Technical Brief

LOCALISATION OF AGROECOLOGY IN THE KARNALI PROVINCE, NEPAL:

Opportunities, Challenges, and Way Forward

EXECUTIVE SUMMARY

Karnali Province faces significant agricultural and food system challenges, including fragile mountain ecosystems, predominantly rainfed farming systems, persistent poverty and food insecurity, youth outmigration, and increasing climate variability. Conventional input-intensive agricultural models are often poorly suited to these conditions. At the same time, Karnali's farming systems are deeply rooted in mixed crop–livestock–forest integration, indigenous crops, rich agrobiodiversity, and strong local knowledge traditions, characteristics that closely align with agroecological principles.

Globally, agroecology is increasingly recognised as a practical framework for transforming food systems while strengthening climate resilience, biodiversity conservation, and rural livelihoods. Karnali already possesses important foundations for advancing agroecology, including the Organic Karnali vision, indigenous crop promotion programmes, Participatory Guarantee Systems, territorial branding initiatives such as the "Mulyawan" label, and municipal Agroecological Plans. However, these initiatives remain fragmented across projects and sectoral programmes. Localising agroecology, embedding agroecological principles within provincial policies, municipal planning processes, extension systems, and market mechanisms, offers a pathway for scaling these efforts into a coherent territorial development approach.

The analysis presented in this technical brief highlights several priority areas for institutionalising and scaling agroecology in Karnali Province. Key actions include:

- Institutionalising agroecology localisation by integrating agroecology into provincial policies, municipal agriculture acts, planning processes, and extension systems while strengthening cross-sector coordination.
- Strengthening monitoring and learning systems by scaling the Food and Agriculture Organisation (FAO) Tool for Agroecology Performance Evaluation (TAPE), developing agroecology indicators, and establishing knowledge platforms linking farmers, researchers, and policymakers.
- Reforming market and incentive systems through public procurement mechanisms, expansion of Participatory Guarantee Systems, stronger aggregation and value addition, and territorial branding of agroecological products.
- Promoting risk-informed agroecology by linking agroecological transition with climate adaptation strategies such as agro-meteorological advisory services, ecological pest management, and resilient crop systems.
- Scaling agroecology through municipal hubs that support farmer learning, training centres, community seed systems, and innovation platforms.

Together, these actions can help move agroecology in Karnali from fragmented initiatives towards an institutionalised and territorially grounded pathway for resilient mountain agriculture and sustainable food systems.

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1. Conceptual Framing of Agroecology for Karnali

Agroecology has emerged globally as a framework for transforming agricultural and food systems by integrating ecological processes with social, economic, and governance dimensions. It is understood simultaneously as a scientific discipline, a set of farming practices, and a broader food system transformation approach that emphasises resilience, biodiversity, and sustainability (Altieri, 1995; Wezel et al., 2009; HLPE, 2019). Rather than focusing solely on increasing agricultural production, agroecology seeks to optimise ecological processes such as nutrient cycling, soil regeneration, biodiversity conservation, and biological pest control while reducing dependence on external chemical inputs.

The Food and Agriculture Organisation (FAO) has articulated key agroecological elements that emphasise diversification, resource recycling, soil and animal health, economic resilience, co-creation of knowledge, and participatory governance (FAO, 2018; FAO, 2021). These principles highlight that agroecology extends beyond farm-level practices to encompass food systems, institutions, markets, and governance arrangements.

In Nepal, agroecology aligns closely with the realities of smallholder agriculture, where most farmers operate rainfed systems with diverse crops and livestock. Climate variability, rising input costs, and soil degradation are increasing risks to agricultural productivity across the country (NPC, 2022; MoALD, 2023). These pressures are particularly pronounced in Karnali Province, where remoteness, fragile ecosystems, and limited infrastructure constrain conventional agricultural intensification.

Localisation of agroecology refers to the process of adapting agroecological principles to specific territorial contexts and embedding them within local governance systems, institutions, markets, and knowledge networks. In Karnali, localisation involves recognising and strengthening agroecological characteristics already present in traditional farming systems, including diversified cropping, integration of crops and livestock, indigenous crop varieties, and community-based resource management.

This technical brief draws on a combination of literature review, field-level evidence, and stakeholder consultation processes. A two-day Writeshop involving provincial government officials, universities, civil society organisations, and development partners provided an opportunity to review field experiences and identify policy priorities for agroecology transition in Karnali. The findings were further refined through validation discussions with provincial stakeholders.

2. Karnali Context: Why Localisation is Imperative

Karnali Province exhibits diverse agroecological zones ranging from inner Terai valleys to high mountain ecosystems. Farming systems are characterised by mixed crop–livestock–forest interactions where households depend on rainfed agriculture, livestock grazing, and forest resources for livelihoods. Indigenous crops such as millets, buckwheat, barley, and local legumes remain central to household food systems, while livestock provide manure, income, and risk buffering.

Traditional agroecological practices such as intercropping, crop rotation, local seed conservation, and nutrient recycling remain widespread across Karnali. These practices demonstrate how farmers have historically adapted to ecological constraints and climate variability through diversified farming systems.

However, the province faces significant socio-economic and climate vulnerabilities. Poverty levels remain high, food insecurity persists in many districts, and access to agricultural services and markets is limited (CBS, 2021). Youth outmigration has reduced agricultural labour availability while increasing the feminisation of agriculture. Climate change further intensifies these pressures through erratic rainfall, prolonged droughts, and increasing soil degradation (MoFE, 2021; ICIMOD, 2023).

These conditions make conventional input-intensive agricultural models economically and ecologically unsuitable for many parts of Karnali. Agroecology offers a more appropriate pathway because it builds on existing farming practices, strengthens ecological processes, and reduces dependency on costly external inputs.

Experiences from development initiatives such as the Green Karnali programme demonstrate that agroecological approaches can improve farm resilience, enhance biodiversity, and strengthen local food systems when supported by farmer learning platforms, community institutions, and enabling policy environments (LI-BIRD, 2023).

3. Policy Context and Strategic Opportunities

Global policy momentum around agroecology has expanded significantly in recent years as countries seek sustainable pathways for transforming food systems. International policy processes, including the Sustainable Development Goals (SDGs) and the UN Food Systems Summit, emphasise diversified, climate-resilient, and nutrition-sensitive food systems that integrate ecological sustainability with social equity and rural livelihoods (HLPE, 2019; FAO, 2018). Agroecology is increasingly recognised as a practical framework for achieving multiple SDGs simultaneously, particularly those related to zero hunger (SDG 2), climate action (SDG 13), responsible consumption and production (SDG 12), and life on land (SDG 15). These global discussions highlight the importance of biodiversity-based farming systems, farmer knowledge, and supportive governance structures for advancing sustainable food systems.

At the national level, Nepal has articulated an increasing commitment toward sustainable and resilient agricultural development. Key policy documents such as the Agriculture Development Strategy (ADS 2015–2035), the Nepal Food Systems Transformation Pathways, and the National Adaptation Plan (NAP 2021–2050) emphasise climate-resilient agriculture, biodiversity conservation, and

