

TVET FOR RECOVERY AND RESILIENCE: BUILDING CLIMATE-RESILIENT GREEN JOBS THROUGH GREENING TVET IN NEPAL

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Abstract

Climate change is reshaping economies, livelihoods and the future of work. Floods, landslides, heat stress, changing agricultural conditions and other climate-related hazards threaten existing occupations while creating demand for new technical competencies. These challenges are especially significant in Nepal, where damage to roads, bridges, hydropower facilities, settlements and agricultural systems can disrupt employment and local markets. Technical and Vocational Education and Training (TVET) can support climate resilience by preparing workers for sustainable production, risk-informed infrastructure, environmental services and green enterprise development. This paper examines how Nepal's TVET system can connect climate adaptation and disaster recovery with green employment. It adopts a qualitative desk-based case-study approach, analysing national adaptation priorities, international guidance on greening TVET, and publicly available material on Nepal's climate and skills-development context. The analysis focuses on curriculum relevance, trainer competence, workplace learning, employer partnerships, green entrepreneurship and inclusion. It argues that resilience should not be treated as a separate topic confined to specialist courses; instead, green and resilience competencies should be integrated into occupations across construction, agriculture, energy, manufacturing, transport, water and sanitation, and waste management. The paper proposes a six-part framework linking climate-risk assessment, green-skills intelligence, responsive curricula, work-based learning, employment and enterprise support, and continuous evaluation. The framework is intended as a planning tool rather than a tested intervention model. The paper concludes that greening TVET can contribute to recovery and resilient livelihoods when training is aligned with actual labour-market demand, decent-work principles and local climate risks. Implementation requires coordinated action by governments, training providers, employers, communities and development partners, together with stronger evidence on skills demand and graduate outcomes.

Keywords: TVET; climate resilience; green jobs; green skills; disaster recovery; just transition; employability; Nepal

1. Introduction

Climate change is not only an environmental challenge; it is also a challenge for employment, skills development, infrastructure and local economic security. Climate-related hazards can damage productive assets, interrupt supply chains, reduce access to markets and affect workers' health and safety. At the same time, adaptation and the transition towards more sustainable economies create demand for skills in renewable energy, resource-efficient production, resilient construction, ecosystem restoration, waste management and climate-smart agriculture. The implications for TVET are direct: training systems need to prepare learners both for emerging green occupations and for changes in established trades.

Nepal is exposed to multiple hazards because of its topography, settlement patterns, climate-sensitive livelihoods and dependence on transport and infrastructure systems that can be disrupted by floods and landslides. The Government of Nepal's National Adaptation Plan (NAP) 2021–2050 provides a long-term policy basis for integrating adaptation into planning and development across sectors and levels of government (Government of Nepal, 2021). The 2024 extreme precipitation and flooding event also demonstrated the potential for widespread disruption: the Department of Hydrology and Meteorology documented the event, while government loss-and-damage reporting described substantial effects on infrastructure and settlements (Department of Hydrology and Meteorology [DHM], 2024; Government of Nepal, 2024).

The Bhote Koshi corridor is a particularly relevant context for considering the connection between hazard exposure, infrastructure resilience and occupational skills. Official agencies have published reports on the Rasuwa–Bhote Koshi flood event in 2083 B.S. (2026), as well as earlier flood updates. These reports should be consulted directly when making event-specific claims about causes, losses and affected assets (Centre of Hydrology and Water Resources Research [CHWRR], 2026; DHM, 2025). The paper does not assume that every flood is caused solely by climate change. Flood events can arise from interacting meteorological, hydrological, geological and land-use processes; attribution to climate change requires event-specific scientific evidence.

TVET can contribute by developing the skills needed for safe reconstruction, infrastructure inspection and maintenance, renewable-energy services, sustainable agriculture, efficient resource use and enterprise recovery. UNESCO's recent discussion of greening TVET in Nepal highlights the need for curriculum and competency reform, stronger industry linkages, trainer capacity and more sustainable training environments (UNESCO, 2026). UNESCO-UNEVOC likewise frames greening TVET as a system-wide transformation involving policies, institutional capacity, teaching,

learning environments and partnerships, rather than a single environmental subject (UNESCO-UNEVOC, n.d.).

