

Informal Construction Labour, Social Protection and Climate Mobility

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Abstract: The construction workforce that supports tourism, roads, accommodation and urban expansion in Himachal Pradesh is characterised by extensive informality, migrant labour, gendered occupational roles and limited social protection. Climate change intensifies these structural vulnerabilities. Heatwaves, intense rainfall, landslides and flash floods interrupt work, expose labourers to injury and disease, damage temporary settlements and encourage movement towards other sectors or regions. This study examines the relationship among informal construction work, social protection and climate-related mobility in Himachal Pradesh. The analysis shows that climate vulnerability is not produced by exposure alone. It is mediated by casual employment, weak contracts, inadequate protective equipment, poor sanitation, limited healthcare access, gender inequality and fragmented worker registration. Existing disaster-management training, welfare-board provisions, skill programmes and community preparedness offer an institutional base, but coverage and enforcement remain uneven. The study argues that climate mobility should not be viewed solely as worker exit, it is also an indicator of gaps in labour protection and sectoral adaptation. A worker-centred resilience strategy requires portable social benefits, climate-responsive occupational safety, reliable worker registries, gender-sensitive facilities, skill transition pathways and stronger enforcement at dispersed construction sites. The conclusion emphasises that resilient tourism and construction cannot be achieved without securing the people who build and maintain their infrastructure.

Keywords: Informal labour; construction workers; social protection; climate mobility; migrant workers; Himachal Pradesh.

1. INTRODUCTION

Construction is central to Himachal Pradesh's tourism economy and wider development. Roads, bridges, hotels, homestays, utilities and public facilities rely on a workforce that often moves between projects, districts and sectors. Much of this labour remains informal. Workers may be hired on a daily or temporary basis without written contracts, stable wages, health insurance, pensions or effective legal recourse. Migrant workers and women are concentrated in insecure and physically demanding roles, making employment vulnerability inseparable from social and gender inequality.

The 80-90% of the construction workforce operates on a casual or daily-wage basis. Women account for approximately 20-30% and migrant workers for roughly 50-60% of this informal workforce (Tiwari & Sher Singh, 2020). Women are frequently assigned material carrying and site-cleaning tasks, while migrant labourers often live in temporary accommodation with limited healthcare, sanitation and safety equipment.

These conditions already create risk under normal weather. Climate change magnifies it.

Heatwaves reduce productivity and create the possibility of heat exhaustion, heat stroke and longer-term health consequences. Heavy rainfall, landslides and flash floods make worksites dangerous, halt projects and damage access routes. Workers who lose wages during stoppages may have little savings or social insurance. Those living at or near worksites may simultaneously lose employment, shelter, water and sanitation. Climate hazards therefore operate through existing labour-market inequalities rather than affecting all workers uniformly.

Mobility is one response. Workers may move from climate-sensitive tourism and construction activities into agriculture, horticulture, services or small industries or relocate to Punjab, Haryana and Delhi in search of more stable work (Chandel & Sharma, 2024; Kumari & Verma, 2019). This movement can diversify household income, but it can also disrupt families, weaken community ties and transfer pressure to destination cities. Understanding climate mobility

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requires attention to why workers move, what protections travel with them and whether the originating sectors address the insecurity driving departure.

This study places informal construction labour at the centre of climate-resilience analysis. It examines employment structure, occupational exposure, protection measures and migration pathways. Its central claim is that labour resilience must be treated as infrastructure resilience, projects and tourism systems cannot remain reliable if the workforce is unsafe, unprotected or compelled to migrate because risks are unmanaged.

2. Research Problem and Objectives

The research problem is the disconnection between the economic importance of construction and the weak institutional position of many workers who sustain it. Informality lowers the visibility of workers in official systems, limits access to welfare provisions and weakens enforcement. Climate events deepen these gaps by disrupting employment, damaging basic facilities and increasing occupational hazards. The result is a pattern in which those most exposed often possess the fewest resources for preparation, recovery or transition.

