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TECHNICAL BRIEF

The Need to Revisit Agricultural Policies to Promote Mixed Farming Systems in Nepal's Mid-hills

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Front cover photo: Agricultural land in the mid-hills of Nepal (*photo:* Sanju Koirala/IWMI)
Back cover photo: Agricultural land in Halesi Tuwachung (*photo:* Sanju Koirala/IWMI

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Contents

Acronyms and Abbreviations

ADS	Agriculture Development Strategy
APP	Agriculture Perspective Plan
CIMMYT	International Maize and Wheat Improvement Centre
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Statistical Database
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GoKP	Government of Koshi Province
GoN	Government of Nepal
I/NGOs	International/Non-Governmental Organizations
ICARDA	International Center for Agricultural Research in the Dry Areas
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
IWMI	International Water Management Institute
KII	Key Informant Interview
KPPC	Koshi Provincial Planning Commission
MFS	Mixed Farming Systems Initiative
MoALD	Ministry of Agriculture and Livestock Development
MoEAP	Ministry of Economic Affairs and Planning, Karnali Province
MoF	Ministry of Finance
MOLMAC	Ministry of Land Management, Agriculture and Cooperatives
NPC	National Planning Commission
NRB	Nepal Rastra Bank (Central Bank of Nepal)
NSO	National Statistics Office
SDG	Sustainable Development Goals
WP	Work Package

1. Introduction

Mixed farming systems (MFS) constitute a significant share of global agricultural production. MFS refers to farming systems in which more than one agricultural commodity is produced, typically by small and marginal holders. In these systems, commodities such as crops, fruits, vegetables, and livestock are integrated, with production primarily aimed at household consumption and surplus outputs sold in local markets (Mabhaudhi et al., 2023). This farming system provides food security and supports the livelihoods of two-thirds of the global population (Herrero et al., 2010), particularly in regions where mono-cropping and commercial farming are constrained due to small landholdings, inadequate irrigation, poor transportation, and limited market access, among other challenges (Thornton & Herrero, 2015). Mixed crop-livestock systems, the most common form of MFS, are estimated to cover approximately 2.5 billion hectares or about half of the global agricultural land area (FAOSTAT online database; Herrero et al., 2010). It provides half of the global cereals, constituting 41percent of maize, 86 percent of rice, 66 percent of sorghum, and 74 percent of millet (Herrero et al., 2010). In the developing world, MFS supplies around 75 percent of milk and 60 percent of meat (ibid), indicating MFS is a major source of protein as well.

The integration of MFS significantly contributes to achieving targets of Sustainable Development Goals (SDG) 1 (no poverty), 2 (zero hunger), 12 (sustainable consumption and production), 13 (Climate Action), and 15 (Life on Land). The integration of livestock with various types of crops such as cereals, fruits, and legumes, ensures diversified income sources, enhancing the economic resilience of smallholder farmers, thus contributing to poverty reduction (Iqbadum et al., 2025). The system provides a diverse range of food products, ensuring stable food production and the availability of essential nutrients for a balanced diet (ibid).

Integrating livestock and crops improves soil fertility through manure recycling and efficient use of crop residues, enhancing productivity while reducing dependence on synthetic fertilisers (Thornton & Herrero, 2015; Niggli et al., 2009). Moreover, MFS contributes to climate change mitigation through carbon sequestration and reduced greenhouse gas emissions (Thornton & Herrero, 2015). Integrating agroforestry within MFS enhances biodiversity, and prevents land degradation, and supports carbon sequestration (Mutuo et al., 2005).

In South Asia, mixed farming is prevalent in the mid-hills and mountain regions where the topography and agro-climatic conditions are not conducive to large-scale commercial agriculture. Smallholders in these regions typically engage in diverse agricultural activities, including crop cultivation, animal husbandry, and horticulture, to meet their subsistence needs and generate income (Neupane et al., 2023). Mixed farming practice is a key component of Nepal's agricultural landscape as well, where the majority of households practice subsistence agriculture (Bastakoti et al., 2024).

In Nepal's mid-hills and mountains, small and marginal farmers face multiple challenges such as limited arable land, insufficient irrigation, and poor market access. Improving traditional mixed farming practices through a systems approach has the potential to optimize resource use and enhance household income, employment, food security, and environmental sustainability (Figure 1) (Raut et al., 2020; Adhikari, 2018; Gentle & Thwaites, 2016). Over the years, system thinking in agriculture has evolved from focusing on individual components to recognizing interconnections among crops (Thornton & Herrero, 2015), soil, water, markets, and institutions (Klerkx et al., 2012). Integrating a systems approach into current mixed farming practices will benefit the Nepalese agriculture sector, which is facing several challenges.

Several factors threaten the MFS in the Global South, including Nepal. These factors are climate change, demographic changes, urbanization, water scarcity, changing diets, volatile food prices, and policy misalignment (Mabhaudhi et al., 2023; Bhatta et al., 2017). Among these agriculture policies play a critical role in shaping MFS and guiding its future direction. However, the extent to which Nepalese policies in the agriculture sector pay attention to promoting the MFS remains under-researched.

Therefore, this technical report examines national and sub-national agricultural policies in Nepal to assess their alignment with MFS principles and it's considerations to smallholder farmers, women, and other marginalized groups. Based on this, we identify some key policy bottlenecks that impede the intensification of MFS and provide actionable recommendations that would contribute to the improvements in the situation of farmers in Nepal.

2. Mixed farming practices in Nepal

2.1. Introduction to the Mixed Farming practices

In Nepal, 62 percent of households rely on agriculture for food security and livelihoods. Although agriculture employs over 60 percent of the labour force—of which women constitute 70 percent—it contributes only 24 percent to the national GDP (NSO, 2023a; MoF, 2023; FAO, 2019; NRB, 2023).

A dominant feature of the sector is its subsistence nature. Approximately 69 percent of farming households consume all their produce and still need to purchase food at certain times of the year. Another 25 percent of households sell any surplus, while the rest is consumed at home. In total, 94 percent of all farming households are either subsistence oriented or only partially engaged. In contrast, just 7 percent are commercially oriented, and only 1 percent are fully engaged in commercial agriculture (NSO, 2023a).

