Sustainable Intensification of Mixed Farming Systems

CGIAR

Report on Nepal Inception Meeting for the Sustainable Intensification of Mixed Farming Systems Initiative

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The Sustainable Intensification of Mixed Farming Systems Initiative aims to provide equitable, transformative pathways for improved livelihoods of actors in mixed farming systems through sustainable intensification within target agroecologies and socio-economic settings.

Through action research and development partnerships, the Initiative will improve smallholder farmers' resilience to weather-induced shocks, provide a more stable income and significant benefits in welfare, and enhance social justice and inclusion for 13 million people by 2030.

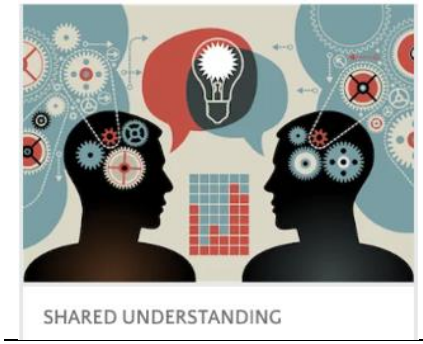
Activities will be implemented in six focus countries globally representing diverse mixed farming systems as follows: Ghana (cereal–root crop mixed), Ethiopia (highland mixed), Malawi: (maize mixed), Bangladesh (rice mixed), Nepal (highland mixed), and Lao People's Democratic Republic (upland intensive mixed/ highland extensive mixed).

Contents

Abbreviations and acronyms

DCRL Project	Developing Climate-Resilient Livelihoods in the Vulnerable Watershed
GESI	Gender and Social Inclusion
HIMAWANTI	Himalayan Grassroots Women's Natural Resource Management Association
NARC	Nepal Agricultural Research Council
NEPSCON	Nepal Suppressed Community Protection Center
SDG	Sustainable Development Goals
SI-MFS	Sustainable Intensification of Mixed Farming Systems Initiative
WP	Work Package

Objectives of the Planning and Inception Meeting

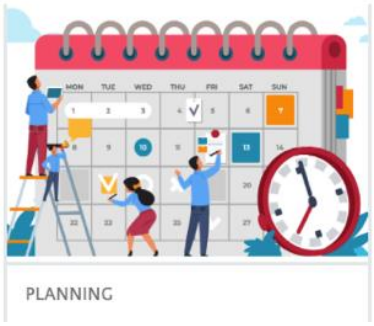


Create a shared understanding of the Initiative amongst implementing institutions.

Lay the groundwork for implementing the One CGIAR SI-MFS Initiative activities in Nepal.

Clarify partner/team member roles and responsibilities.

Discuss and agree on important Initiative-wide implementation arrangements necessary to achieve set goals at work package and in-country levels across collaborating entities.



Discuss, agree and confirm activities concerning the Initiative Gantt chart, and plan out roles and responsibilities in relation to contributing members for each work package among the different entities.

Participants group photo. Photo credit: IWMI/Onion Films.

Introduction

Most agricultural production in the global south occurs in Mixed Farming Systems (MFS). MFS allows farmers to integrate crops, trees, and livestock systems to diversify risky single-crop production labor efficiently, access cash, and add value to products. MFS can potentially maintain ecosystem function and health and help prevent agricultural systems from becoming fragile. However, key drivers of change- population pressure, urbanization, migration, climate change, water scarcity, changing eating habits, and unstable food- deepening resource access inequalities access. All these drivers are obstructing progress toward achieving sustainable development goals.

The CGIAR's Sustainable Intensification of Mixed Farming System (SI-MFS) Initiative aims to address these challenges through sustainable intensification of mixed crop-tree-livestock systems to deliver more productive and equitable livelihoods, along with reduced environmental footprint. SI-MFS intends to provide gender-transformative pathways to achieve this goal by deploying locally viable socio-technical innovations to maximize synergies and minimize trade-offs between the systems' biophysical and social components.

The SI-MFS Initiative works globally across five regions and six countries including Bangladesh, Ethiopia, Ghana, Laos, Malawi, and Nepal. In Nepal, the International Water Management Institute (IWMI), The International Maize and Wheat Improvement Centre (CIMMYT), and the International Institute of Tropical Agriculture (IITA) are collaborating with various stakeholders under the leadership of the Department of Agriculture and the Department of Livestock Services within the Ministry of Agriculture and Livestock Development.

The SI-MFS Initiative is categorized into five work packages. The work packages are **WP1:** Assessing status, trends, and future dynamics of MFS and identifying entry points for SI-MFS; **WP2:** Building methods and tools; **WP3:** Co-designing and validating sustainable intensification pathways; **WP4:** Advancing and supporting scaling of innovations; and **WP5:** Capacity building for systems design and analyses. The initial implementation timeframe of the research initiative is three years.

A one-day workshop was held to discuss the implementation of the SI-MFS Initiative in Nepal on 24 August 2022. The workshop was attended by 46 participants and had the following objectives:

1. Gain insights about opportunities, challenges, and relevance of Mixed Farming Systems in Nepal.
2. Develop a shared understanding of the aims, outcomes, priority innovation packages, and activities of the SI-MFS Initiative in the coming three years in Nepal.

The workshop was designed to be participatory and interactive. The workshop was divided into three sessions: Inaugural, Introductory, and Group Discussion. The details of these sessions are discussed in the section below.

Opening session

The opening session began with the National Anthem, followed by opening/key note speeches. The Chief Guest, Ms. Saloni Singh Pradhan, Honourable Member, National Planning Commission, officially inaugurated the workshop.