Nevertheless, the existence of green training does not guarantee decent employment. Training may be poorly matched to employer demand, graduates may lack access to equipment or finance, and local labour markets may not yet contain enough paid jobs. The central challenge is therefore to connect climate-risk priorities with credible labour-market intelligence, occupational standards, practical learning and employment support.

1.1 Research problem

Nepal's climate and development priorities require technical competencies that support environmental sustainability and resilience. However, the relationship between climate policy, TVET delivery and employment outcomes requires more systematic attention. Where curricula do not reflect emerging technologies, environmental standards or hazard-related work practices, graduates may be insufficiently prepared for changing workplaces. Where training is not connected to employers and local investment, even relevant competencies may not translate into jobs. This paper addresses the potential misalignment between climate-resilience priorities, green employment opportunities and the skills developed through TVET.

1.2 Objectives and research questions

The overall objective is to examine how TVET can support climate-resilient green employment and recovery in Nepal. The specific objectives are to; (i) examine the relationship between climate risks, occupational change and green employment; (ii) identify areas for integrating green and resilience competencies into TVET; (iii) analyse institutional and implementation challenges; and (iv) propose a framework connecting climate-risk priorities, skills development and inclusive employment.

The study addresses four questions: How can TVET contribute to climate resilience and recovery in Nepal? What competencies are relevant to emerging green and climate-resilient occupations? What institutional barriers may constrain greening TVET? What framework can connect skills development with inclusive and decent employment?

2. Literature Review

2.1 Greening TVET as a system-wide approach

Greening TVET refers to integrating sustainability into governance, institutional management, curricula, teaching methods, assessment, facilities and partnerships. UNESCO-UNEVOC's practical guidance emphasises institutional transformation and the role of TVET in equipping learners with knowledge, skills and attitudes for sustainable development (UNESCO-UNEVOC,

2017). The organisation's current resource platform also highlights the importance of updated trainer knowledge, institutional capability, skills strategies and collaboration to meet the demands of the green transition (UNESCO-UNEVOC, n.d.).

This approach matters because environmental sustainability affects most occupational sectors. Electricians may need skills in solar systems and energy efficiency; construction workers may need to apply material-efficiency and risk-informed practices; agricultural workers may need competencies in water conservation and soil management; and vehicle technicians may need to maintain electric mobility systems safely. Greening TVET therefore requires both new specialist programmes and the integration of green competencies into existing trades.

2.2 Green jobs and green skills

Green jobs contribute to environmental sustainability by reducing emissions, conserving resources, protecting ecosystems, improving energy efficiency or supporting adaptation. They may emerge in new sectors or through the transformation of established occupations. Green skills include technical competencies such as renewable-energy installation, efficient production, waste segregation and sustainable construction as well as transversal competencies such as problem-solving, environmental awareness, communication and adaptability.

The ILO's work on skills for green jobs emphasises anticipating changing skills needs and preparing workers for the transition to sustainable economies (ILO, n.d.). However, a job should not be considered decent merely because it is described as green. Occupational safety, fair remuneration, employment security, access to social protection and opportunities for progression remain important. Skills policies should therefore consider the quantity, quality and accessibility of jobs.

2.3 Climate resilience, disaster recovery and skills

Climate resilience refers to the ability of people, communities, institutions and systems to anticipate, withstand, adapt to and recover from climate-related hazards and their consequences. TVET can support resilience before a disaster by developing competencies in safe construction, drainage, energy efficiency, ecosystem management and maintenance. After a disaster, trained workers may help restore essential services, repair equipment, rebuild livelihoods and support local enterprises.

For example, masonry training that excludes site assessment, drainage, material quality, building standards and occupational safety may be insufficient for risk-informed reconstruction. Similarly, agricultural training is more useful when it combines production techniques with water management, soil conservation, climate information and livelihood diversification. TVET

complements, but cannot replace, disaster-risk governance, engineering design, early-warning systems, public investment and social protection.