Subsistence farming is more prevalent in the hills and mountains, where difficult terrain and limited market access constrain agricultural commercialization. For example, in Humla, one of Nepal's most remote upland districts, households own an average of 0.7 hectares of cultivable land, which meets only 63 percent of their food needs. The rest must be purchased (Gautam & Anderson, 2016). Nationwide, 86 percent of farming households own less than a hectare of land, and the average holding is fragmented into 2.8 parcels (NSO, 2023a), further limiting productivity and investment potential.

In recent decades, Nepalese agriculture has undergone a significant shift, disproportionately affecting farmers practicing a MFS. Between 2011 and 2021, the total area of agricultural land declined by 12 percent, by as much as 22 percent in upland areas, where mixed farming is more common (NSO, 2023a). Livestock, a core component of MFS, is also in decline. The number of large cattle has decreased, particularly in the mid-hills, indicating the gradual disintegration of integrated crop-livestock systems (NSO, 2023c).

Most farmers operate on small, rain-fed plots, making them highly vulnerable to erratic rainfall and prolonged drought—both intensified by climate change. These challenges contribute to increasing food insecurity: 13.2 percent of the population is severely food insecure, and 37.4 percent of children under five are stunted (FAO, 2022). Nepal's growing dependence on food imports exacerbates its vulnerability to external shocks and price volatility. In 2023, the average cost of a healthy diet in Nepal was USD 4.62 per person per day—an amount unaffordable for the majority of the population, including 26.7 million Nepalis (FAO, 2022). Table 1 below illustrates the farming households in Nepal.

Table 1. Categories of farming households in Nepal and the hill region

S.No.	Categories	Nepal	Hills
1	Total number of farming households	4.10 million (62 percent of total households)	
2(a)	Households engaged in agricultural production only for home consumption	2.82 million (68 percent of total agriculture households)	75 Percent
2(b)	Households engaged in agricultural production for home consumption and surplus is marketed (percentage)	1.0 million (24 percent of total agriculture households)	20 Percent
3	Total households based on subsistence agriculture (2a+2b)	3.82 million (93 percent of total agriculture households)	95 Percent
4	Households engaged in agricultural production for market (percentage)	0.27 million (7 percent of total agriculture households)	5 Percent

Source: Calculated from National Agriculture Census, 2021/22 and Population Census, 2021/22 (NSO, 2023a; NSO, 2023b).

2.2. Relevance of the systems approach in the mixed farming practices of Nepal

Systems thinking views agriculture as an interconnected whole, recognising interdependencies across biological, physical, social, economic, and institutional components (Klerkx et al., 2012). Unlike a mono-crop or livestock approach, systems thinking embraces the complexity and diversity of MFS, where multiple components are integrated within a single farm (Figure 1) within a certain socio-economic, environmental, and institutional setting (ibid). In MFS, the interdependencies between different components of the farming systems are key to its success. For example, livestock provides manure for fertilizing crops and draft power for land cultivation, while crop residues serve as feed for the livestock, creating a closed-loop system that optimizes resource use and minimizes waste (Neupane & Koirala, 2023). This cyclical relationship enhances productivity and sustainability, making farmers more resilient to external shocks. Further, it also considers components related to market, inputs, human resources, policies, and laws, which are essential for recognizing and optimizing these interconnections (Igbadun et al., 2025)

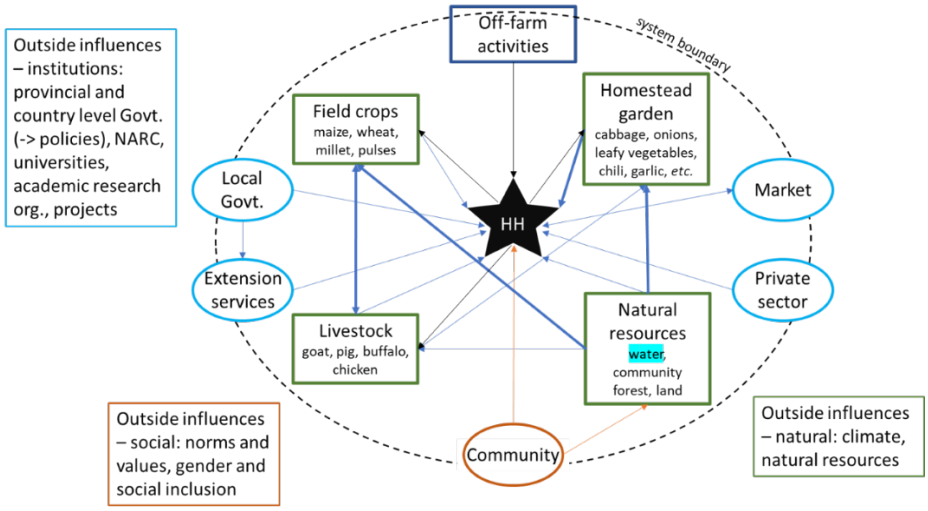


Figure 1. Interaction among the sub-components of MFS in the Mid-hills of Nepal (adapted from Neupane et al. 2023).

Systems thinking also recognizes MFS as a complex system of resources that are arranged and managed according to the totality of production and consumption decisions made by farm households. These decisions involve choices about crops, livestock, and other on-farm or off-farm enterprises. The complexity of these interactions requires a holistic approach to farm management, where the interconnections between various components are carefully considered to optimize the overall performance of the system. The flexibility of this approach enables farmers to tailor their practices to local conditions, maximizing resource use (Neupane et al., 2023).

Nepal's diverse geography—from high mountains and mid-hills to plains— requires locally adapted systems that respond effectively to varying agro-ecological conditions. A systems approach allows farmers to integrate farming components that incorporate local resources and take into consideration climate and market access (Neupane & Koirala, 2023). Given Nepal's high climate vulnerability, diversifying income across crop, livestock, and off-farm activities helps reduce households' economic exposure to shocks. Likewise, MFS can lessen women farmers' drudgery through interconnected systems, circular resource flows, and integrated planning approaches, reducing labour-intensive tasks.