Summary of keynote speeches.

Dr. Manohara Khadka, Country Representative, IWMI Nepal, CGIAR County Convenor for Nepal

She welcomed the participants on behalf of the organizers and highlighted the overall objectives of the workshop. She also shared about the current challenges in achieving sustainable development goals. She further highlighted the benefits of SI-MSF initiatives to small landholder farmers, including women and marginalized groups, in securing food security and improving nutrition, reducing poverty, and creating in-country employment opportunities, and at the same time, tackling climate change issues.

Dr. Martin Kropff, One CGIAR Global Director, Resilient Agri-Food System

Dr. Kropff presented virtually on CGIAR's research strategy and partnership and briefly introduced the SI-MFS Initiative in Nepal. He mentioned that the 2030 Research and Innovation Strategy of CGIAR is focused on five impact areas: nutrition, health, and food security; poverty reduction; livelihood and jobs; gender equality; youth and inclusion; climate adaptation and mitigation; & environmental health and biodiversity. He also stated that SI-MFS implementation is necessary to improve food security, increase biodiversity, reduce environmental degradation and economic growth, and strengthen resilience in the face of climate change.

Dr. Fred Kizito, Lead, Mixed Farming System, and Dr. Santiago Lopez Ridaura, Co-Lead, Mixed Farming System

They briefly defined the SI-MFS initiative approach stating that it focuses on producing more food on the same piece of land while reducing the negative environmental impacts and delivering critical outcomes that result in multiple impacts at scale, minimizing sectoral trade-offs, and leveraging/maximizing synergies in MFS. They also highlighted geographic prioritization and selection of MFS/ countries for SI-MFS implementation. They also briefly shared the work packages of the SI-MFS activities and their interlinkages.

Dr. Doj Raj Khanal, Director, Livestock and Fishery, NARC, Kathmandu

Dr. Khanal highlighted the importance of the mixed farming system for the agro-economy of Nepal and livestock contribution in achieving food security, manure security, income generation, poverty reduction, and maintaining the farmers' mental health. He stressed that during the 1980s and 1990s, most of the agricultural land in Nepal was covered with crops, unlike the present day. He then emphasized that our main aim should be to restore MFS in those areas where land is barren for various reasons. He also suggested agro mechanization in flat lands of Terai and animal-based farming in hills. He further emphasized the need to provide subsidies for

farmers using bullocks in hills, promote bee farming, establish community seed banks for crops and fodder, provide insurance for all crops, and facilitate easy market access. He also stated that NARC would continue to support all the CGIAR initiatives.

Dr. Susheel Chandra Acharya, Director General, Department of Water Resources and Irrigation

Dr. Acharya expressed that Nepal's water resources and energy are the country's primary sources of socio-economic development and shared the importance of irrigation for the food and nutrition security of smallholder farmers. He stressed that despite this, small landholder farmer faces challenges due to limited land with year-round irrigation facilities and high dependence on rain-fed farming. He highlighted that Nepal's irrigation system is behind due to natural factors, management, and structural reasons. He also mentioned that climate change has reduced water availability and decreased agriculture productivity- and this can be tackled by climate-adaptive irrigation technologies and efficient watershed management. Dr. Acharya expressed his belief in the relevancy of the SI-MFS Initiative in Nepal for tackling many challenges of farmers. He further stated he is hopeful that the SI-MFS research will support the generation of scientific evidence, knowledge, tools, and methods for developing and promoting climate-smart water storage technologies for multiple and efficient water use. He also expressed that the Department of Water Resources and Irrigation is happy to cooperate with the organizations involved in the SI-MFS Initiative.

Prof. Dr. Punya Prasad Regmi, Vice Chancellor, Agriculture and Forest University, Chitwan.

Agriculture and Forest University, Chitwan, because the university is organizing a curriculum workshop soon. Hence, the lesson learned from the workshop could be beneficial in improving the university's curriculum. He further stated that the periodic plans of the federal, provincial, and local governments had prioritized the development of the agriculture sector for reducing poverty and achieving food security and nutrition.

He also stressed that small and medium-scale farmers suffer from low agricultural productivity and poverty and are affected by climate change. So, it is high time to think, research, work, and produce human resources to serve the farmers. He suggested CGIAR first conduct rigorous scientific research and develop research-based activities for SI-MFS Initiative. He also expressed the need to collaborate with different partners, including NARC, universities, and research organizations, and produce synergy to work together and make changes in the agriculture sector. He concluded by expressing his interest in putting hands and minds together to make changes in the agricultural system of Nepal.

Ms. Saloni Pradhan Singh, Honorable Member, National Planning Commission, Nepal

Ms. Singh firstly congratulated the launching of the SI-SMF initiative in Nepal as it focuses on small landholder farmers, women farmers, and youth. She also stated that an Initiative like this is also relevant for mitigating and adapting adverse impacts of climate change. She also shared that agriculture productivity and production are decreasing due to a lack of irrigation facilities, fertilizers, extension services, input services, and technologies. She stressed the need for capacity development of farmers and extension officers to adapt to the adverse impact of climate change. She also mentioned that the out-migration of youth and feminization of agriculture had increased the work burden of those left behind, including women. Further, over 40 percent of women suffer from malnutrition as women and girls have lower access to food and less autonomy to make the right choices regarding feeding and caregiving practices.

She stressed that in such a scenario, reducing women's work burden and food security could be ensured through climate-smart technologies, knowledge, information, and skills transformation that are climate resilient, less labor intensive, and profitable. She also shared that the GON has set a strategic development roadmap with a vision of "Prosperous Nepal, