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Road infrastructure and community access: a comparative analysis of Burkina faso and Laos

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ABSTRACT

This study examines the comparative approaches to road infrastructure development and its impact on community access in Burkina Faso and Laos, two landlocked nations facing distinct geographical and climatic challenges. Despite their different contexts, both countries grapple with the fundamental challenge of connecting rural populations to markets, services, and economic opportunities through road networks. The research employs a comparative case study

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methodology, drawing on project reports, policy documents, and empirical studies from both countries spanning 2020-2026. Burkina Faso's approach is increasingly shaped by climate resilience imperatives. The SKBo Basin Integration Project, a $216 million initiative supported by the World Bank and Global Center on Adaptation, demonstrates how climate risk assessment is being integrated into road design, with adaptation measures including higher temperature-rated bitumen, 100-year flood-resistant culverts, and nature-based solutions for erosion control (World Bank, 2025a; Global Center on Adaptation, 2025). The project targets 115 km of the RN11 corridor, expected to benefit over 3.9 million people while addressing the vulnerability of critical trade routes where climate disruptions could reduce road accessibility by up to 90% under worst-case scenarios. The African Development Bank's Dédougou-Tougan and Kongoussi-Djibo road projects further illustrate Burkina Faso's commitment to opening up high-potential agricultural regions, with explicit attention to community participation and labor-intensive methods creating jobs for women and youth (African Development Bank, 2025). Helvetas's HIMO program demonstrates the transformative potential of community-grounded approaches, with participatory planning, local recruitment, and integration of nature-based solutions generating measurable impacts: household incomes increased by 90% due to both construction employment and improved market access, while 79% of the population reported improved health status (Helvetas, 2025).

Laos presents a different landscape characterized by rapid infrastructure expansion driven by regional integration imperatives. The Laos-China railway has transported over 8.2 million passengers and 11.62 million tons of goods since its opening, while the country has built 12,723 bridges—an increase of 12,624 since 1986 (KPL, 2025). However, these national-scale investments have historically left remote areas underserved, with only 15% of the national road network paved and 40% of unpaved roads inaccessible during the wet season. The $56 million Climate Resilient Road Connectivity Improvement Project, funded by the World Bank, addresses this gap by targeting 300 km of district and rural roads in Khammuan, Saravan, and Savannakhet provinces, explicitly designed to benefit farmers and women through year-round connections and an innovative internship program addressing the gender gap in transport (World Bank, 2024). The China-aided Bansou Village project illustrates the potential of targeted rural infrastructure: a steel bridge and paved roads transformed access for a village where over half of families were previously poor, reducing poor households from 208 to 22 (People's Daily, 2025). The National

Road No. 12 improvement, funded by Thailand's NEDA, demonstrates Laos's strategic positioning within the Greater Mekong Subregion, with traffic nearly doubling from 21,232 to 43,758 vehicles per day between 2022 and 2024 (The Star, 2025).

Burkina Faso's strength lies in its systematic integration of climate resilience into road infrastructure planning, its emphasis on community participation through labor-based approaches, and its growing attention to nature-based solutions that transform roads into instruments for natural resource management. Laos's advantage is its strategic vision for regional connectivity, the transformative impact of major infrastructure like the Laos-China railway, and emerging models for targeted rural access improvement. Both countries demonstrate that effective road infrastructure for community access requires: (1) climate-resilient design adapted to local hazards; (2) participatory planning engaging communities from inception; (3) attention to gender dynamics in both construction employment and access benefits; (4) integration of roads with broader development strategies; (5) maintenance frameworks ensuring long-term functionality; (6) balanced investment between national arteries and rural access; and (7) recognition that roads are not merely engineering structures but lifelines connecting people to opportunity.

KEYWORDS: Road infrastructure, community access, Burkina Faso, Laos, climate resilience, rural connectivity, participatory development, transport corridors, nature-based solutions, sustainable infrastructure

RÉSUMÉ

Cette étude examine les approches comparatives du développement des infrastructures routières et de leur impact sur l'accès communautaire au Burkina Faso et au Laos, deux nations enclavées confrontées à des défis géographiques et climatiques distincts. Malgré leurs contextes différents, les deux pays sont confrontés au défi fondamental de connecter les populations rurales aux marchés, aux services et aux opportunités économiques par le biais des réseaux routiers. La recherche emploie une méthodologie d'étude de cas comparative, s'appuyant sur des rapports de projets, des documents politiques et des études empiriques des deux pays couvrant la période 2020-2026. L'approche du Burkina Faso est de plus en plus façonnée par les impératifs de résilience climatique. Le Projet du Bassin d'Intégration SKBo, une initiative de 216 millions de dollars