2.3. The existing mixed farming systems in the hills and mountains of Nepal

MFS in Nepal's hills and mountain regions are predominantly subsistence-oriented, focusing primarily on household food and nutritional security rather than profit. In contrast to the intensive, irrigated MFS found in the Terai and peri-urban areas, hill-based systems are generally rain-fed, less mechanized, and less connected to markets and infrastructure such as roads or cold storage facilities (Koirala & Neupane, 2023).

Due to increasing outmigration, particularly among youth, agricultural work in these regions is largely managed by women, elderly individuals, and sometimes children (ibid). The farming systems here are more extensive and integrated, combining crop cultivation, livestock rearing, and forest use. These components function in a mutually reinforcing cycle, enabling sustainability even under resource constraints (Neupane et al., 2023). The Figure 2 below illustrates a typical MFS structure in the mid-hills of Nepal.

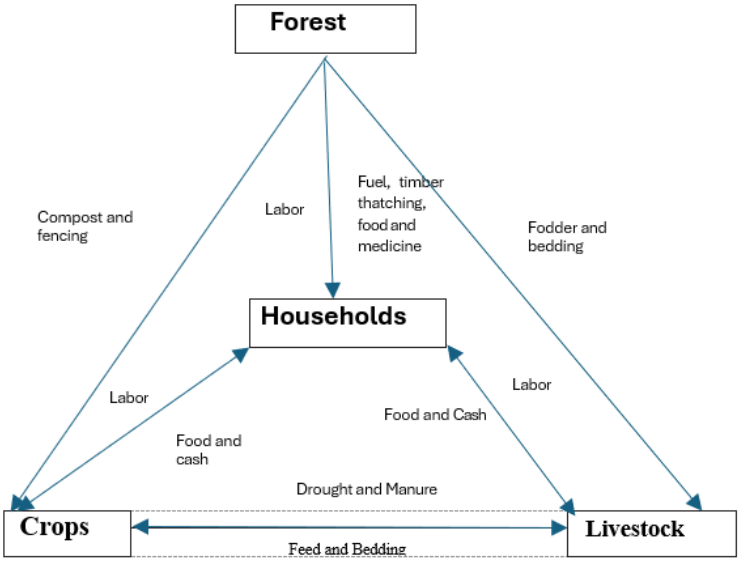


Figure 2. A typical MFS in the mid-hills of Nepal (adopted from Sherchand, 1990)

The figure illustrates households at the center, responsible for managing diverse resources to sustain production and meet essential needs. The core interactions include:

- Crop production: Crops are cultivated primarily for household consumption and income generation through the sale of surplus produce. Crop residues, such as straw and stalks, are used as livestock bedding. These residues, when mixed with animal dung and urine, form organic manure that is recycled back into the fields to enhance soil fertility.
- Livestock management: Livestock play a crucial role by providing milk, meat, and eggs for both household consumption and income generation.
- Forest resources: Leaf litter from forests enriches compost, while forest fodder supplements animal feed, particularly when crop residues are insufficient.

This closed-loop system of interdependent resource flows promotes resilience and self-reliance, especially in areas with limited external inputs. However, these linkages are weakening due to socio-economic shifts (e.g., migration, labor scarcity) and biophysical stressors (e.g., climate change, land degradation).

Revitalizing MFS in these regions is therefore critical for improving overall farm performance, enhancing food security, sustaining livelihoods, and generating rural employment, particularly in Nepal's hill communities (Palikhe et al., 2024; K.C. & Nilhari, 2024).

3. Nepal's agriculture policies and their Mixed Farming Systems provisions

Despite the prevalence of mixed farming practices, Nepal lacks an official definition or classification of "mixed farming systems" and "mixed farming systems farmers." This indicates a lack of policy recognition of MFS. While terms like "mixed crops" or "mixed cropping" are often conflated with 'mixed farming', which integrates crops and livestock.

We used three broader criteria to identify the inclination of national, provincial, and local-level agricultural policies towards the MFS. The criteria include:

a. Key policy objective inclination to MFS: Assessment of the policy objectives in relation to the definition of MFS (as defined in the earlier section)

b. MFS sub-components included in the policies: The sub-component of MFS includes household, field crops, livestock, homestead garden, natural resources, off-farm activities, market, private sector actors, relevant stakeholders, and externals (see figure 1 for details)

c. Inclusion of stakeholders (beneficiaries) covered by the policies: Inclusion of diverse groups of women, Dalits, and other marginalized farmers

In the policy review, we considered 12 sub-components of the MFS (summarized in Figure 1), practiced in the hill farming system which are crop, livestock/ fishery, forage/feed, manure/fertilizer, water/ irrigation, land/biodiversity conservation, seed, knowledge/skills, homestead garden/ pond, mechanization/technology use, institutions/cooperatives, market, financing/ insurance and households/farmers, and the main target groups of the policy. Based on these indicators, we rank policies on whether they support MFS or not. We then assessed the policies for the level of integration of these diverse components. We have ranked those policies into four categories as 'High', 'Medium', 'Low', and 'No integration' (Table 2) based on the interconnectedness of the diverse farm components incorporated into the policy, which is a subjective assessment.

Table 2. Categorization of Policies Based on Focus on MFS, Integration of Components, and Inclusion of Target Groups

Ranking	Explanation of Indicator
High	Policies that incorporate a comprehensive and systematic approach to integrate multiple MFS components, such as crop production, livestock, forest, resource management, and market access, for marginal and female farmers. Such policies demonstrate clear guidelines for coordination among different sectors, actively involve stakeholders, and prioritize sustainable practices and gender inclusivity. They also provide a clear framework for implementation, monitoring, and evaluation of the integrated approach.
Medium	These policies may address a few MFS components, such as crop and livestock management or resource conservation, but do not provide comprehensive coverage of all aspects. They may involve stakeholders to a limited extent. The policies might offer some guidelines or support mechanisms but are not as robust or inclusive as those ranked "High."
Low	Policies that have minimal integration of MFS components, addressing them in a fragmented or isolated manner. These policies might mention a few farm components, such as livestock management or irrigation, but lack a holistic approach. They often do not involve key stakeholders or consider the interconnectedness of different farm activities.
No integration	Policies that do not address any MFS components. These policies focus on a single aspect of agriculture without considering the broader context or the potential synergies and trade-offs among different components.