The study has five objectives. First, it examines the demographic and employment characteristics of informal construction labour. Second, it analyses how heat and extreme weather affect health, income and productivity. Third, it assesses existing protection measures and their enforcement limitations. Fourth, it interprets climate-related migration and sectoral movement as both adaptation and evidence of labour insecurity. Fifth, it proposes an integrated social-protection framework for a mobile, informal and climate-exposed workforce.

3. METHODOLOGY

The study uses the qualitative secondary-source methodology. The data sources comprises government and institutional reports, policy material, statistical information and published research concerning tourism, construction, labour, migration, human development and climate change issued by agencies such as the Himachal Pradesh Tourism Department, the Ministry of Statistics and Programme Implementation (MoSPI) and the Ministry of Environment, Forest, and Climate Change (MoEFCC). The sources were examined thematically to identify relationships among informality, gender, migrant status, worksite exposure, social protection, climate hazards and mobility. The analysis organises the labour and migration into a worker-centred analytical framework.

4. The Structure of Informal Construction Employment

4.1 Casual work and limited labour security

Informality in construction is not simply the absence of a written contract. It shapes income regularity, bargaining power, safety, housing and access

to public protection. Daily-wage workers depend on the availability of work and may receive no compensation when rain, heat or access disruption halts a project. Short-term hiring also makes it difficult to establish employer responsibility for health monitoring, training or post-injury support.

The high estimated share of informal construction employment indicates that these conditions are systemic rather than exceptional (Tiwari & Sher Singh, 2020). Workers are spread across small private projects, road works, tourism facilities and larger infrastructure sites. Dispersed and changing worksites make inspection more difficult. Subcontracting can further obscure who is responsible for wages, accommodation, protective equipment and emergency planning.

This structure creates a resilience problem. A project may possess engineering safeguards while its workers remain excluded from reliable warnings, paid stoppages or healthcare. When climate adaptation is assessed only through the physical asset, an important part of operational vulnerability remains invisible.

4.2 Migrant workers and temporary settlement

Migrant workers from Bihar, Uttar Pradesh, Jharkhand and neighbouring areas form a substantial part of Himachal Pradesh's construction labour force (Tiwari & Sher Singh, 2020). Migration allows contractors to meet labour demand and provides workers with income opportunities, but temporary status can limit local registration, housing quality and access to services. Workers may reside in makeshift facilities near construction sites, where water, sanitation and protection from severe weather are inadequate.

During a flood or landslide, the distinction between workplace and residence may disappear, the same event can isolate a site, destroy shelter, contaminate water and prevent access to medical care. Migrant workers may also lack local networks or information about evacuation routes. Language, documentation and unfamiliarity with public institutions can increase barriers to relief.

4.3 Gendered divisions of labour

Women construction workers frequently perform low-paid, labour-intensive activities such as carrying materials and cleaning sites. These roles expose them to physical strain, dust and weather while offering limited prospects for advancement (Tiwari & Sher Singh, 2020). Climate-induced work stoppages can be especially damaging where women already combine paid work with unpaid household and care responsibilities.

Women may also face inadequate sanitation, lack of privacy, unsuitable protective equipment and limited access to healthcare. Climate-responsive labour policy must therefore move beyond formally equal rules.

Facilities, equipment, training schedules and benefit access should be designed around gender-specific conditions. This argues for gender-responsive interventions and improved healthcare, social protection and economic opportunities for women and migrant workers (Aggarwal, 2019).

5. Climate Hazards and Worker Vulnerability

5.1 Heat stress, health and productivity

Construction requires sustained physical effort, often outdoors and on exposed slopes. Higher temperatures increase the risk of dehydration, heat exhaustion and heat stroke. Chronic occupational heat exposure is also associated with kidney and cardiovascular risks (Turner, 2023; US Department of Labor, n.d.). Productivity may fall as workers slow down, take more breaks or make errors under heat stress. These effects can lead to project delays and financial pressure that is then passed down through unstable employment.

Heat management is therefore both a health requirement and an economic adaptation. Work-rest schedules, shaded recovery areas, drinking water, acclimatisation, first-aid preparation and heat-appropriate protective equipment should be treated as minimum site infrastructure. Weather-responsive scheduling must not become unpaid exclusion, workers require income protection when conditions make work unsafe.