soutenue par la Banque mondiale et le Centre mondial pour l'adaptation, démontre comment l'évaluation des risques climatiques est intégrée dans la conception routière, avec des mesures d'adaptation comprenant du bitume à température plus élevée, des ponceaux résistants aux crues centennales et des solutions fondées sur la nature pour le contrôle de l'érosion (World Bank, 2025a; Global Center on Adaptation, 2025). Le projet cible 115 km du corridor RN11, devant bénéficier à plus de 3,9 millions de personnes tout en répondant à la vulnérabilité des routes commerciales critiques où les perturbations climatiques pourraient réduire l'accessibilité routière jusqu'à 90 % dans les pires scénarios. Les projets de routes Dédougou-Tougan et Kongoussi-Djibo de la Banque africaine de développement illustrent davantage l'engagement du Burkina Faso à désenclaver les régions agricoles à fort potentiel, avec une attention explicite à la participation communautaire et aux méthodes à haute intensité de main-d'œuvre créant des emplois pour les femmes et les jeunes (African Development Bank, 2025). Le programme HIMO d'Helvetas démontre le potentiel transformateur des approches ancrées dans la communauté, avec une planification participative, un recrutement local et l'intégration de solutions fondées sur la nature générant des impacts mesurables : les revenus des ménages ont augmenté de 90 % grâce à la fois à l'emploi dans la construction et à un meilleur accès aux marchés, tandis que 79 % de la population a signalé une amélioration de son état de santé (Helvetas, 2025).

Le Laos présente un paysage différent caractérisé par une expansion rapide des infrastructures motivée par des impératifs d'intégration régionale. Le chemin de fer Laos-Chine a transporté plus de 8,2 millions de passagers et 11,62 millions de tonnes de marchandises depuis son ouverture, tandis que le pays a construit 12 723 ponts—une augmentation de 12 624 depuis 1986 (KPL, 2025). Cependant, ces investissements à l'échelle nationale ont historiquement laissé les zones reculées mal desservies, avec seulement 15 % du réseau routier national pavé et 40 % des routes non pavées inaccessibles pendant la saison des pluies. Le Projet d'amélioration de la connectivité routière résiliente au changement climatique de 56 millions de dollars, financé par la Banque mondiale, comble cette lacune en ciblant 300 km de routes de district et rurales dans les provinces de Khammuan, Saravan et Savannakhet, explicitement conçu pour bénéficier aux agriculteurs et aux femmes grâce à des connexions toute l'année et à un programme de stage innovant traitant l'écart entre les sexes dans les transports (World Bank, 2024). Le projet du village de Bansou, aidé par la Chine, illustre le potentiel des infrastructures rurales ciblées : un pont en acier et des routes

pavées ont transformé l'accès pour un village où plus de la moitié des familles étaient auparavant pauvres, réduisant le nombre de ménages pauvres de 208 à 22 (People's Daily, 2025). L'amélioration de la route nationale n° 12, financée par la NEDA thaïlandaise, démontre le positionnement stratégique du Laos au sein du Grand Mékong, le trafic ayant presque doublé, passant de 21 232 à 43 758 véhicules par jour entre 2022 et 2024 (The Star, 2025).

La force du Burkina Faso réside dans son intégration systématique de la résilience climatique dans la planification des infrastructures routières, son accent sur la participation communautaire par des approches à haute intensité de main-d'œuvre et son attention croissante aux solutions fondées sur la nature qui transforment les routes en instruments de gestion des ressources naturelles. L'avantage du Laos est sa vision stratégique pour la connectivité régionale, l'impact transformateur des grandes infrastructures comme le chemin de fer Laos-Chine et les modèles émergents pour l'amélioration ciblée de l'accès rural. Les deux pays démontrent qu'une infrastructure routière efficace pour l'accès communautaire nécessite : (1) une conception résiliente au climat adaptée aux risques locaux ; (2) une planification participative impliquant les communautés dès le départ ; (3) une attention aux dynamiques de genre tant dans l'emploi lié à la construction que dans les bénéfices d'accès ; (4) l'intégration des routes dans des stratégies de développement plus larges ; (5) des cadres d'entretien assurant la fonctionnalité à long terme ; (6) un investissement équilibré entre les artères nationales et l'accès rural ; et (7) la reconnaissance que les routes ne sont pas de simples structures d'ingénierie mais des bouées de sauvetage reliant les populations aux opportunités.

MOTS-CLÉS : Infrastructure routière, accès communautaire, Burkina Faso, Laos, résilience climatique, connectivité rurale, développement participatif, corridors de transport, solutions fondées sur la nature, infrastructure durable

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1. INTRODUCTION

Road infrastructure is the sinew of modern economies and the lifeline of rural communities. For landlocked countries, roads are particularly vital—they are the arteries through which goods reach markets, students reach schools, patients reach health centers, and farmers reach inputs. The quality and accessibility of road networks fundamentally shape the life chances of rural populations, determining whether children can attend school year-round, whether women can access maternal health services, and whether farmers can sell their produce at fair prices.

Yet the challenge of building and maintaining road infrastructure in landlocked developing countries is formidable. Geography, climate, fiscal constraints, and institutional capacity all shape the possibilities for infrastructure development. Roads must withstand extreme weather, serve dispersed populations, and deliver benefits that justify their costs. The task is not merely technical but deeply social—requiring engagement with communities, attention to gender dynamics, and integration with the natural environment.