The review analyses a range of policy documents from national, provincial, and local levels (Table 3). At the national level, 17 policies were reviewed, including those related to agriculture, irrigation, climate change, and agro-industrial development. At the provincial level, 13 policies were analysed, focusing on agriculture and market promotion in regions such as Koshi and Karnali Provinces. At the local level, nine policies were reviewed from municipalities, including Halesi-Tuwachung and Gurbhakot (Table 3). The analysis assesses the level of integration with MFS principles, targeted groups, and key policy components (Table 3).

3.1. Mixed farming systems in the mountains and hills of Nepal

Following the Green Revolution, global and regional policies prioritized maximizing production per unit area to reduce hunger. Nepal has also since focused on the development, expansion, and commercialization of agriculture (GoN, 2016). Hence, small-scale farming, like mixed farming, is usually ignored; nevertheless, a few polices align with some of the MFS principles. At the national level, the National Agriculture Policy 2004 and the Agriculture Development Strategy (ADS) 2015-2035 provide a broad framework for agricultural development that is conducive to MFS (Table 3). The ADS, with its focus on modernization, diversification, and sustainability, aligns well with the MFS approach. It emphasizes integrated crop-livestock systems, sustainable resource use, and food and nutritional security, which are all central to MFS (GoN, 2016). The 16th Development Plan has heavily focused on commercial agriculture development and aims for an inclusive, sustainable, and climate-resilient agriculture economy (NPC, 2024). It has acknowledged that the majority of the population is engaged in small and medium-scale farming, and that they lack the capabilities to respond to disasters. However, the plan does not have specific targets or provisions to support the capability development and other needs of the small and marginal farmers.

Other more recent provisions, like the Land Use Policy 2015, aim to consolidate lands for the protection of agricultural zones and promotion of commercial agriculture (NSO, 2023c). Likewise, the National Science and Technology Policy 2019 consider agricultural commercialization and land use as priority sectors for technological innovation; therefore, it does not have targets to improve access to technology for the household-level small farming communities (GoN, 2019).

Similarly, the National Fertilizer Policy 2001 emphasizes increasing fertilizer availability and use to enhance crop production, which does not acknowledge the livestock contribution to crops, and importantly, the ecological principles of MFS. This policy could be more supportive of MFS by promoting organic and integrated nutrient management practices that reduce reliance on external inputs and support ecological balance (MOAC, 2002).

Policies geared towards the commercialization of agriculture tend to ignore the fact that more than half of the farming population is still dependent on subsistence. And that focusing on commercialization does not mean that it should completely ignore the population that depends on agriculture for subsistence. For instance, the National Agricultural Policy 2004 has the same objective, but the Policy is targeted towards farmers with access to resources as well as those with relatively less access to tools and opportunities (GoN, 2004). It has ensured the implementation of policies that improve access of skilled, landless, marginalized, and small farmers to land, have incremental taxation policies, and other policies to ensure access to land for farmers.

3.2. Provincial agricultural policies analyzed through the lens of MFS

Provincial policies, particularly in regions like Karnali Province, show a mixed alignment with MFS. On one hand, provincial agriculture development strategies have emphasized the promotion of mixed farming practices, supporting local niche crops, livestock rearing, and agroforestry. These strategies align with the MFS approach, recognizing diverse and resilient farming systems tailored to the unique ecological and socio-economic conditions of each province. For example, the Ministry of Land Management, Agriculture, and Cooperatives (MoLMAC) Karnali Province focuses on sustainable agriculture and market integration for small and marginal farmers, aligning with the MFS objective of enhancing livelihoods through diverse and resilient farming systems (MOLMAC, n.d.)

On the other hand, there is a strong focus on promoting high-value cash crops and commercial farming in some provinces. This sectoral focus can lead to a reduction in farm diversity and resilience, contrary to the goals of MFS. These policies risk marginalizing small-scale and subsistence farmers. This divergence highlights the need for provincial policies to balance the promotion of commercial agriculture with support for MFS that integrate diverse farming components.

3.3. Local agricultural policies analyzed from the lens of MFS

At the local level, policies and initiatives tend to be more varied, reflecting the specific needs and priorities of different municipalities and districts. In some areas, local governments have adopted policies that explicitly support MFS, recognizing their potential to enhance food security, livelihoods, and ecological sustainability. These local policies often include measures to support the integration of crop and livestock components, promote sustainable resource use, and improve market access for small-scale farmers. For example, initiatives in Gurbhakot Municipality in Surkhet District focus on supporting MFS to address the challenges faced by subsistence farmers and enhance their market participation.

However, there are also challenges at the local level in terms of policy implementation and coordination. In many cases, local governments lack the resources and technical expertise needed to effectively implement policies that support MFS. This can lead to gaps between policy objectives and actual outcomes on the ground. Additionally, there is often a lack of coordination between local, provincial, and national policies, which can result in conflicting priorities and undermine the effectiveness of MFS initiatives. To address these challenges, there is a need for

greater capacity-building and support for local governments, as well as improved coordination and alignment of policies across different levels of governance.

4. A gap between Nepal's policy priorities and agricultural realities

4.1. Criteria 1: Policy objective inclination to MFS

At the macro level, the fragmented nature of sectoral policies - covering groundwater, surface water, irrigation, and agriculture - is a significant impediment to the integration of diverse components of MFS. Analyzing the policies, it is inferred that systems thinking is critically underrepresented in the agricultural policies and practices of Nepal, leading to gaps between policy priorities and the actual needs of smallholder farmers, particularly those engaged in MFS. Current agricultural policies tend to prioritize high-yield cereal crops like rice, wheat, and maize, while marginalizing rainfed and neglected high-nutrition crops such as buckwheat and barley, which are essential for food security in the hill regions. This narrow focus disregards the diverse and interconnected nature of MFS, where multiple enterprises—crops, livestock, and sometimes agroforestry—are integrated within a single farm to optimize resource use and enhance resilience.