5.2 Rainfall, landslides and worksite safety

Rain, wind and slope instability create immediate hazards. Falls become more likely, excavation and materials can become unstable and access roads may fail. Informal workers often lack helmets, gloves, protective clothing and systematic hazard training (NIDM *et al.*, 2021). Weak enforcement makes the presence of disaster-management plans insufficient if they do not alter daily site practice.

Early warning systems can provide time for evacuation when they are connected to workers, supervisors and local communities. The Himachal Pradesh State Disaster Management Authority has conducted training on hazard identification, safe construction and emergency protocols, while state disaster plans provide a broader procedural basis (NIDM *et al.*, 2021). However, alerts must reach dispersed and temporary workers in a comprehensible form. Every site needs a clear chain of responsibility for stopping work, accounting for workers and arranging safe shelter.

5.3 Water, sanitation and disease risk

Construction-worker safety includes water and sanitation. Remote sites may lack clean water, toilets and

handwashing facilities even before a disaster. Floods and landslides can disrupt supplies and contaminate water, increasing the risk of disease (Sinisi & Aertgeerts, 2011; The World Bank, 2021). Mobile toilets, handwashing stations, protected drinking-water storage and emergency sanitation plans are therefore climate-adaptation measures.

These facilities should not be regarded as temporary concessions. Their absence reflects the low institutional status of informal labour. Contracts and permissions for construction projects should specify worker accommodation, water, sanitation and emergency-health requirements, with responsibility extending through subcontracting chains.

5.4 Income loss and recovery inequality

Climate disruptions affect workers through lost days as well as direct injury. Daily-wage labourers may receive no payment during monsoon stoppages, road closures or disaster recovery. Workers without savings, insurance or portable benefits may borrow, reduce consumption or leave the area. Recovery is thus unequal, project owners may reschedule or insure assets, while workers absorb the immediate income shock.

Social protection can reduce this asymmetry. Registration, accident coverage, health support, emergency cash assistance and wage-protection mechanisms should be accessible before a crisis. A system that requires workers to establish eligibility only after a disaster will exclude those with missing documents, short contracts or interstate mobility.

6. Protection Measures and Institutional Gaps

6.1 Existing protective measures

Himachal Pradesh has a foundation on which stronger worker protection can be built. Early warning, disaster-management training, community preparedness and welfare-board mechanisms are identified. Skill-development and self-employment programmes also provide pathways for workers seeking more secure livelihoods. These measures demonstrate that labour protection, disaster preparedness and economic transition need not be separate policy domains.

Nevertheless, effectiveness depends on coverage. Informal workers may remain outside registration systems, training may not reach short-duration sites and contractors may not enforce safety standards. Protection should therefore be designed for a workforce that is mobile and difficult to capture through a single employer.