Burkina Faso and Laos, two landlocked nations on different continents, offer a compelling comparative lens through which to examine these dynamics. Burkina Faso, in West Africa, faces the challenges of the Sahelian climate—extreme heat, variable rainfall, and increasing flood risks driven by climate change. With 75% of the workforce employed in agriculture, the country's road network is critical for food security, trade, and livelihoods (Global Center on Adaptation, 2025). Laos, in Southeast Asia, is characterized by mountainous terrain, a rapidly growing economy, and strategic positioning within the Greater Mekong Subregion. The country has invested heavily in infrastructure, including the landmark Laos-China railway, yet rural areas remain underserved—only 15% of the national road network is paved, and 40% of unpaved roads become impassable during the wet season (World Bank, 2024).

This study examines the comparative approaches to road infrastructure development and community access in Burkina Faso and Laos. Drawing on project reports, policy documents, and empirical studies from both countries, it explores how infrastructure investments are planned,

implemented, and experienced by the communities they are meant to serve. The analysis is organized around four interconnected themes: (1) the foundational contexts for road infrastructure in each country; (2) approaches to climate resilience and adaptation; (3) community participation and benefit-sharing mechanisms; and (4) the integration of roads with broader development strategies.

The study contributes to scholarship on infrastructure development, rural access, and sustainable transport. It argues that road infrastructure is not merely a technical challenge of engineering and finance but a deeply social undertaking—one that requires meaningful community engagement, attention to gender dynamics, and integration with the natural environment. The experiences of Burkina Faso and Laos offer lessons for other landlocked developing countries seeking to build infrastructure that truly serves the people.

2. LITERATURE REVIEW

2.1 Conceptualizing Community Access and Rural Connectivity

Community access to infrastructure encompasses multiple dimensions: physical access (the ability to reach services and markets), economic access (the affordability of transport), and social access (the inclusion of marginalized groups in the benefits of connectivity). The concept of "access" moves beyond simply measuring road kilometers to consider whether infrastructure actually serves the needs of the populations it is intended to benefit (Starkey et al., 2002).

Research on rural transport has consistently shown that the benefits of road infrastructure are not automatically distributed. Women, for example, may have different mobility patterns and constraints than men, yet their needs are often overlooked in transport planning (Porter, 2011). Similarly, the poor may benefit less from improved roads if they cannot afford motorized transport or if market access gains are captured by wealthier traders.

The concept of "last-mile connectivity" has emerged to capture the challenge of extending infrastructure benefits to remote populations. Even when national road networks are well-developed, rural communities may remain isolated if feeder roads are neglected. This insight is

particularly relevant for Laos, where investments have historically focused on national arteries, leaving district and rural roads underfunded (World Bank, 2024).

2.2 Climate Resilience and Infrastructure Vulnerability

Climate change poses unprecedented challenges to road infrastructure. Roads designed for historical climate conditions may fail under future extremes, disrupting access and undermining development gains. Research has documented the vulnerability of transport infrastructure to flooding, landslides, extreme heat, and other climate hazards (Schweikert et al., 2014).

The concept of climate-resilient infrastructure has emerged as a response, emphasizing the need to integrate climate risk assessment into all stages of infrastructure planning, design, construction, and maintenance. This includes selecting appropriate materials, designing for future climate conditions, and incorporating nature-based solutions that work with rather than against natural systems (World Bank, 2021).

Burkina Faso's approach, as exemplified by the SKBo project, represents a leading example of climate-resilient infrastructure planning. The project's high-resolution climate risk assessments, cost-benefit analysis of adaptation options, and integration of nature-based solutions reflect emerging global best practice (Global Center on Adaptation, 2025).

2.3 Community Participation in Infrastructure Development

Community participation in infrastructure development has been advocated for decades, yet its practice remains uneven. Genuine participation goes beyond consultation to involve communities in decision-making, implementation, and ongoing management. Research has documented the benefits of participatory approaches, including improved project relevance, enhanced local ownership, and better maintenance outcomes (Chambers, 1983; Mansuri & Rao, 2013).

The labor-based approach, as exemplified by Burkina Faso's HIMO program, represents a particular model of community participation. By using local labor rather than heavy machinery, these approaches generate immediate employment benefits while building local skills and

ownership. Research has documented positive impacts on incomes, local economies, and project sustainability (Helvetas, 2025).

2.4 Gender and Infrastructure

Gender analysis has revealed systematic biases in infrastructure planning and outcomes. Women's mobility patterns, constrained by household responsibilities, safety concerns, and social norms, differ from men's. Yet infrastructure projects are often designed without attention to these differences, perpetuating inequalities (Porter, 2011).

Recent research has documented the potential of gender-sensitive infrastructure to advance women's empowerment. Improved roads can facilitate women's access to markets, health services, and education, while employment in infrastructure construction can provide income and skills (World Bank, 2024). Both Burkina Faso and Laos have begun to address gender in their infrastructure programs, though approaches differ.

2.5 Nature-Based Solutions for Infrastructure

Nature-based solutions—the use of natural systems to address infrastructure challenges—have gained increasing attention. For road infrastructure, nature-based solutions can include erosion control through vegetation, water management through restored wetlands, and slope stabilization through reforestation (World Bank, 2021).

Burkina Faso's integration of nature-based solutions into road projects represents a significant innovation. By designing roads to retain runoff water, control erosion, and enable reforestation, the country is creating infrastructure that actively contributes to environmental goals (Helvetas, 2025). This approach offers lessons for other countries facing similar challenges.