Similarly, while policy efforts have been directed towards improving livestock breeds, there has been insufficient attention to improving fodder cultivation. This oversight is critical because, in MFS, the productivity of livestock is directly tied to the availability and quality of fodder. Improved livestock breeds without corresponding improvements in fodder availability can lead to unsustainable practices, such as overgrazing, which degrades land and reduces overall farm productivity. Similarly, policies that focus solely on increasing crop yields without considering market access fail to address the full spectrum of challenges that farmers face in monetizing their surplus produce, leading to inefficiencies and lost income opportunities.

Table 3. MFS integration into agriculture policies of all three tiers of government

National Agricultural Policies	MFS integration level	Provincial Agricultural Policies	MFS integration level	Local Agricultural Policies	MFS integration level
National Fertilizer Policy 2001	Low	**Koshi Province**		**Halesi-Tuwachung Municipality**	
National Agriculture Policy 2004	Medium	Provincial Agriculture Business Promotion Grant Act, 2020	Medium	Implementation and Management of Agriculture Development Program of Halesi-Tuwachung Municipality, Khotang (working procedure, 2076) (2019 AD)	High
Irrigation Policy 2013	Medium	Provincial Cooperative Act, 2019	Medium	Revolving Fund for Seed Capital for Mothers' Group (2077) (AD 2020)	Moderate
Agri Mechanization Policy 2014	Medium	Katahari Fruit and Wholesale Market Operation Regulations, 2020 (Including First Amendment)	Low	Municipality's Market Monitoring Guidelines (2075) (AD 2018)	Moderate
Land Use Policy 2015	No integration	Provincial Agriculture Business Promotion Grant Regulations, 2021	Medium	Fertilizer Imports and Distribution Management at Municipal Level (Working Procedure, 2075) (AD 2018)	Moderate
Agriculture Development Strategy (ADS) (2015-2035)	Medium to High	Provincial Agriculture Business Promotion Grant Standards, 2021	Medium	Municipal Cleanliness and Waste Management (Working Procedure, 2075) (AD 2018)	Low
National Food Safety Policy, 2017	Low	Ordinance Amending Some Provincial Acts, 2022	Low	Working Procedure for Group Formation and Implementation (2079) (AD 2022)	Moderate
National Fishery Development Policy 2018	Medium	Provincial Industrial Business Regulations, 2023	Low	Incentive for Demand-Based Livestock Development Program (2076) (AD 2019)	High
Food Right and Food Sovereignty Act 2018	Medium	Provincial No. 1 Private and Partnership Firm Registration Regulations, 2021	No integration	Cooperative Act of Haleshi Tuwachung Municipality (2075) (AD 2018)	High
One Health Strategy 2019	No integration	Provincial Cooperative Regulations, 2019	Medium	**Gurbhakot Municipality**	
National Land Policy 2019	Medium	Provincial Outstanding Women Entrepreneur/Women Micro-Entrepreneur Award Distribution Procedure, 2023	Medium	Gurvakot Municipality's Working Procedure (2075 BS) (2018 AD) for Registration and Renewal of Groups Related to Agriculture and Livestock	High
National Science and Technology Policy 2019	No integration	Technology (Machinery and Tools) Support Procedure, 2023	Medium	Promotion and Management of Agriculture Enterprises Act, 2074 BS (2017 AD)	High
National Climate Change Policy 2019	Medium	Cooperative Institutions Merger Procedure, 2020	Medium	Cooperative Act of Gurvakot Municipality, 2074 BS (2017 AD)	Moderate
National Agroforestry Policy 2019	Low	Cooperative Education and Training Program Operation Procedure, 2020	Medium		
Industrial Enterprise Act 2020	No integration	Agriculture Business Promotion Grant (Second Amendment) Standards, 2023	Medium		
National Livestock Health Policy, 2021	Medium	Standards for Awards in the Cooperative Sector, 2022	Medium		
National Dairy Development Policy 2021	Low	**Karnali Province**			
Irrigation Policy 2023	Low to medium	Organic Agriculture Act, 2019	High		
16th Five Year Plan (2024/25 to 2029/30	Low to medium	Co-operative Act, 2019	Medium		
		Food Right and Food Sovereignty Act, 2020	High		
		Agriculture Enterprise Promotion Act, 2022	Medium		
		Food Sovereignty Regulation, 2022	Medium		

4.2. Criteria 2: Integration of MFS components

We identified 12 sub-components of MFS prevailing in the mid-hill MFS (Figure 1). Nonetheless, a policy focusing on MFS sub-components as an integrated framework is largely missing. The agricultural policies in Nepal often focus narrowly on one or two components of the farming system, such as crop production or livestock

improvement, without considering the interconnected nature of MFS. This fragmented approach leads to a lack of coherence and effectiveness in policy implementation. For instance, while fertilizer subsidies and single-commodity programs like cereal crop intensification receive significant attention, they do not address the broader needs of MFS, such as the integration of livestock, manure management, irrigation, and crop-livestock interactions. The emphasis on commercial and intensive agriculture often overlooks the smallholder farmers who rely on MFS, leaving them without adequate support for the diverse activities that sustain their livelihoods.

Furthermore, livestock policies tend to emphasize herd improvement and expansion, but they fail to address the essential components needed to make livestock farming sustainable within an MFS framework. Policies rarely consider the need for fodder management, which is crucial for maintaining healthy livestock. Additionally, there is often little to no focus on the marketing of milk and dairy products, leaving farmers with limited opportunities to sell their produce at a fair price. Manure management, another critical aspect of MFS, is also neglected, despite its importance in maintaining soil fertility and reducing the need for chemical fertilizers. This narrow focus on isolated components of the farming system limits the potential for MFS to contribute to sustainable agricultural development and food security in Nepal.

Therefore, the policies' inclination towards commercial agriculture and intensive farming practices reflects a disconnect from the realities of smallholder and subsistence farmers who depend on MFS. To fully harness the potential of MFS, there needs to be a shift towards more integrated and holistic policy frameworks that recognize and support the interdependencies between crops, water, livestock, and other components of the farming system.

4.3. Criteria 3: Inclusion of target groups

An analysis of key agricultural policies in Nepal reveals a significant gap in addressing the diverse needs of different farming households (Table 5), especially those engaged in MFS. These policies are largely skewed towards promoting commercial agriculture, often neglecting subsistence farming. The absence of a dedicated policy framework for MFS leaves a critical void in supporting the agricultural practices most relevant to the majority of smallholder farmers.