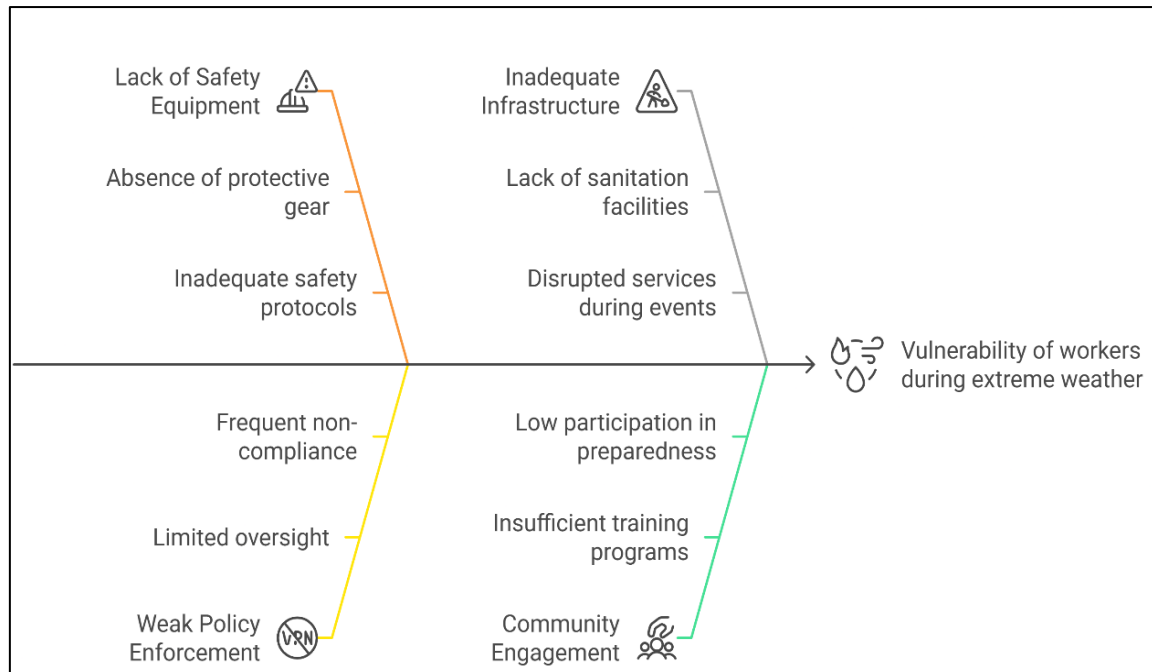


Figure 1: Challenges in protecting Informal Construction Workers

Figure 1 illustrates that worker protection is constrained by interacting institutional and material deficiencies. Informality, weak enforcement, inadequate equipment and poor basic facilities reinforce one another. Supplying protective equipment without changing inspection and employer responsibility will have limited impact, improving registration without making benefits portable will similarly leave mobile workers exposed.

6.2 Registration and portability

Registration is the gateway to many welfare schemes, yet migrant and short-term workers may move before administrative processes are completed. A climate-resilient labour system requires portable identification and benefits across districts, contractors and state boundaries. Records should document work history, training and benefit eligibility without tying protection to one employer.

Digital systems can help, but accessibility is essential. Workers need assisted enrolment, multilingual information and mechanisms for correcting records. Local bodies, labour departments, welfare boards and contractors should share responsibility for on-site registration drives. Data collection must serve benefits and safety rather than merely surveillance.

6.3 Enforcement and responsibility across subcontracting

Weak enforcement is identified. A contractor may formally agree to safety measures while responsibility becomes diluted through subcontractors. Clear liability is required for protective equipment, wages during emergency stoppages, accommodation standards, sanitation and evacuation. Public procurement

can reinforce these obligations by making worker protection a condition of payment and contract performance.

Inspection strategies should prioritise high-risk seasons and locations. Remote worksites, steep slopes and temporary settlements require particular attention. Worker complaint channels must protect against retaliation, especially where employment is daily or undocumented.

6.4 Social protection as a climate-adaptation system

Social protection is often discussed as compensation after injury or retirement, but climate change requires a broader interpretation. Benefits should help workers anticipate, absorb and recover from disruption. Preventive health checks, accident coverage and paid safety training reduce exposure. Emergency cash and wage support help households manage periods when extreme weather suspends work. Healthcare and rehabilitation reduce the longer-term consequences of injury. Skill and placement services support transitions when particular activities become less reliable.

These functions need to be connected. A worker registered for one benefit should not have to repeat documentation for every form of support. Climate events can destroy documents, interrupt transport and displace households, so claims systems should allow assisted and remote access. Benefits should also travel with workers across contractors and districts. Portability is especially important in a sector where mobility is normal even without climate pressure.

The financing of protection should reflect the distribution of risk and benefit. Workers should not bear

the cost of hazards created or intensified by project decisions. Contractors, project owners and public authorities all have roles in financing safety, insurance and emergency support. Linking welfare contributions to permits and public-contract payments can reduce evasion. Transparent reporting of worker registration and benefit delivery would make protection measurable rather than aspirational.

7. Climate Mobility and Sectoral Resilience

7.1 Forms of mobility

Climate-related mobility occurs in several forms. Workers may leave a disrupted project temporarily, move from construction or tourism into agriculture, horticulture or small industry, relocate from rural areas to urban centres such as Shimla, Dharamshala and Manali or migrate to Punjab, Haryana and Delhi for more predictable employment (Chandel & Sharma, 2024; Kumari & Verma, 2019). These movements reflect a combination of climate pressure, job insecurity, health risk and differences in regional opportunity.