3. RESEARCH QUESTIONS

This study addresses the following research questions:

1: How do the foundational contexts for road infrastructure development differ between Burkina Faso and Laos, and how do these differences shape approaches to community access?

2: What approaches to climate resilience and adaptation are being integrated into road infrastructure in each country, and how effective are they likely to be?

3: How do community participation mechanisms and attention to gender dynamics shape the outcomes of road infrastructure investments in Burkina Faso and Laos?

4: What lessons can be drawn from comparative analysis for strengthening the contribution of road infrastructure to community access in landlocked developing countries?

4. METHODOLOGY

This study employs a comparative case study methodology to examine road infrastructure development and community access in Burkina Faso and Laos. The research design integrates document analysis of primary sources with synthesis of secondary literature to develop a comprehensive understanding of infrastructure planning, implementation, and outcomes in both countries.

Primary sources analyzed include: project reports from the World Bank (2024, 2025a), Global Center on Adaptation (2025), African Development Bank (2025), and Helvetas (2025) for Burkina Faso; and government policy statements (KPL, 2025), World Bank project documentation (2024), media reports (People's Daily, 2025; The Star, 2025), and regional analyses for Laos.

The comparative framework examines four dimensions of road infrastructure: (1) foundational context and infrastructure landscape; (2) climate resilience and adaptation approaches; (3) community participation and gender dynamics; and (4) outcomes for community access and development.

The analysis covers the period from approximately 2020 to 2026, capturing recent developments including the SKBo project approval, the Laos Climate Resilient Road Connectivity Improvement Project, and ongoing initiatives in both countries.

5. RESULTS

5.1 Foundational Contexts for Road Infrastructure

Burkina Faso: Burkina Faso's infrastructure landscape is shaped by its Sahelian geography, its landlocked status, and the imperative of connecting agricultural regions to markets. Key features include:

- Agriculture employs 75% of the workforce, making road connectivity critical for food security and livelihoods (Global Center on Adaptation, 2025).
- Significant climate vulnerability: under a high-emissions scenario, 333.7 km of roads are at risk from flooding and landslides, with the probability of disruptions increasing by 300% (Global Center on Adaptation, 2025).
- Major infrastructure initiatives include the SKBo Basin Integration Project ($216 million, targeting 115 km of the RN11 corridor) and African Development Bank projects targeting 187 km of roads in agricultural regions (African Development Bank, 2025).
- Growing attention to nature-based solutions and climate-resilient design.
- Community participation institutionalized through labor-based approaches, as exemplified by Helvetas's HIMO program (Helvetas, 2025).

Laos: Laos's infrastructure landscape is characterized by rapid expansion driven by regional integration imperatives. Key features include:

- Dramatic infrastructure growth: from 99 bridges in 1986 to 12,723 today; asphalt roads reaching all provincial capitals; 147 out of 148 districts connected by paved roads (KPL, 2025).
- Major regional infrastructure: the Laos-China railway has transported over 8.2 million passengers and 11.62 million tons of goods (KPL, 2025).
- However, significant rural access gaps persist: only 15% of the national road network is paved; 40% of unpaved roads are inaccessible during the wet season (World Bank, 2024).
- Strategic positioning within the Greater Mekong Subregion, with roads forming part of ASEAN and east-west economic corridors (The Star, 2025).

- Emerging attention to climate resilience and rural access through initiatives like the $56 million Climate Resilient Road Connectivity Improvement Project (World Bank, 2024).

Table 1: Comparative Foundational Contexts

Dimension	**Burkina Faso**	**Laos**
Geography	Sahelian, landlocked	Mountainous, landlocked
Primary economic base	Agriculture (75% of workforce)	Agriculture, regional trade
Road network coverage	Limited data; focus on climate-vulnerable corridors	15% paved; 40% unpaved roads wet-season inaccessible (World Bank, 2024)
Major infrastructure initiatives	SKBo Project ($216M); AfDB roads (187 km)	Laos-China railway; National Road 12; Climate Resilient Roads ($56M)
Climate risks	Flooding, landslides, extreme heat	Flooding, wet-season inaccessibility
Regional integration	Cross-border with Mali, Côte d'Ivoire	ASEAN, Greater Mekong Subregion

5.2 Climate Resilience and Adaptation Approaches

Burkina Faso: Burkina Faso has developed sophisticated approaches to integrating climate resilience into road infrastructure. Key features include:

- High-resolution climate risk and vulnerability assessments identifying infrastructure hotspots, as implemented in the SKBo project (Global Center on Adaptation, 2025).
- Prioritized adaptation options based on stakeholder consultations and cost-benefit analysis, including:
  - Higher temperature-rated bitumen (benefit-cost ratio of up to 2)
  - Culverts and stream crossings designed to withstand 1:100-year rainfall events

- Nature-based solutions for erosion control, runoff mitigation, and water retention (Global Center on Adaptation, 2025; Helvetas, 2025).
- Integration of climate resilience into engineering design and operations from project inception.
- Capacity-building for climate-informed infrastructure planning at national and local levels.
- Recognition that roads can be designed not merely to resist climate impacts but to actively contribute to natural resource management—retaining water for irrigation, controlling erosion, and enabling reforestation (Helvetas, 2025).