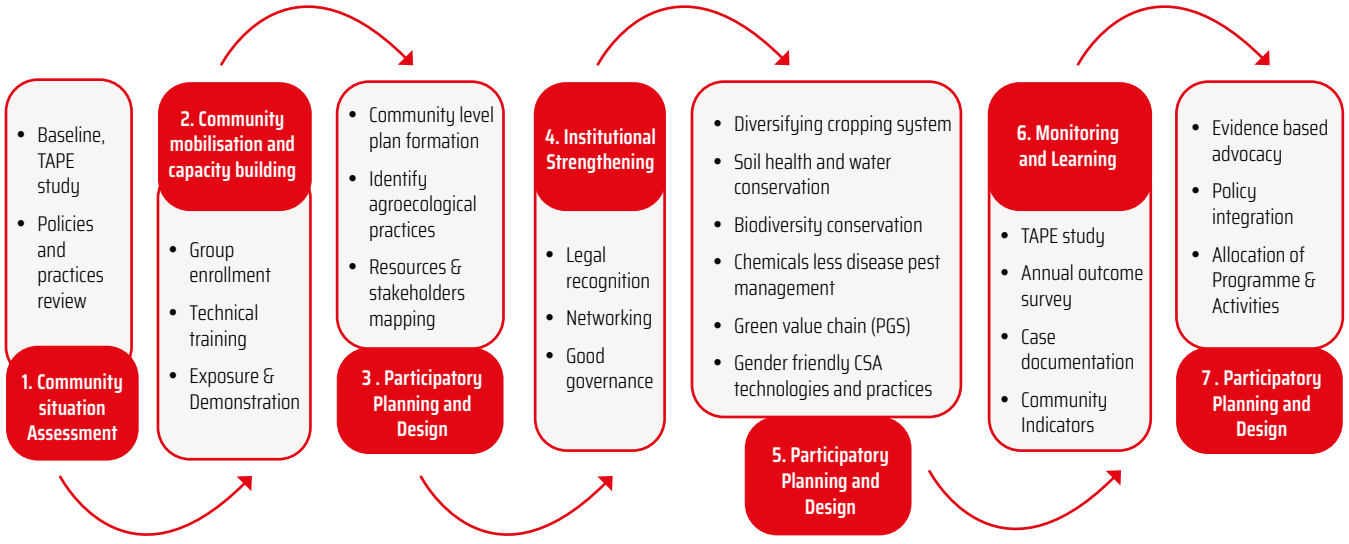
sustainable natural resource management (MoALD, 2015; NPC, 2022; MoFE, 2021). Nutrition-sensitive agriculture is also promoted through policy frameworks such as the Multi-Sectoral Nutrition Plan (MSNP). More recently, policy discussions around the National Agroecology Roadmap of Nepal have further strengthened the enabling environment for agroecological transition by proposing a long-term framework linking agroecology with food sovereignty, climate resilience, and sustainable rural livelihoods.

Within this broader national context, Karnali Province already possesses several institutional foundations that support agroecology. Provincial initiatives such as the Organic Karnali vision, the Karnali Organic Agriculture Act, indigenous crop promotion programmes, Participatory Guarantee Systems (PGS) for local organic certification, and territorial branding initiatives such as the "Mulyawan" label demonstrate growing policy interest in ecological agriculture. In addition, municipal-level initiatives, including Agroecological Plans (PAPs) supported under projects such as R-HVAP, provide emerging platforms for integrating agroecology into local development planning and extension systems.

Despite these positive developments, agroecology-related initiatives in Karnali remain dispersed across sectoral programmes and institutions, limiting coordination and scaling potential. Localisation of agroecology therefore, provides a strategic opportunity to align global commitments, national policy directions, and provincial initiatives within a coherent territorial framework that integrates policies, planning processes, extension services, market systems, and knowledge platforms.

4. Localisation Process in Karnali

The localisation of agroecology in Karnali has evolved through a structured process combining community engagement, ecological farming practices, institutional strengthening, and policy integration. Field initiatives have demonstrated that agroecology transition requires sequential steps beginning with agroecosystem assessments, followed by participatory planning, community mobilisation, implementation of ecological farming practices, and integration of lessons into policy frameworks.



Field experiences show that agroecology localisation involves strengthening community institutions, promoting agricultural biodiversity and local seed systems, improving soil and water management, advancing ecological pest management practices, revitalising indigenous food cultures, and developing market systems for agroecological products. Farmer learning platforms, demonstration villages, and Local Resource Persons (LRP) have played important roles in facilitating knowledge exchange and community-level innovation. Monitoring systems such as the FAO Tool for Agroecology Performance Evaluation (TAPE) have also supported documentation of agroecological outcomes related to biodiversity, resilience, and farmer knowledge systems.

These experiences demonstrate how localised agroecology initiatives can generate practical models for scaling agroecological transition through municipal planning systems and provincial policy engagement.

5. Strengthening Local Market Systems

The long-term viability of agroecological farming systems depends not only on ecological production practices but also on supportive and inclusive market systems. Farmers in Karnali face multiple market barriers, including limited road connectivity, high transportation costs, weak aggregation systems, small production volumes, and limited local processing infrastructure. These constraints often reduce the economic incentives for diversified and indigenous crops that are central to agroecological farming systems.

At the same time, several emerging market innovations in Karnali demonstrate promising pathways to strengthen agroecological value chains. Local market systems, community-based marketing platforms, and Participatory Guarantee Systems (PGS) are helping to strengthen trust-based certification and improve linkages between smallholder producers and local consumers. Territorial branding initiatives such as the “Mulyawan” label are also creating opportunities to promote indigenous crops and biodiversity-based products from Karnali in regional markets. In addition, value-added activities, including processing traditional foods, spices, honey, herbal products, and niche mountain crops such as millets and buckwheat, are contributing to strengthening local agroecological economies.