2.4 Just transition and inclusion

A just transition seeks to ensure that environmental transformation creates fair opportunities and does not disproportionately disadvantage workers, enterprises and communities already facing economic or social barriers. In Nepal, a climate-responsive skills system should consider young people, women, informal workers, people with disabilities, low-income households and communities exposed to climate hazards. Barriers may include training costs, inaccessible facilities, care responsibilities, limited mobility, occupational segregation and lack of access to tools or finance.

Inclusive TVET requires more than enrolling disadvantaged learners. It should monitor completion, certification, employment, job retention, earnings where feasible, working conditions and access to career progression. Flexible schedules, recognition of prior learning, accessible training facilities, mentoring and links to enterprise support may improve participation and outcomes.

2.5 Analytical lens: skills gaps and institutional alignment

The paper uses a skills-gap perspective to examine three interrelated dimensions. Skills demand refers to competencies required by employers, communities and emerging green occupations. Skills supply refers to competencies developed through curricula, trainers, practical facilities and workplace learning. Institutional alignment concerns whether policies, financing, employer engagement, qualifications and employment services connect training supply with actual demand. A mismatch may arise when training is outdated, when graduates cannot demonstrate workplace performance, or when training is offered in locations with limited employment prospects. The framework therefore examines both technical competence and the institutions that connect competence with work.

3. Methodology

3.1 Research design

The study uses a qualitative, desk-based case-study approach focused on Nepal. It is exploratory and analytical: it draws on policy documents, institutional guidance and published material to examine how TVET could contribute to climate resilience and green employment. It does not claim to measure the causal effect of greening TVET on employment outcomes or to provide a statistically representative assessment of green-job demand.

3.2 Sources and analytical procedure

Sources include Nepal's National Adaptation Plan, official climate and flood-related documents, UNESCO-UNEVOC guidance on greening TVET, and ILO resources on green skills. The sources were reviewed thematically across five dimensions: (i) climate-related risks and livelihoods; (ii) green and resilience competencies across sectors; (iii) curricula, trainers and practical learning; (iv) partnerships among training providers, employers, government and communities; and (v) inclusion, enterprise development and employment outcomes. The themes were synthesised into a proposed framework.

3.3 Scope and limitations

The study is limited by the availability, comparability and currency of secondary information. It does not include original interviews, focus groups, direct observation, graduate tracer studies or employer surveys. The sectoral priorities identified below are analytical propositions rather than verified rankings of vacancies or skills shortages. Future research should test them through regional labour-market assessments, employer interviews, training-provider reviews and graduate follow-up. Specific claims about individual flood events should be grounded in official event reports and should distinguish documented impacts from scientific attribution to climate change.

4. Findings and Analysis

4.1 Climate hazards create employment risks and changing skills needs

Climate-related hazards can damage roads, bridges, buildings, irrigation systems, hydropower facilities and productive assets. These impacts can interrupt transport, reduce access to markets, disrupt business operations and increase household vulnerability. Agricultural disruption can reduce income and encourage workers to seek alternative livelihoods. Heat stress and unsafe working conditions may also affect worker health and productivity.

At the same time, adaptation and recovery may generate demand for workers who can maintain infrastructure, install renewable-energy systems, improve water efficiency, restore ecosystems, manage waste and repair equipment. This demand is not guaranteed to become stable employment; it depends on investment, procurement, institutional capacity and market development. TVET planning should therefore consider both occupations exposed to climate risks and plausible employment opportunities arising from adaptation and the green transition.

4.2 Bhote Koshi as a resilience and recovery context

The Bhote Koshi corridor illustrates why recovery should be linked to occupational skills and long-term resilience. Government hydrology and water-resource institutions have published reports

relating to the Rasuwa–Bhote Koshi flood event in 2083 B.S. (2026), while the Department of Hydrology and Meteorology has also made earlier Bhote Koshi flood updates available (CHWRR, 2026; DHM, 2025). These documents provide a basis for a more detailed event-specific case analysis, including verification of affected infrastructure, disruption and response measures. From a TVET perspective, the relevant skills domains include hazard-informed construction planning, site safety, quality control, drainage, erosion control, infrastructure inspection, maintenance of water and electricity systems, safe handling of materials and environmental management. Where flood events involve glacial or transboundary river processes, these occupational skills must complement hydrological monitoring, early warning, specialist engineering and inter-agency coordination. TVET graduates cannot independently resolve systemic hazard risks, but they can contribute technical capacity within a broader resilience strategy.