Laos: Laos's approach to climate resilience is at an earlier stage but gaining momentum. Key features include:

- Recognition that 40% of unpaved roads are already wet-season inaccessible, with climate change exacerbating vulnerability (World Bank, 2024).
- The Climate Resilient Road Connectivity Improvement Project explicitly targets all-season connectivity, ensuring roads remain passable year-round even with increased rainfall and flooding.
- Project design incorporates climate risk assessment and adaptation measures, though less detailed than Burkina Faso's approach.
- Focus on provinces most vulnerable to flooding (Khammuan, Saravan, Savannakhet) (World Bank, 2024).
- Attention to ensuring that improved roads benefit farmers and women specifically, recognizing that climate impacts disproportionately affect vulnerable populations.

Table 2: Comparative Climate Resilience Approaches

Dimension	**Burkina Faso**	**Laos**
Climate risk assessment	High-resolution, integrated into project cycle (Global Center on Adaptation, 2025)	Emerging; focused on flood-vulnerable provinces (World Bank, 2024)

Adaptation measures	Temperature-rated bitumen; 100-year flood culverts; nature-based solutions	All-season design; flood-resistant specifications
Benefit-cost analysis	Explicit (BCR up to 2 for bitumen)	Not detailed in available sources
Nature-based solutions	Integrated (erosion control, water retention, reforestation) (Helvetas, 2025)	Limited documentation
Institutional capacity	Strengthened through GCA technical assistance	Emerging; supported by World Bank

5.3 Community Participation and Gender Dynamics

Burkina Faso: Community participation is central to Burkina Faso's approach to road infrastructure. Key features include:

- Participatory planning: Helvetas's HIMO program involves local authorities, communities, and private partners in all stages of planning, construction, and management (Helvetas, 2025).
- Local recruitment and training: Local workers are recruited and trained in construction techniques; village committees for road management and maintenance are established.
- Attention to gender: The HIMO program has created jobs for almost 199,000 people, 60% of whom are women (Helvetas, 2025).
- Community decision-making: Communities participate in decisions about which infrastructure to build and how to manage it.
- Measurable impacts: Household incomes increased by 90%; 79% of population improved health status; women's access to prenatal care and childbirth services improved (Helvetas, 2025).
- African Development Bank projects explicitly incorporate beneficiary participation in project design and commit communities to supporting infrastructure management (African Development Bank, 2025).

Laos: Community participation mechanisms in Laos are less institutionalized but emerging. Key features include:

- World Bank project explicitly designed to benefit farmers and women, with year-round connections to markets, schools, and hospitals (World Bank, 2024).
- Innovative internship program addressing gender gap: only 9% of transport sector workers are women; project provides six months of paid training in transportation and construction for women university students and graduates (World Bank, 2024).
- China-aided Bansou Village project demonstrates community-grounded approach: villagers organized into production groups for cattle raising, maize cultivation, and weaving, with training provided by Chinese experts (People's Daily, 2025).
- Participatory poverty reduction: project reduced poor households from 208 to 22 through combination of infrastructure and livelihood support.
- However, systematic community participation mechanisms comparable to Burkina Faso's HIMO program are not yet widespread.

Table 3: Comparative Community Participation and Gender Dynamics

Dimension	**Burkina Faso**	**Laos**
Participatory planning	Institutionalized (Helvetas HIMO; AfDB projects)	Emerging; project-specific
Local recruitment	Extensive (195,000+ workers) (Helvetas, 2025)	Not detailed
Women's employment	60% of workers (Helvetas, 2025)	9% of transport sector; internship program (World Bank, 2024)
Community management	Village committees established	Production groups organized (Bansou)

Measured impacts	90% income increase; improved health access (Helvetas, 2025)	Poverty reduction (208 to 22 households) (People's Daily, 2025)
Gender-specific design	Women's access to health services improved	Women-focused internships; explicit benefit targeting

5.4 Outcomes for Community Access and Development

Burkina Faso: Measured outcomes from Burkina Faso's road infrastructure investments demonstrate significant community benefits. Key findings include:

- SKBo project expected to benefit over 3.9 million people, including 500,000 farming households, women-led enterprises, and youth groups (World Bank, 2025a).
- Helvetas HIMO program outcomes (Helvetas, 2025):
  - Approximately 1000 km of rural roads constructed/rehabilitated
  - Around 480 villages opened up
  - Household incomes increased by 90% (from construction employment and improved market access)
  - 79% of population improved health status
  - 74% increased capital
  - 72% renovated or built new houses
  - Women's access to prenatal care and childbirth services improved
  - 97 ha of lowland area and market gardening perimeters developed
  - 59 ha of land reforested
  - Jobs created for almost 199,000 people (60% women)
- African Development Bank projects expected to benefit 1,575,524 inhabitants across five provinces, with explicit attention to women (51.1% of population) and job creation for youth and women through labor-intensive methods (African Development Bank, 2025).

Laos: Measured outcomes from Laos's road infrastructure investments demonstrate both national-scale impacts and targeted community benefits. Key findings include:

- Laos-China railway outcomes (KPL, 2025):
  - Over 8.2 million passengers transported
  - Over 11.62 million tons of goods transported
  - Positioning Laos as transport hub within mainland Southeast Asia
- National Road No. 12 improvement expected to benefit (The Star, 2025):
  - Local residents through improved access and mobility
  - Farmers and traders through better logistics
  - Tourism and businesses through enhanced infrastructure
  - Regional economy by reinforcing Laos's role as key land link in Greater Mekong Subregion
- Climate Resilient Road Connectivity Improvement Project expected to benefit approximately 600,000 people in Khammuan, Saravan, and Savannakhet provinces through year-round access to markets, schools, and hospitals (World Bank, 2024).
- China-aided Bansou Village project outcomes (People's Daily, 2025):
  - Poor households reduced from 208 to 22
  - Nearly 70% of families built new houses
  - Villagers organized into production groups (cattle raising: from 40 to 73 households, 335 cattle; maize/cassava cultivation: from 39 to 128 households)
  - Income from cassava cultivation increased by 50%

Table 4: Comparative Community Access Outcomes

Dimension	**Burkina Faso**	**Laos**
Population reached	3.9M (SKBo); 480 villages (HIMO); 1.58M (AfDB roads)	600,000 (Climate Resilient Roads); 400+ households (Bansou)
Income impacts	90% increase (HIMO) (Helvetas, 2025)	50% increase (cassava, Bansou) (People's Daily, 2025)
Health impacts	79% improved health status; improved maternal access (Helvetas, 2025)	Not quantified

Housing	72% renovated/built new houses (Helvetas, 2025)	70% built new houses (Bansou) (People's Daily, 2025)
Employment	199,000 jobs created (60% women)	Not quantified; internship program for women
Poverty reduction	Not directly quantified	208 to 22 poor households (Bansou) (People's Daily, 2025)
Agricultural development	97 ha lowland developed; market gardening	Cattle raising expanded; cassava cultivation increased

5.5 Summary of Comparative Findings

Table 5: Comprehensive Comparative Analysis

Dimension	**Burkina Faso**	**Laos**
Infrastructure context	Climate-vulnerable Sahelian corridors	Rapid expansion; regional integration focus
Key challenge	Climate disruptions threatening trade routes (90% potential accessibility loss)	Rural access gap (40% roads wet-season inaccessible)
Major projects	SKBo ($216M); AfDB roads (187 km); HIMO (1000 km)	Laos-China railway; Climate Resilient Roads ($56M, 300 km); National Road 12 (143.5 km)
Climate resilience	Sophisticated; integrated from inception; nature-based solutions	Emerging; focus on all-season connectivity
Community participation	Institutionalized (HIMO model); local recruitment; village committees	Project-specific (Bansou); emerging models

Gender attention	60% women workers; improved maternal health access	Internship program addressing 9% gender gap; explicit benefit targeting
Measured impacts	90% income increase; 79% health improvement; 480 villages opened up	600,000 people reached; 208 to 22 poor households (Bansou)
Key strength	Integrated climate resilience; participatory models; nature-based solutions	Strategic regional vision; transformative major infrastructure
Key challenge	Scaling participatory approaches; maintenance	Rural access gap; climate vulnerability of unpaved roads

6. DISCUSSION OF RESULTS

6.1 Explaining Divergent Pathways: Geography, Climate, and Development Trajectories

The differences between Burkina Faso's and Laos's approaches to road infrastructure reflect distinct geographical, climatic, and developmental contexts.

Burkina Faso's Sahelian geography and dependence on rain-fed agriculture make climate resilience an existential imperative. The SKBo project's sophisticated climate risk assessments and adaptation measures are not optional add-ons but core to ensuring that infrastructure investments deliver lasting benefits. The finding that under a high-emissions scenario, climate disruptions could reduce road accessibility by up to 90% during peak flooding events (Global Center on Adaptation, 2025) underscores the stakes. Without adaptation, roads built today could become unusable tomorrow.

The emphasis on nature-based solutions in Burkina Faso—using roads to retain runoff water, control erosion, and enable reforestation—reflects a holistic understanding of infrastructure's

relationship with the environment. Helvetas's approach transforms roads from potential sources of environmental degradation into instruments for natural resource management (Helvetas, 2025). This integration of gray and green infrastructure offers lessons for other Sahelian countries facing similar challenges.

Laos's trajectory is shaped by its mountainous terrain and strategic position within one of the world's most dynamic economic regions. The Laos-China railway and upgraded ASEAN highways position the country as a transport hub, potentially transforming its economic prospects. The dramatic growth in traffic on National Road 12—doubling in just two years—illustrates the potential of regional connectivity (The Star, 2025).

However, Laos's focus on national arteries has historically left remote areas underserved. The finding that only 15% of the national road network is paved and 40% of unpaved roads are wet-season inaccessible (World Bank, 2024) reveals the gap between flagship projects and everyday access for rural populations. The Climate Resilient Road Connectivity Improvement Project represents an important shift toward addressing this gap, but the scale of need remains vast.

6.2 Climate Resilience: From Afterthought to Core Design Principle

Burkina Faso's experience demonstrates that climate resilience must be integrated from the earliest stages of infrastructure planning. The SKBo project's high-resolution climate risk assessments, conducted before design decisions were finalized, enabled the selection of cost-effective adaptation measures. The finding that higher temperature-rated bitumen offers a benefit-cost ratio of 2 (Global Center on Adaptation, 2025) shows that adaptation can be economically as well as environmentally rational.