Mobility should not automatically be interpreted as failure. It can diversify household income and allow workers to avoid dangerous conditions. The

problem arises when movement is involuntary, unsupported or driven by the absence of basic protection. Workers who migrate without transferable skills, benefits or housing support may exchange one form of vulnerability for another.

7.2 Effects on households, communities and sectors

Out-migration can produce labour shortages in tourism and construction, affecting project delivery and regional economic activity (Chandel & Sharma, 2024). It can also alter family structures and weaken local social networks. Rural-to-urban movement adds pressure to housing, sanitation and services in receiving towns (Kumari & Verma, 2019). Climate mobility is therefore not only a labour-market adjustment, it redistributes social and infrastructure demands.

For originating sectors, worker departure can signal that adaptation measures are inadequate. If repeated heat exposure, unpaid stoppages or unsafe accommodation push workers away, employers and institutions lose experience and face higher recruitment costs. Retention should not mean preventing mobility, but making work sufficiently safe and secure that workers can choose rather than be compelled to leave.

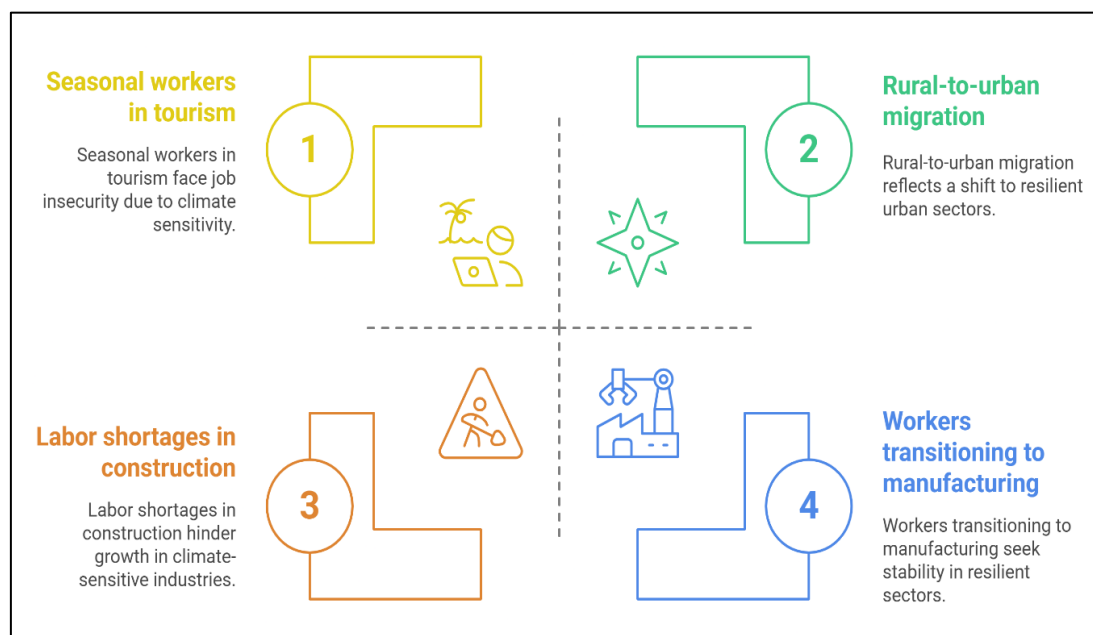


Figure 2: Migration Patterns and Sector Resilience in Himachal Pradesh

Figure 2 presents mobility as part of a wider resilience system. Climate shocks influence employment, migration and destination pressure, while economic diversification and skills affect the capacity to adapt. This reinforces the need to connect labour policy with urban planning and sector strategy.

7.3 Skill transitions and dignified adaptation

Skill development can support workers moving towards climate-resilient construction, building retrofits, green materials, drainage maintenance and other

emerging roles. It can also facilitate movement into alternative sectors when construction demand declines. Training must be linked to recognised certification and actual employment opportunities, short courses without placement or wage improvement will not materially strengthen resilience.