Strengthening aggregation through cooperatives and producer groups, improving storage and processing infrastructure, and supporting local market platforms can help reduce transaction costs and improve farmer incomes. Public procurement programmes linked to schools, hospitals, and local government institutions also offer important opportunities to create stable demand for diversified and locally produced foods. Together with appropriate certification pathways and territorial branding initiatives, these measures can strengthen market incentives and ensure that farmers benefit economically from agroecological production systems.

6. Challenges in Localisation

Despite strong ecological rationale and growing institutional support, agroecology localisation in Karnali faces several structural and operational challenges. At the policy level, agroecology-related initiatives remain fragmented across sectoral programmes, and agroecology is not yet fully articulated as a guiding framework within provincial and municipal planning systems. This limits coordination across agriculture, livestock, forestry, climate adaptation, and rural development programmes. Institutional capacity constraints also persist, as extension services are still largely oriented toward input-based technologies and commodity production rather than systems-based approaches that emphasise biodiversity, soil regeneration, and integrated crop–livestock–forest systems.

At the implementation level, farmers face multiple barriers when transitioning from conventional input-based practices toward diversified agroecological systems. These include limited access to quality seeds and bio-inputs, insufficient technical support for ecological pest management and soil health practices, and weak knowledge platforms for farmer-to-farmer learning and innovation. Market constraints affecting indigenous and diversified crops, combined with limited aggregation systems and value chains, further reduce economic incentives for agroecological production. In addition, structural challenges such as youth outmigration, labour shortages, and increasing human–wildlife conflict create additional risks for farming households in the province.

Addressing these challenges will require coordinated action across policy frameworks, institutions, markets, and knowledge systems. Strengthening extension systems, supporting farmer learning platforms, improving access to agroecology-friendly inputs, and developing territorial market systems will be essential. Embedding agroecology within provincial and municipal planning frameworks, while strengthening coordination across sectors and institutions, can help move agroecology from fragmented initiatives toward a coherent territorial transition pathway in Karnali Province.

7. Green Karnali's Contribution

The Green Karnali project implemented by DCA in Nepal with partners LI-BIRD and SOSEC has played an important role in demonstrating practical approaches for agroecology localisation in Karnali Province. Building on partners' long-standing work in agrobiodiversity conservation, participatory research, and farmer-led innovation, the initiative has translated agroecological principles into operational practices adapted to Karnali's ecological and socio-economic realities. These efforts include strengthening community institutions, promoting diversified crop–livestock systems, supporting local seed systems and participatory varietal selection, improving soil fertility management, and advancing ecological pest and pollinator-friendly farming practices. The initiative has also supported nutrition-sensitive agriculture and indigenous crop promotion, linking agroecological production with household food security and dietary diversity.

Through farmer learning platforms, demonstration villages, and collaboration with cooperatives and community institutions, the project has strengthened farmer-to-farmer knowledge exchange and local innovation systems. It has also supported Participatory Guarantee Systems and value addition initiatives that link agroecological production with local markets and territorial branding efforts. Importantly, Green Karnali has worked closely with provincial and municipal governments to support agroecological planning processes, capacity strengthening of extension services, and policy dialogue on resilient mountain agriculture. Through these efforts, the initiative has generated valuable field-level evidence on biodiversity conservation, soil health practices, and climate-resilient farming systems, helping inform ongoing policy discussions on agroecology transition and localisation in Karnali Province.

These field-level experiences highlight the potential for scaling agroecology through coordinated policy, market, and institutional interventions, which are outlined in the following strategic directions.

8. Way Forward: Strategic Policy Directions

The analysis presented in this technical brief indicates that Karnali Province already possesses important ecological and institutional foundations for advancing agroecology. However, agroecology initiatives remain fragmented across projects, programmes, and sectoral institutions, requiring deliberate policy alignment and institutional integration to support scaling. Moving forward, Karnali Province can consolidate existing initiatives into a coherent transition pathway by embedding agroecology within public institutions, knowledge systems, and market mechanisms. The following strategic directions highlight priority actions for institutionalising and scaling agroecology across the province.