The case also raises a key distinction: rebuilding is not necessarily resilient rebuilding. If reconstructed assets reproduce previous vulnerabilities, recovery may restore services temporarily while leaving communities exposed to future disruption. Skills programmes should therefore be aligned with relevant building standards, engineering supervision, environmental safeguards and locally identified risks.

4.3 Priority sectors and illustrative competencies

Sector	Potential competencies	Illustrative employment pathways
Construction and infrastructure	Quality control, resilient construction, drainage, safe retrofitting, hazard awareness	Masonry, carpentry, site supervision, infrastructure maintenance
Renewable energy	Solar installation, energy efficiency, electrical safety, system maintenance	Solar technicians, electricians, energy-service enterprises
Agriculture	Water-efficient production, soil conservation, composting, climate-adaptive practices	Agricultural technicians, farm and irrigation services
Manufacturing	Energy and material efficiency, repair, reuse, waste reduction	Production and maintenance workers, recycling enterprises
Transportation	Electric-vehicle maintenance, battery safety, efficient mobility	EV technicians, vehicle-service enterprises
Water and sanitation	Water-system maintenance, efficient	Water technicians, sanitation

	pumping, wastewater management	and maintenance services
Waste management	Segregation, recycling, composting, safe handling	Waste-management and circular-economy enterprises
Forestry and ecosystem restoration	Nursery management, restoration, erosion control	Restoration technicians, nursery and community enterprises
Tourism and hospitality	Resource efficiency, waste minimisation, environmental management	Sustainable tourism and hospitality services

These are illustrative areas for investigation, not a quantified ranking of employment demand. Local assessments should determine which occupations are viable in each region and whether opportunities are likely to be formal jobs, informal work, self-employment or seasonal employment.

4.4 Curriculum and Occupational Standards

Curriculum relevance is central to climate-responsive TVET. Existing programmes can be reviewed to identify where green competencies should be embedded without unnecessarily expanding course duration. Construction programmes could include material efficiency, safe site practices, drainage and quality assurance. Electrical programmes could incorporate renewable-energy systems and energy efficiency. Agricultural programmes could include water conservation, soil management and climate-adaptive production. Transport programmes could incorporate electric mobility and battery safety where local demand justifies it.

Curriculum reform should be informed by employers, workers, trainers, professional bodies, local governments and communities. Competencies should be observable and assessable through practical tasks rather than described only as general awareness. Training should also be locally adapted: a flood-prone river corridor may prioritise safe reconstruction and infrastructure maintenance, while a drought-affected agricultural area may prioritise irrigation efficiency and soil-water management.

4.5 Trainer competence and institutional capacity

Updated curricula cannot deliver results unless trainers have the relevant knowledge, teaching methods and equipment. Professional development may be required in renewable-energy technologies, sustainable construction, resource-efficient production, climate-risk awareness, environmental management and practical assessment. Training institutions may also need

demonstration equipment, safe workshops, digital learning resources and partnerships with enterprises.

A whole-institution approach would combine curriculum changes with energy-efficient facilities, water conservation, waste reduction, sustainable procurement and community engagement. Training providers can model the practices they teach. Partnerships with employers and specialist organisations can support trainer placements, technical demonstrations, shared equipment and joint curriculum reviews, particularly where individual institutions cannot afford new technologies independently.

4.6 Work-based learning and employer partnerships

Work-based learning enables learners to apply competencies in realistic conditions and understand workplace quality standards, production processes, safety requirements and employer expectations. Potential mechanisms include apprenticeships, supervised placements, enterprise projects, industry demonstrations and joint assessment. Employers can contribute to curriculum reviews, provide information about emerging skills needs and assess practical performance.

Work-based learning requires clear safeguards. Agreements should specify supervision, learning objectives, working hours, occupational safety, insurance or other protection where applicable, and the responsibilities of training providers and employers. Trainees should not be treated as substitutes for paid workers or assigned hazardous reconstruction tasks without adequate preparation and protection.