Women and migrant workers require equitable access to training. Course timing, location, language and entry requirements can otherwise reproduce exclusion.

Recognition of prior learning is valuable for experienced workers who lack formal credentials.

7.4 Receiving areas and planned mobility

Mobility policy must consider receiving locations as well as places of origin. Workers moving to Shimla, Dharamshala, Manali or neighbouring states require housing, healthcare, transport and access to employment information. If these needs are ignored, mobility can expand informal settlements and expose workers to new environmental hazards. Coordination between labour departments and urban local bodies can anticipate seasonal inflows and improve access to basic services.

Planned mobility does not mean directing workers where to live. It means ensuring that people who choose or need to move retain rights, records and support. Information centres at major labour destinations can assist with registration, benefit transfer, grievance procedures and job matching. Interstate coordination is important for workers who move beyond Himachal Pradesh. Climate adaptation will increasingly cross administrative borders, protection systems must be capable of doing the same.

8. A Worker-Centred Resilience Framework

The evidence suggests that climate resilience for informal construction labour rests on five connected pillars. The first is visibility through accessible worker registration. The second is prevention through climate-responsive occupational safety, water, sanitation and training. The third is income security through portable benefits and emergency support. The fourth is mobility support through recognised skills and cross-regional portability. The fifth is accountability through enforceable responsibility across contractors and public agencies.

These pillars should operate across the employment cycle. At recruitment, workers need registration, clear terms and benefit information. During work, they require safe facilities, equipment, alerts and health protection. During climate disruption, they need paid or compensated stoppages, evacuation and emergency care. After disruption, they require claims support, income recovery and options for retraining or movement.

This framework also clarifies the relationship between social and physical infrastructure. A climate-resilient road or tourism facility is not resilient if its construction depends on unsafe labour arrangements. Conversely, worker protection is harder to sustain when projects are poorly planned and repeatedly disrupted. Labour standards, engineering and climate-risk governance must therefore be integrated.

9. Policy Recommendations

First, Himachal Pradesh should establish portable worker registration and benefit access across contractors and districts, with assisted enrolment at major and remote worksites. Second, climate-responsive occupational safety standards should define heat thresholds, work-rest schedules, hydration, shaded recovery, weather-adapted protective equipment and mandatory stop-work procedures. Third, every construction permission and public contract should include enforceable requirements for worker housing, clean water, toilets, handwashing, emergency shelter and medical access. Fourth, public procurement should make compliance with labour and climate-safety standards a condition for payment. Principal contractors should retain responsibility when work is subcontracted. Fifth, early-warning systems should be linked directly to site-level evacuation plans and multilingual worker communication. Regular drills should include temporary and migrant labourers. Sixth, emergency income and accident-support mechanisms should be designed for daily-wage workers who lose employment during climate-related stoppages. Seventh, skill programmes should create recognised pathways into green construction, retrofitting, drainage, slope protection and other resilience-related occupations, with equitable access for women and migrants. Finally, labour, disaster management, urban development, tourism and welfare-board institutions should share a worker-centred monitoring framework. Data should be used to improve benefits and target inspections while protecting worker privacy.

10. CONCLUSION

Informal construction workers occupy a critical but vulnerable position in Himachal Pradesh's tourism and development economy. Their exposure to heat, rainfall, landslides, unsafe sites and disrupted access is intensified by casual employment, weak contracts, inadequate facilities and limited social protection. Women and migrants face additional barriers linked to occupational segregation, housing, documentation and mobility.

Existing warning systems, training and welfare mechanisms provide a starting point, but protection remains incomplete when coverage and enforcement are uneven. Climate mobility reveals both adaptive agency and institutional failure, workers move to manage risk, yet unsupported movement can reproduce insecurity elsewhere.

A resilient construction and tourism system must secure its workforce throughout recruitment, employment, disruption and recovery. Portable social protection, climate-responsive safety, gender-sensitive facilities, accountable contracting and recognised skill pathways are not supplementary welfare measures. They are core components of climate-resilient infrastructure and inclusive regional development.

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