markets operate largely outside the purview of formal institutions. Labour inspection mechanisms are either absent or underfunded in rural areas, and employment laws are poorly enforced. This administrative vacuum has allowed informal arrangements to become the default mode of employment.

For example, rural employers rarely register workers, offer contracts, or comply with minimum wage provisions. Moreover, dispute resolution mechanisms are inaccessible to rural workers, and trade unions are almost entirely absent outside of urban centres.²⁸

Another shared feature is the low level of formal education among rural populations, which limits their access to stable, formal-sector jobs. In Nepal, over 40% of rural adults have

²⁷ Bappenas. (2020). *Indonesia's low carbon development initiative: A pathway to sustainable development*. Ministry of National Development Planning. <https://lcdi-indonesia.id>

²⁸ Meagher, K. (2013). *Unlocking the informal economy: A literature review on linkages between formal and informal economies in developing countries*. *WIEGO Working Paper No. 27*. <https://www.wiego.org/publications/unlocking-informal-economy-literature-review>

no formal education. Similarly, functional illiteracy remains high in remote parts of Bangladesh and Indonesia.

The lack of access to vocational training and skill development services in rural areas further restricts occupational mobility. Informality thus becomes both a consequence of exclusion from formal sectors and a survival strategy.

Across the three countries, rural land tenure is often insecure or informal. Smallholder farmers and tenants frequently lack legal documentation of land ownership or lease rights, making them ineligible for formal agricultural loans or subsidies (World Bank, 2021). As a result, they are forced to rely on informal credit markets and engage in low-return, informal labour.

Land fragmentation exacerbates this problem. In Bangladesh and Nepal, for instance, many rural households own plots that are too small to generate subsistence income, pushing them into supplementary informal wage labour.²⁹

Traditional gender roles and discrimination systematically push women into informal employment. Women in rural areas have less access to land, education, and financial services, and are more likely to be engaged in unpaid or home-based informal work. Climate shocks worsen this marginalisation by increasing the burden of unpaid care and reducing household income.³⁰

Country-Specific Structural Drivers. Nepal's rural labour market is heavily influenced by international migration, especially to India and the Gulf states. While migration offers income opportunities, it has created a dependency on remittances and entrenched informality both at home and abroad. Migrant workers often leave without formal contracts, work in exploitative conditions, and remit income that supports informal enterprises back home.

Additionally, post-disaster recovery efforts, such as after the 2015 earthquake, have relied on informal rural labour for reconstruction without providing job security or social protection.

In Bangladesh, massive environmental displacement—especially from coastal erosion, flooding, and salinity intrusion—has been a critical driver of informal employment. Many displaced rural households move to peri-urban zones or slums, where they work in informal services, construction, or subcontracted manufacturing with minimal regulation.

The country also suffers from weak inter-agency coordination between labour, environment, and disaster management authorities, which hinders the development of integrated formalisation strategies.

Indonesia's decentralised governance structure gives significant autonomy to provinces and districts. While this allows for local adaptation, it has also resulted in fragmented regulation and enforcement. In many provinces, local governments lack capacity or political will to formalise rural employment or monitor working conditions in agriculture and forestry.

The presence of extractive industries in rural Indonesia—such as mining and palm oil—has also encouraged informal subcontracting and casual labour arrangements that escape national oversight.

²⁹ Neelormi, S., Ahmed, A. U., & Rauf, A. (2019). Climate change, migration and informal labour markets in Bangladesh. *Bangladesh Journal of Political Economy*, 35(2), 15–37.

³⁰ Huq, S., Reid, H., & Murray, L. A. (2015). Gender and climate change: Women as agents of change. In B. Denton (Ed.), *Climate change and human development* (pp. 89–106). Zed Books.

Structural drivers of informality do not act in isolation—they reinforce each other. For instance, weak institutions fail to regulate informal labour or respond to climate disasters, which increases vulnerability and incentivises informal coping strategies. Similarly, insecure land tenure restricts access to credit, limiting investment in resilient livelihoods and trapping workers in low-productivity informal jobs.

This dynamic reinforces the “informality trap”, where informal work becomes both a cause and consequence of climate vulnerability.

Policy Responses and Gaps. All three countries under study—Nepal, Bangladesh, and Indonesia—have adopted a variety of national strategies and action plans to address either climate change or labour market challenges. However, most of these responses operate in silos, with limited cross-sectoral integration between labour formalisation, climate adaptation, and rural development.

Nepal’s key frameworks include the National Climate Change Policy and Labour Act. The climate policy emphasises community-based adaptation and resilience building, while the Labour Act establishes basic worker rights. However, rural informal workers—especially migrants, seasonal workers, and women—are rarely covered by enforcement mechanisms or consulted in policy design.³¹ The Prime Minister Employment Program aims to generate temporary jobs, but it lacks sustainable funding and often supports low-productivity tasks.