4.7 Green entrepreneurship and local recovery

Self-employment and microenterprise development may be important where formal green jobs are geographically concentrated or limited. TVET can combine technical skills with business planning, costing, financial literacy, marketing, customer service, digital promotion and environmental compliance. Potential enterprise areas include solar maintenance, energy-efficient building services, agricultural processing, composting, recycling, repair and reuse, efficient irrigation, electric-vehicle servicing and sustainable tourism.

Technical training alone is rarely sufficient to establish a viable enterprise. Graduates may need tools, workspace, affordable finance, mentoring, registration support, procurement opportunities and reliable markets. Local governments, business associations and development partners can connect training graduates with these services. Support should be based on market assessment and should consider whether the proposed business can provide safe work, reliable income and genuine environmental benefits.

4.8 Inclusion and decent work

A just transition requires that people who face barriers to training and employment can access new opportunities. Women, people with disabilities, low-income learners, informal workers and communities affected by climate hazards may face financial, mobility, accessibility or social barriers. Possible responses include flexible schedules, accessible facilities, recognition of prior learning, mentoring, career guidance, targeted outreach and support with transport or tools where feasible.

Inclusion should be measured by outcomes rather than enrolment alone. Relevant indicators include completion, certification, employment, job retention, earnings where feasible, enterprise survival, safe working conditions and access to progression. Disaggregated data can help identify whether some groups are systematically excluded from higher-quality green occupations.

4.9 Federal, Provincial and Local Sphere Government Coordination Mechanism

Nepal's federal structure creates opportunities to connect national climate priorities with local skills needs. National institutions can provide policy direction, standards and qualification frameworks. Provincial institutions can support sectoral planning, training-provider coordination, labour-market analysis and partnerships across districts. Local governments can identify community risks, reach vulnerable groups and connect training with local employment and enterprise services. These roles should be aligned with actual legal mandates and institutional capacity.

Provincial or local green-skills coordination mechanisms could bring together government agencies, TVET providers, employers, workers' representatives, community organisations and development partners. Their functions could include identifying priority occupations, reviewing training plans, coordinating resources and tracking employment outcomes. Without shared information, training providers may deliver courses unrelated to local demand, while governments may lack evidence for allocating resources.

5. Proposed Framework: TVET for Climate Resilience and Green Employment

The paper proposes a six-stage framework to connect climate risks with skills development, workplace practice and employment outcomes. The framework is the author's conceptual contribution and has not yet been empirically tested.

Stage 1: Climate-risk and livelihood assessment

Identify locally relevant hazards, vulnerable livelihoods, infrastructure risks and environmental priorities. Use official climate assessments, local plans, employer consultations and community

knowledge. Avoid assuming that all hazards have the same cause or that every climate-related priority translates directly into a job.

Stage 2: Green-skills and labour-market intelligence

Identify occupations affected by climate risks and plausible opportunities arising from adaptation, reconstruction, resource efficiency and the green transition. Assess employer demand, required competencies, qualification requirements, job quality and barriers to access. Distinguish actual vacancies from anticipated future demand and social needs.

Stage 3: Responsive curricula and trainer development

Translate identified competencies into occupational standards, course content, trainer development, practical resources and competency-based assessment. Review existing courses before creating new qualifications, and adapt content to local hazards and employment opportunities.

Stage 4: Work-based learning and employer collaboration

Connect training providers with employers, public agencies, community organisations and enterprises through supervised placements, apprenticeships, practical projects and joint assessment. Ensure that workplace learning is safe and genuinely educational.