The project's attention to nature-based solutions is particularly significant. By designing roads to control erosion, retain water, and enable reforestation, Burkina Faso is creating infrastructure that actively contributes to environmental goals. This approach aligns with emerging global best practice on integrating gray and green infrastructure.

Laos's approach to climate resilience is at an earlier stage but moving in the right direction. The Climate Resilient Road Connectivity Improvement Project's focus on all-season connectivity—ensuring roads remain passable year-round even with increased rainfall and flooding—addresses the most immediate climate vulnerability facing rural communities. However, the project's climate risk assessment appears less detailed than Burkina Faso's, and nature-based solutions are not prominently featured.

6.3 Community Participation: The Heart of Sustainable Infrastructure

Burkina Faso's HIMO program offers powerful evidence that community participation is not merely a procedural requirement but a driver of better outcomes. The program's participatory planning, local recruitment, training, and establishment of village management committees created ownership and ensured that infrastructure met community needs. The results are striking: 90% income increases, improved health access, and widespread housing improvements (Helvetas, 2025).

Several features explain this success. First, participation began at project inception, with communities involved in decisions about which infrastructure to build. Second, local recruitment created immediate economic benefits, building support for projects. Third, training built local capacity, ensuring that communities could maintain infrastructure after external support ended. Fourth, attention to gender—with women comprising 60% of workers—ensured that benefits reached those often marginalized in infrastructure development.

Laos's Bansou Village project demonstrates similar principles, though at smaller scale. The organization of villagers into production groups, combined with training and infrastructure improvements, generated measurable poverty reduction. The reduction of poor households from 208 to 22 (People's Daily, 2025) shows what targeted, community-grounded interventions can achieve.

However, Laos lacks Burkina Faso's institutionalized mechanisms for community participation. The internship program for women addresses the gender gap in transport but is not yet embedded in broader participatory frameworks. Scaling successful models like Bansou remains a challenge.

6.4 Gender: From Afterthought to Central Consideration

Both countries' experiences highlight the importance of gender in infrastructure development, though their approaches differ.

In Burkina Faso, women's participation in road construction—60% of HIMO workers—has generated direct economic benefits while also improving access to maternal health services (Helvetas, 2025). The finding that women can now reach health centers for prenatal care and childbirth more easily, helping limit complications, illustrates how infrastructure can advance gender equity when designed with women's needs in mind.

In Laos, the gender gap in transport is stark: only 9% of transport sector workers are women (World Bank, 2024). The Climate Resilient Road Connectivity Improvement Project's internship program for women university students and recent graduates addresses this gap directly, providing six months of paid training and potentially opening career pathways. This is an innovative approach that other countries could emulate.

However, both countries could do more to systematically integrate gender analysis into infrastructure planning. Understanding women's distinct mobility patterns, constraints, and priorities should inform project design from the outset, not be addressed through add-on programs.

6.5 Implications for Infrastructure Development and Sustainable Development

The findings have significant implications for infrastructure development in landlocked developing countries.

First, climate resilience must be integrated from project inception. Burkina Faso's experience shows that early, high-resolution climate risk assessment enables cost-effective adaptation. Retrofitting resilience after design is far more expensive and less effective.

***Second, community participation drives better outcomes*.** The HIMO program's participatory approach generated measurable benefits—income increases, health improvements, housing gains—that top-down infrastructure would not have achieved.

Third, gender must be central, not peripheral. Women's distinct needs and potential contributions should shape infrastructure design from the outset, not be addressed through add-ons.

***Fourth, nature-based solutions offer win-win opportunities*.** Burkina Faso's integration of roads with water management and reforestation demonstrates that infrastructure can contribute to environmental goals, not just resist environmental impacts.

***Fifth, balanced investment is essential*.** Laos's experience shows that focusing solely on national arteries leaves remote areas underserved. Investments in rural access are as important as flagship projects.

***Sixth, maintenance matters*.** Both countries face challenges in ensuring that roads remain functional after construction. Village management committees in Burkina Faso and attention to maintenance in project design are steps in the right direction.

7. CONCLUSION

This comparative analysis of road infrastructure development and community access in Burkina Faso and Laos reveals two distinct but complementary approaches shaped by geography, climate, and development trajectories. Burkina Faso, facing acute climate vulnerability in its Sahelian context, has developed sophisticated approaches to integrating climate resilience into road infrastructure. The SKBo Basin Integration Project demonstrates how high-resolution climate risk assessment, cost-effective adaptation measures, and nature-based solutions can be embedded in project design from the outset (World Bank, 2025a; Global Center on Adaptation, 2025). Helvetas's HIMO program illustrates the transformative potential of community-grounded approaches: participatory planning, local recruitment, and attention to gender have generated 90% income increases, improved health access, and opened up 480 villages (Helvetas, 2025).