Bangladesh has developed relatively advanced planning instruments such as the National Adaptation Programme of Action (NAPA), Bangladesh Delta Plan 2100, and the National Labour Policy. The country has also pioneered social safety net programs, such as the Vulnerable Group Development (VGD) and Food-for-Work schemes, which target climate-affected rural populations.

However, coordination challenges persist. Employment policies rarely account for environmental displacement, and climate plans insufficiently address labour market formalisation. Moreover, the expansion of informal urban settlements caused by rural displacement has outpaced policy responses.

Indonesia’s National Medium-Term Development Plan (RPJMN 2020–2024) and Nationally Determined Contributions (NDCs) recognise both climate and employment challenges, including targets for green job creation. Decentralisation reforms allow for local-level adaptation and labour programming, especially in climate-vulnerable provinces.

Nonetheless, implementation varies widely. In provinces such as Kalimantan and Papua, weak institutional capacity, limited budgets, and poor data on informal workers hamper policy effectiveness. Most climate-focused programmes prioritise infrastructure and environmental conservation without addressing labour vulnerabilities.³²

Conclusion. This study has explored the complex and multifaceted relationship between climate change and the expansion of informal employment in rural labour markets across Nepal, Bangladesh, and Indonesia. Through a comparative and thematic analysis, the research reveals that climate-induced disruptions—such as floods, droughts, sea-level rise, and ecosystem degradation—are not merely environmental events but catalysts of structural

³¹ Ministry of Forests and Environment (MOFE), Nepal. (2022). *National climate change policy*. Government of Nepal. <https://mofe.gov.np>

³² Bappenas. (2020). *Indonesia’s low carbon development initiative: A pathway to sustainable development*. Ministry of National Development Planning. <https://lcdi-indonesia.id>

labour market transformations, particularly in rural areas where formal employment opportunities are scarce.

Several important conclusions emerge from the analysis:

1. Climate change is a critical driver of informal employment in rural economies. By destroying agricultural livelihoods, displacing communities, and reducing economic security, climate events push rural workers—especially those with limited assets or education—into informal, unregulated, and insecure forms of work.

2. Informality is structurally embedded in rural labour markets. It is perpetuated by weak institutional frameworks, inadequate labour inspection, fragmented governance, insecure land tenure, and poor access to education and training. Climate shocks act as stress multipliers within these vulnerable systems.

3. Women, landless farmers, and migrants bear the disproportionate burden of informal employment, often working under exploitative conditions with little or no access to social protection or public services.

4. National policies are fragmented and under-integrated. Labour formalisation strategies are rarely coordinated with climate adaptation efforts, and existing social protection mechanisms are not designed to address the specific needs of climate-displaced informal rural workers.

5. Despite differences in geography and governance, the three countries share many common challenges—including rural institutional weakness, informalisation of climate-affected sectors, and policy neglect of gender and social equity.

Contribution to Scholarship and Policy. This research contributes to academic scholarship by linking the climate-labour nexus within rural informality, a field that has received insufficient attention in both climate adaptation literature and labour market studies. By drawing on cross-country comparisons and structural analysis, the paper challenges the view of informal labour as a purely economic outcome, instead situating it within a dynamic interaction of environmental, institutional, and socio-political forces.

For policy practitioners, the findings underscore the urgency of breaking silos between climate, labour, and rural development sectors. Climate action must go beyond infrastructure or conservation and embed strategies for inclusive, sustainable, and dignified rural employment. Similarly, labour market reforms must internalise the growing reality of climate-induced shocks and design systems that can adapt, absorb, and support vulnerable populations.

While this study offers an in-depth examination of three highly affected countries, several avenues remain open for future research:

- Empirical fieldwork with affected rural communities, including longitudinal studies, would enrich understanding of how informal employment evolves before and after climate events.
- Quantitative modelling could better estimate the contribution of climate stressors to informal labour expansion, distinguishing it from economic or demographic drivers.
- Policy evaluation studies are needed to assess the effectiveness of existing adaptation, job creation, and social protection programs in reducing informal employment in rural areas.

- Comparative research across other regions (e.g., Sub-Saharan Africa, Latin America) could reveal whether the trends observed in South and Southeast Asia are globally generalisable.

The rise of informality in rural labour markets under climate change is not inevitable. It is the outcome of choices—political, institutional, and economic—that fail to protect the most vulnerable while navigating the realities of a changing climate. With proactive, integrated, and inclusive strategies, governments and development partners can turn crisis into opportunity—by building adaptive capacities, promoting decent work, and supporting a just transition to sustainable rural economies.

The stakes are high. Without decisive action, informal labour will continue to grow as a mechanism of survival, locking millions into a cycle of precarity and exclusion. But with informed policy, genuine political will, and community engagement, it is possible to imagine a rural future that is both climate-resilient and socially just

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