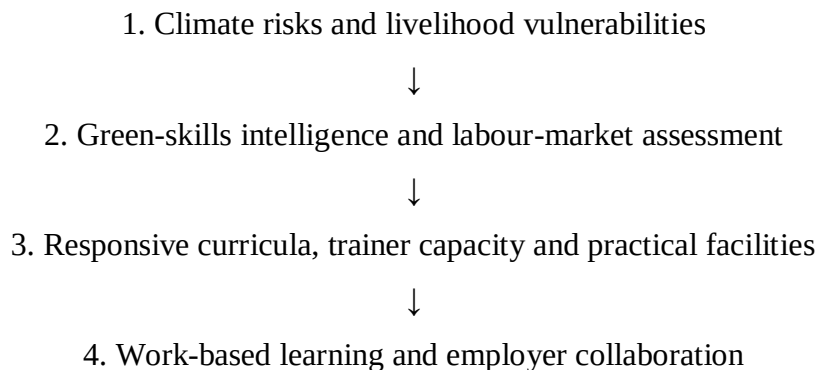
Stage 5: Employment and enterprise support

Connect graduates to jobs, career services, business development, finance, mentoring, tools and markets. Promote decent work and assess whether employment is safe, fairly remunerated and environmentally beneficial.

Stage 6: Monitoring and continuous improvement

Track skills acquisition, completion, employment, job retention, enterprise performance, inclusion, job quality and relevant environmental outcomes. Use evidence to revise curricula, training priorities and partnerships.

Cross-cutting enablers include government coordination, employer and worker participation, inclusive access, sustainable financing, occupational safety, environmental standards and reliable labour-market information.



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5. Green entrepreneurship, decent employment and livelihood recovery
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6. Monitoring, evaluation and continuous improvement

CROSS-CUTTING ENABLERS: Government Coordination, inclusion, finance, occupational safety, environmental standards, social protection

This framework is intended as a planning and evaluation tool. It does not assume that green training automatically creates jobs. Outcomes depend on employer demand, public and private investment, training quality, institutional capacity and complementary employment services. Piloting and local validation are therefore necessary.

6. Discussion

6.1 From climate awareness to occupational competence

The analysis suggests that climate awareness alone is insufficient. Workers need demonstrable competencies that can be applied to specific tasks and assessed against appropriate standards. Construction workers should be able to follow quality-control procedures and identify unsafe site conditions; solar technicians should install and maintain systems safely; and agricultural workers should apply relevant soil- and water-management practices. This shift from awareness to occupational competence helps employers recognise the practical value of training.

6.2 Integrating adaptation, recovery and green employment

Adaptation, disaster recovery and green employment are often addressed through separate policy channels, yet they can reinforce one another when training is planned around shared priorities. Sustainable infrastructure maintenance can support jobs and reduce future damage; renewable-energy services can improve energy access; and recycling can create local enterprise opportunities while reducing environmental pressures. However, reconstruction can reproduce vulnerabilities if risk, quality and maintenance are neglected. Green investment may also fail to benefit local workers if required skills are imported or training is disconnected from procurement.

6.3 Local labour-market intelligence

National green-skills priorities need to reflect differences among Nepal's ecological regions and local economies. Skills needs in a flood-prone corridor may differ from those in a drought-affected agricultural area or an urban centre expanding electric mobility. Local assessments should examine enterprises, planned investments, infrastructure needs, occupational profiles, training-provider

capacity and barriers to employment. Graduate tracer studies and employer feedback can reveal whether courses are relevant and whether graduates use their skills at work.

6.4 Policy coherence and the federal TVET system

Nepal's National Adaptation Plan provides a national basis for adaptation planning, while UNESCO-UNEVOC and ILO resources provide guidance on green competencies and skills-system transformation. UNESCO's 2026 discussion of greening TVET in Nepal also notes the development of a baseline study and the intention to advance guidelines and an implementation framework (UNESCO, 2026). This creates an opportunity to connect climate policy with occupational standards, training budgets, employer partnerships and employment services. Implementation should clarify institutional responsibilities and avoid duplication.

6.5 What the framework

The framework's contribution is to treat greening TVET as a chain from risk assessment to employment outcomes rather than as curriculum reform alone. It combines local climate-risk information with skills intelligence, practical training, enterprise support and continuous monitoring. Its emphasis on job quality and inclusion also guards against equating training enrolment or course completion with successful transition to decent green work. The framework remains conceptual and should be tested through pilot programmes and comparative regional studies.