One of the most pressing issues is the limited policy focus on addressing the feminization of agriculture, despite women making up over 70 percent of Nepal’s agricultural workforce.

This trend is increasingly evident as more households are headed by women, in regions like Karnali Province, 32.1 percent of the total households are headed by women, which is comparatively high given the domination of patriarchal society in Nepal. However, there remains a stark disparity in land ownership between men and women, which is particularly pronounced at the local and provincial levels. For instance, in Gurbhakot Municipality, while 42 percent of households are headed by women, only 19 percent of these women own land (Table 4). This pattern is reflective of broader national trends, where women-headed households are on the rise, yet women’s land ownership remains disproportionately low. The national data shows that, out of 42,866 households in Khotang, in 0.4 percent of households, women own the house only, in 8 percent they own land but not the house, and in 3 percent of cases they own both house and land. (NSO, 2023b).

This disparity in land ownership is not just a social issue but also an economic one, as it directly affects women's ability to benefit from agricultural policies and related incentives. The low percentage of land ownership among women hinders their access to credit, agricultural inputs, and decision-making processes that could otherwise empower them to improve their livelihoods through MFS. The percent of households with women ownership of either land, housing unit or both is 23.8, meanwhile, 11.8 percent own both land and housing (Table 4).

Current policies have failed to address this critical gap, leaving women at a significant disadvantage. For MFS to truly thrive and for agricultural policies to be inclusive, it is essential to focus on gender disparities. Policies must be reformed to not only recognize the role of women in agriculture but also to ensure that they have equitable access to land ownership, resources, and agricultural support systems.

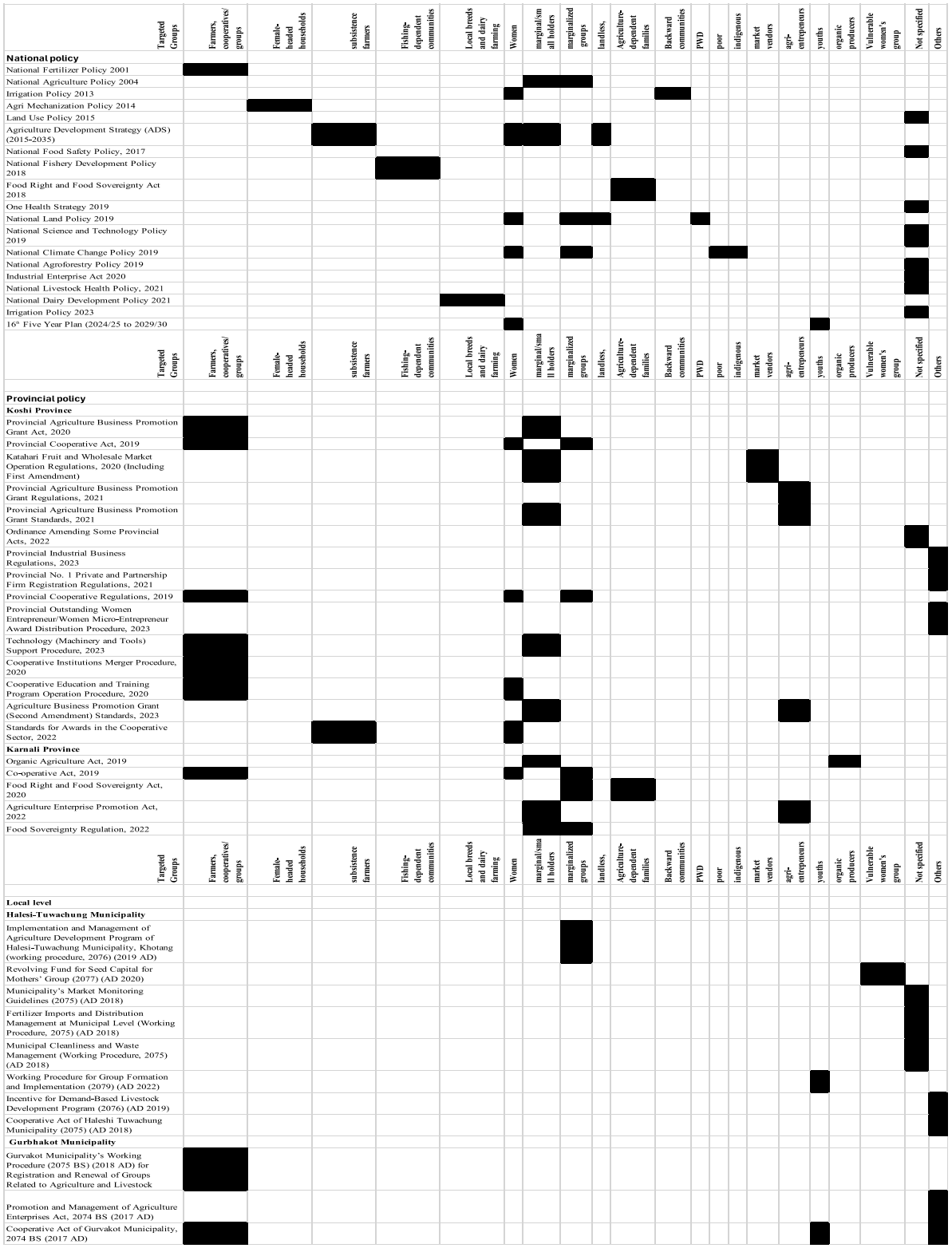
Table 4. Percentage of women’s ownership of land and housing in relation to the total number of households

	Housing or land ownership	Housing Unit Only	Land Only	Both Land & Housing	Neither
Nepal	23.86	2.35	9.66	11.84	74.56
Mountain	12.82	1.02	5.57	6.24	85.20
Hill	21.89	2.47	8.67	10.74	76.47
Koshi	28.40	1.57	12.57	14.25	70.67

Karnali	12.55	0.92	5.47	6.16	84.72
Khotang	18.18	0.92	9.55	7.72	80.70
Surkhet	18.27	1.40	7.80	9.07	76.26

(*Source:* NSO, 2023b)