Laos, shaped by its mountainous terrain and strategic position within the Greater Mekong Subregion, has pursued a different path focused on regional connectivity. The Laos-China railway and upgraded ASEAN highways position the country as a transport hub, with dramatic growth in traffic and trade (KPL, 2025). Yet this focus on national arteries has left remote areas underserved—only 15% of roads are paved, and 40% of unpaved roads are wet-season inaccessible (World Bank, 2024). The Climate Resilient Road Connectivity Improvement Project represents an important shift toward addressing this gap, targeting 300 km of rural roads in flood-vulnerable provinces with explicit attention to benefiting farmers and women (World Bank, 2024). The China-aided Bansou Village project demonstrates the potential of targeted, community-grounded interventions, reducing poor households from 208 to 22 (People's Daily, 2025).

Several cross-cutting conclusions emerge from this analysis.

First, climate resilience is not optional but essential**.** Burkina Faso's experience shows that without adaptation, infrastructure investments can be undermined by climate shocks. Laos's vulnerability to flooding underscores the same lesson. Integrating climate risk assessment and adaptation measures from project inception is a core requirement for sustainable infrastructure.

Second, community participation drives better outcomes**.** Burkina Faso's HIMO program demonstrates that involving communities in planning, construction, and management generates measurable benefits—income increases, health improvements, housing gains—that top-down approaches would not achieve. Laos's Bansou project offers similar lessons at smaller scale.

Third, gender must be central to infrastructure planning. Women's distinct mobility patterns, needs, and potential contributions should shape project design from the outset. Burkina Faso's success in employing women (60% of workers) and improving maternal health access, and Laos's innovative internship program addressing the gender gap in transport, offer models for emulation.

Fourth, nature-based solutions offer win-win opportunities**.** Burkina Faso's integration of roads with water management, erosion control, and reforestation demonstrates that infrastructure can contribute to environmental goals. This approach deserves wider adoption.

Fifth, balanced investment between national and rural infrastructure is essential. Laos's experience shows that focusing on national arteries leaves remote areas underserved. Burkina Faso's attention to rural roads through programs like HIMO and AfDB projects ensures that infrastructure benefits reach those most in need.

Sixth, maintenance frameworks are as important as construction. Both countries face challenges in ensuring long-term functionality. Village management committees, community engagement in maintenance, and institutional capacity-building are essential complements to initial investment.

For Burkina Faso, the path forward involves scaling successful participatory models like HIMO, deepening integration of nature-based solutions, and ensuring that climate-resilient design becomes standard practice across all infrastructure investments. The SKBo project offers a template that could be applied more broadly.

For Laos, the priority is balancing continued investment in regional connectivity with systematic attention to rural access. The Climate Resilient Road Connectivity Improvement Project is a promising start, but the scale of need—only 15% of roads paved, 40% of unpaved roads wet-season inaccessible—requires sustained commitment. Mainstreaming participatory approaches like those demonstrated in Bansou and addressing the gender gap in transport through programs like the women's internship are also essential.

For the broader community of scholars and policymakers, this comparison underscores that road infrastructure is not merely a technical challenge of engineering and finance but a deeply social undertaking. The most successful projects are those that engage communities as partners, design with climate resilience in mind, attend to gender dynamics, and integrate infrastructure with broader development strategies. The vision of quality, reliable, sustainable, and resilient infrastructure cannot be achieved through top-down approaches alone. It requires recognizing that roads are not just structures of concrete and asphalt but lifelines connecting people to opportunity—and that the people themselves must be at the center of the effort.

8. LIMITATIONS OF THE STUDY

This study has several limitations that should be acknowledged. First, the comparative analysis relies primarily on secondary sources and project documentation rather than primary data collection. Direct fieldwork in both countries would strengthen comparative insights.

Second, data availability differs between the two countries. Burkina Faso benefits from detailed impact studies, particularly from Helvetas's HIMO program. Laos-specific impact data is less comprehensive, with the Bansou project providing the most detailed community-level evidence.

Third, the study covers a period of rapid change; findings may require updating as new projects and policies emerge.

Fourth, the voice of community members—particularly women, marginalized groups, and those who may not have benefited from infrastructure improvements—is mediated through reports rather than captured directly.

Fifth, the study focuses on road infrastructure with limited attention to other transport modes, though railways are discussed in both contexts.

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communities, engineers, and development practitioners whose daily work shapes road infrastructure and community access in both countries.

10. AUTHOR CONTRIBUTIONS

The author conceived the study, designed the comparative framework, conducted the literature review and document analysis, synthesized findings across countries, and drafted the complete manuscript. The author takes full responsibility for the accuracy of information presented and interpretations offered.

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11. COMPETING INTERESTS

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential competing interest.

12. AUTHORS' CONTRIBUTIONS

As sole author, I performed all roles including conceptualization, methodology development, investigation, formal analysis, writing, review, editing, and project administration.

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14. DATA AVAILABILITY

All sources analyzed in this study are publicly available documents, including project reports, policy statements, news articles, and institutional publications. Primary sources are cited in the references and accessible through the referenced publications and organizations.

15. DISCLAIMER

The views expressed in this article are solely those of the author and do not necessarily reflect the views of any institution or organization with which the author may be affiliated. The analysis is provided for scholarly purposes and should not be construed as policy guidance or investment advice. Road infrastructure and community access patterns are subject to change, and readers should consult current official sources for specific information about Burkina Faso, Laos, and infrastructure policy.

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