8.1 Institutionalising Agroecology Localisation

Advancing agroecology in Karnali requires formal institutionalisation within provincial and municipal governance systems so that agroecology becomes part of mainstream agricultural development rather than a stand-alone initiative. Localisation, therefore, involves embedding agroecology within existing policy, planning, and budgeting frameworks to guide public investment and service delivery.

Priority actions include:

Developing a Provincial Agroecology Localisation Framework aligned with the National Agroecology Roadmap

Integrating agroecology principles within Palika-level agriculture acts and development plans

Establishing cross-sector coordination mechanisms linking agriculture, forestry, livestock, nutrition, and climate programmes

Formally recognising LRPs as community-based agroecology extension facilitators

8.2 Monitoring and Learning Systems

Scaling agroecology requires monitoring systems capable of capturing ecological, economic, and social outcomes of diversified farming systems, which are often overlooked by conventional productivity-focused indicators. Strengthening monitoring and learning platforms will enable evidence-based policy development and adaptive management of agroecological initiatives.

Priority actions include:

Scaling the FAO TAPE framework across agroecology initiatives in Karnali

Developing agroecology indicators for soil health, biodiversity, diversification, and resilience

Establishing learning platforms connecting farmers, extension services, researchers, and policymakers

Strengthening documentation and evidence systems to capture lessons from agroecology model villages and field innovations

8.3 Market and Incentive Reforms

For the agroecological transition to be sustainable, farmers must receive economic incentives that reward biodiversity-based production systems and diversified crops. Strengthening territorial markets and value chains will therefore be essential for linking agroecological production with viable rural livelihoods.

Priority actions include:

- Strengthening public procurement mechanisms (schools, hospitals, local government programmes) to create demand for agroecological products
- Expanding Participatory Guarantee Systems for local markets
- Developing tiered certification pathways for higher-value markets
- Expanding territorial branding initiatives such as "Mulyawan" for agroecology-based products
- Strengthening aggregation, local processing, and cooperative marketing systems

8.4 Risk-Informed Agroecology

Karnali's farming systems are highly exposed to climate variability, ecological degradation, and production risks, making resilience a central element of agroecological transition. Integrating agroecology with climate adaptation and ecosystem restoration strategies can help strengthen farming system resilience while reducing dependence on external inputs.

Priority actions include:

- Strengthening agro-meteorological advisory services for farmers
- Promoting ecological pest and disease management systems
- Supporting resilient crop systems based on indigenous and climate-adapted varieties
- Integrating agroecology within watershed management and ecosystem-based adaptation programmes`

8.5 Scaling through Agroecology Hubs

Establishing municipal agroecology hubs can support long-term agroecology transition by creating institutional spaces for innovation, training, and farmer learning. Building on existing agroecology model villages and demonstration platforms, such hubs can serve as territorial centres for knowledge exchange and enterprise development.

Agroecology hubs could support:

Municipal-level agroecology training centres

Farmer field schools and demonstration platforms

Community seed systems and biodiversity conservation initiatives

Innovation platforms linking farmers, researchers, and extension services

Incubation of agroecology-based rural enterprises

The strategic directions outlined above can be translated into coordinated actions across policy, institutions, markets, and knowledge systems. Table 1 summarises the key strategic areas for localising agroecology in Karnali Province, highlighting priority actions and the roles of key stakeholders. Together, these strategic areas provide an operational pathway for embedding agroecology within provincial and municipal governance systems, enabling coordinated scaling of biodiversity-based, climate-resilient farming systems across Karnali Province.

Strategic Area	Priority Actions	Key Actors
Institutionalising Agroecology Localisation	Provincial agroecology framework Palika policy integration Recognition of LRP	Provincial government Local governments Civil Society Organisations (CSO)
Monitoring and Learning Systems	Scaling FAO TAPE Agroecology indicators Learning platforms	Province Municipalities Universities
Market and Incentive Reforms	Procurement programmes PGS certification Territorial branding expansion	Province Cooperatives Private sector
Risk-Informed Agroecology	Climate advisory systems Ecological pest management Resilient crop systems	Extension agencies Research institutions
Agroecology Hubs for Scaling	Municipal agroecology hubs Training centres Seed systems Innovation platforms	Local governments Universities Development partners

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