Table 5. Inclusion of target groups into the policies



5. Conclusion and policy recommendations: systems thinking should be central to the MFS

An analysis of policies and field consultations indicates that systems thinking is critically underrepresented in the agricultural policies and practices across all three levels of government, contributing to the poor performance of MFS. To effectively promote systems thinking in mixed farming policy and implementation in Nepal, it is imperative to adopt holistic approaches that recognize the interdependencies within the MFS. This can be achieved through the following key actions:

1. **Define MFS, develop the MFS Framework, and integrate into agriculture policies:** The government should establish a clear and official definition of MFS, tailored to Nepal's diverse agro-ecological zones, particularly focusing on the unique needs of smallholder farmers in the mid-hills and mountain regions. This framework should emphasize the interconnectedness of crop cultivation, water, livestock rearing, and forestry, and their collective role in ensuring food security, enhancing livelihoods, and promoting environmental sustainability. National and sub-national agricultural policies should be revisited and revised to explicitly incorporate MFS. This includes recognizing the contributions of MFS to food security, climate resilience, and poverty reduction in policies. Policies should support the diversification of agricultural activities, promote sustainable land use, and encourage resource-efficient practices that leverage the synergies between crops, livestock, and forestry.

2. **Systems Thinking into policy discourse: I**nclusion of systems thinking principles in agricultural policies at all levels—national, provincial, and local. Ensure that these policies are developed not in isolation but in a coherent and integrated manner that reflects the interconnected nature of MFS. This requires collaboration and cooperation among government agencies across different levels of governance to harmonize policies that address the full spectrum of farming needs, including crop production, livestock management, fodder cultivation, irrigation service, market access, and environmental sustainability. By promoting policy coherence, we can create a unified approach that supports farmers holistically, ensuring that the diverse components of MFS are effectively integrated and that policies are responsive to the realities of smallholder farmers. This alignment across different levels of governance is crucial for building a resilient and sustainable agricultural sector that can adapt to local conditions while contributing to national food security and economic development goals. Currently, there is a low level of awareness among policy makers, implementers, and farmers about system thinking (Bastakoti et al. 2024). There is a need for capacity sharing among farmers, policymakers, and agricultural institutions to promote a deeper understanding of systems thinking and its applications in agriculture.

3. **Improve market access and invest in market-related infrastructures:** Strengthening market linkages is essential for applying systems thinking in MFS. This involves improving smallholders' access to markets, transportation, and storage facilities. Investments in rural infrastructure, such as farm-to-market roads and cold storage, are critical to reducing post-harvest losses and increasing the profitability of mixed farming. Improved market access also supports value addition and market diversification, enhancing the economic resilience of MFS. These improvements particularly benefit surplus producers by increasing their marketable output and ensuring a consistent supply of commodities to the market.

4. **Inclusive agriculture policies and programs:** Agricultural policies and programs at all three levels of government should address the specific needs of women farmers. As agricultural tasks have become increasingly feminized, policies must be adjusted to respond to the unique challenges women farmers face, the skills and knowledge they invest in agri-food systems and recognize their contributions to resource management and development. Policies should be inclusive, considering the voices of smallholder farmers, women, and marginalized groups. Local government should design targeted agricultural programs and subsidies to support women in agriculture, providing access to credit, subsidies, training, technology and inputs that enhance productivity and market participation. Participatory approaches must be adopted to ensure policies are responsive to these groups and that they benefit equitably from policy interventions.

5. **Promote research and innovation in MFS:** Encouraging research and innovation in MFS is essential for understanding and addressing the location specific challenges faced by smallholder farmers in MFS. National and regional research institutions and universities should collaborate with local government and farming communities to develop context-specific solutions that improve the productivity and sustainability of MFS. Innovations in water management, agroforestry, soil fertility management, and crop-water-livestock integration should be prioritized.

6. References

Adhikari, S. (2018). Drought impact and adaptation strategies in the mid-hill farming system of western Nepal. *Environments*, *5*(9), 101. Available at: https://ui.adsabs.harvard.edu/link_gateway/2018Envi....5..101A/doi:10.3390/environments5090101

Bastakoti, R. C., Shrestha, R. K., Khadka, M., Koirala, S., Neupane, N., Karki, D., & K.C., J.K. (2024). Stakeholders Mapping and Capacity Gap Assessment: Mixed Farming Systems in Nepal. Nepal:I International Institute of Tropical Agriculture. Available at: https://hdl.handle.net/10568/163730

Bhatta, L. D., Shrestha, A., Neupane, N., Jodha, N. S., & Wu, N. (2019). Shifting dynamics of nature, society and agriculture in the Hindu Kush Himalayas: Perspectives for future mountain development. *Journal of Mountain Science*, *16*(5), 1133-1149. Available at: https://link.springer.com/article/10.1007/s11629-018-5146-4

Devendra, C., & Thomas, D. (2002). Crop–animal interactions in mixed farming systems in Asia. *Agricultural Systems*, *71*(1-2), 27-40. Available at: https://doi.org/10.1016/S0308-521X(01)00034-8

FAO. (2019). Country gender assessment of agriculture and the rural sector in Nepal. Kathmandu: FAO. Available at: https://www.fao.org/3/CA3128EN/ca3128en.pdf

FAO, IFAD, UNICEF, WFP & WHO. (2022). The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. Rome: FAO. Available at: https://doi.org/10.4060/cc0639en

FAOSTAT. (2024). FAO's Statistics Division. Available at: https://www.fao.org/about/who-we-are/departments/statistics-division

Gautam, Y., & Andersen, P. (2016). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. *Journal of rural studies*, *44*, 239-249. Available at: https://doi.org/10.1016/j.jrurstud.2016.02.001

Gentle, P., & Thwaites, R. (2016). Transhumant pastoralism in the context of socioeconomic and climate change in the mountains of Nepal. *Mountain Research and Development*, *36*(2), 173-182. Available at: https://doi.org/10.1659/MRD-JOURNAL-D-15-00011.1

GoN. (2019). National Science, Technology and Innovation Policy, 2019. Available at: https://kms.pri.gov.np/dams/pages/view.php?ref=313&search=%21collection1804&k=339b3638b2