7. Policy Recommendations

1. Develop a coordinated green-skills strategy for TVET. Connect national climate and employment priorities with occupational standards, local labour-market needs, financing and implementation responsibilities.
2. Conduct provincial and local green-skills assessments. Use employer consultations, climate-risk information, infrastructure plans and graduate tracer studies to identify viable occupations and training priorities.
3. Review curricula and occupational standards. Embed resilience, resource efficiency, environmental protection and occupational safety in relevant trades, using observable competencies and practical assessment.
4. Strengthen trainer development and institutional facilities. Provide continuing professional development, updated equipment, demonstration facilities and opportunities for trainer placements with employers.

5. Expand structured work-based learning. Develop supervised apprenticeships and placements with clear learning objectives, safety arrangements and protection for trainees.
6. Link technical training with enterprise and employment support. Provide career guidance, mentoring, business development, access to finance and market linkages based on credible local demand.
7. Promote inclusion and decent work. Reduce access barriers and monitor employment quality, not only participation and certification.
8. Integrate TVET into recovery planning. Assess local skills needs during disaster recovery and reconstruction, ensuring that training complements engineering standards, professional supervision and risk management.
9. Establish monitoring and accountability mechanisms. Track employment, retention, enterprise performance, inclusion and environmental outcomes, and use the evidence to revise program.

8. Proposed Monitoring Indicators

Result area	Illustrative indicators
Curriculum relevance	Number/proportion of priority programmes reviewed for green and resilience competencies
Trainer capacity	Number of trainers completing relevant professional development
Practical learning	Proportion of relevant programmes offering supervised workplace learning
Employer engagement	Active employer partnerships and joint curriculum reviews
Employment outcomes	Graduate employment, job retention and use of acquired competencies
Enterprise development	Supported enterprises still operating after a defined follow-up period
Inclusion	Participation, completion and employment outcomes disaggregated by relevant groups
Job quality	Evidence of safe working conditions, fair remuneration and appropriate protections
Environmental outcomes	Documented improvements in resource efficiency, waste reduction or resilience practices
Coordination	Evidence of joint planning, regular coordination and shared resource allocation

These indicators are illustrative and should not be treated as national targets. Baselines, definitions, data responsibilities and follow-up periods should be established before performance benchmarks are set.

9. Limitations and Future Research

As a desk-based study, this paper cannot establish the size of green skills gaps in Nepal or determine whether a particular training intervention improves employment or resilience. It also cannot attribute an individual flood event to climate change. Future research should combine document analysis with interviews involving employers, TVET authorities, trainers, graduates, local governments and climate-affected communities. A useful next step would be a comparative study of selected municipalities in the Koshi and Bagmati river systems, examining construction, agriculture, renewable energy and waste-management occupations. Graduate tracer studies and employer surveys could test whether proposed competencies correspond to workplace requirements. A dedicated Bhote Koshi case study should use official event assessments to establish chronology, affected assets, recovery priorities and the specific skills needed.

10. Conclusion

Climate change presents Nepal with interconnected challenges involving infrastructure, livelihoods, employment and development. At the same time, adaptation, disaster recovery and the transition towards sustainable production create opportunities to upgrade existing trades and develop new competencies. This paper has examined how TVET can contribute through curriculum reform, trainer development, work-based learning, employer collaboration, green entrepreneurship and inclusive employment support.

The analysis suggests that climate resilience should not be treated as a separate subject confined to specialist programmes. It should be integrated into relevant occupational competencies across construction, infrastructure, agriculture, energy, manufacturing, transportation, water and sanitation, and waste management. The Bhote Koshi context highlights why recovery should extend beyond rebuilding damaged assets to developing the technical capacity needed for safer construction, infrastructure maintenance, environmental management and livelihood recovery. Such skills must complement engineering standards, early-warning systems, risk-informed planning and effective governance.

The proposed six-stage framework links climate-risk assessment, green-skills intelligence, responsive training, work-based learning, employment and enterprise support, and continuous

evaluation. Its implementation requires coordinated action by governments, TVET institutions, employers, workers, communities and development partners. It also requires reliable labour-market evidence and attention to the quality and inclusiveness of employment. Greening TVET should therefore be understood as both a skills-system reform and a contribution to climate-resilient development. For Nepal and other climate-vulnerable countries, the key opportunity is to connect climate action with practical skills, productive livelihoods and decent work.

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