GoN. (2004). National Agriculture Policy, 2004. Kathmandu: National Law Commission. Available at: https://cfpcc.gov.np/content/25/national-agricultural-policy-2004/

GoN. (2016). Agriculture Development Strategy 2015 to 2035. Kathmandu: Ministry of Agricultural Development. Available at: https://lpr.adb.org/resource/agriculture-development-strategy-2015-2035-nepal

Gurung, B. (2023). *Role of Gender, Improved Agricultural Technology and Non-Farm Employment in Household Wellbeing in Nepal*. Michigan: Michigan State University. Available at: https://doi.org/doi:10.25335/d8q7-7c14

Herrero, M., Thornton, P. K., Notenbaert, A. M., Wood, S., Msangi, S., Freeman, H. A., ... & Rosegrant, M. (2010). Smart investments in sustainable food production: revisiting mixed crop-livestock systems. Science, 327(5967), 822-825. Available at: https://doi.org/10.1126/science.1183725

Igbadun, H. E., Ojeleye, O. A., Mabhaudhi, T., & Cofie, O. (2025). Sustainable intensification of mixed farming system in West Africa: concepts, practices, and challenges. In *Enhancing Water and Food Security Through Improved Agricultural Water Productivity: New Knowledge, Innovations and Applications* (pp. 165-183). Singapore: Springer Nature Singapore. Available at: https://doi.org/10.1007/978-981-96-1848-4_7

K. C., J.K., Neupane, N. (2024). Sustainable formulae for mixed farming in the Middle Hills of Nepal. Op-ed. Kathmandu: Kantipur Daily News Paper. Available at: https://hdl.handle.net/10568/163141

Klerkx, L., Van Mierlo, B., & Leeuwis, C. (2012). Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. *Farming Systems Research into the 21st century: The new dynamic*, 457-483. Available at: https://doi.org/10.1007/978-94-007-4503-2_20

Mabhaudhi, T., Chibarabada, T. P., & Sikka, A. (2023). Status of integrated crop-livestock research in the mixed farming systems of the Global South: a scoping study. *Frontiers in Sustainable Food Systems*, *7*, 1241675. Available at: https://doi.org/10.3389/fsufs.2023.1241675

Ministry of Finance (MoF). (2023). Economic Survey 2022/23. Kathmandu: Government of Nepal, Ministry of Finance. Available at: https://www.mof.gov.np/uploads/document/file/1710323031_Economic%20Survey%20Engslish%202022-23%20Eng%20Final%20for%20WEB.pdf

Ministry of Agriculture and Cooperation (MOAC), (2002). National Fertilizer Policy 2058. Government of Nepal. Kathmandu: Ministry of Agriculture and Cooperative.

Mutuo, P. K., Cadisch, G., Albrecht, A., Palm, C. A., & Verchot, L. (2005). Potential of agroforestry for carbon sequestration and mitigation of greenhouse gas emissions from soils in the tropics. *Nutrient cycling in Agroecosystems*, *71*, 43-54. Available at: https://doi.org/10.1007/s10705-004-5285-6

Ministry of Land Management, Agriculture and Cooperatives (MOLMAC), n.d. Organic Farming Promotion and Biodiversity Division. Available at: https://molmac.karnali.gov.np/department/agricultural-development-division/detail

National Planning Commission (NPC). (2024). The Sixteenth Plan. Fiscal year 2081/82-2085/86. Government of Nepal. Kathmandu: NPC. Available at: https://npc.gov.np/

National Statistics Office (NSO). (2023a). National Sample Census of Agriculture 2021/22: Report on Land Use. Kathmandu: National Statistics Office.

NSO. (2023b). National Population and Housing Census 2021 (National Report). Kathmandu: National Statistics Office.

NSO. (2023c). National Sample Census of Agriculture Nepal 2021/22: National Report. Kathmandu: National RauKathmandu: NRB. Available at: https://www.nrb.org.np/contents/uploads/2023/08/Current-Macroeconomic-and-Financial-Situation-English-Based-on-Annual-data-of-2022.23.pdf

Neupane, N., Koirala, S., Karki, D., Khadka, M., Shrestha, N., K.C., J.K. & Frija, A. (2023). Harmonization of Work Packages in Mixed Farming: A descriptive design of farming systems components, priorities, and sociotechnical packages towards sustainable intensification. Available at: https://hdl.handle.net/10568/135864

Neupane, N.& Koirala, S. (2023). Reviving Nepal's agriculture: mixed farming can boost Nepal's income, food security and resilience to climate change. Kathmandu: The Kathmandu Post. Available at: https://hdl.handle.net/10568/132732

Niggli, U., Fließbach, A., Hepperly, P., & Scialabba, N. (2009). Low greenhouse gas agriculture: mitigation and adaptation potential of sustainable farming systems. *Ökologie & Landbau*, *141*, 32-33.

Palikhe, A., Shrestha, N., Khadka, M., & Sikka, A. (2024). Sustainable Intensification of Mixed Farming System in the Mid-Hills. Available at: https://doi.org/10.2139/ssrn.4740230

Raut, N., Sitaula, B. K., & Bajracharya, R. M. (2010). Agricultural intensification: Linking with livelihood improvement and environmental degradation in the mid-hills of Nepal. *Journal of Agriculture and Environment*, *11*, 83-94. Available at: https://doi.org/10.3126/aej.v11i0.3655

Sherchand, K. (1990). Assessing the Impact of Natural Resource Management for Sustaining the Mountain Farming System in Nepal. *Management of Natural and Environmental Resources for Sustainable Agricultural Development*, 22.

Thornton, P. K., & Herrero, M. (2015). Adapting to climate change in the mixed crop and livestock farming systems in sub-Saharan Africa. *Nature Climate Change*, *5*(9), 830-836. Available at: https://doi.org/10.1038/NCLIMATE2754

Tilman, D., Balzer, C., Hill, J., & Befort, B. L. (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the national academy of sciences*, *108*(50), 20260-20264. Available at: https://doi.org/10.1073/pnas.1116437108

World Bank. (2003). Reaching the rural poor: A renewed strategy for rural development. Washington, DC: World Bank. Available at: https://doi.org/10.1596/0-8213-5459-0

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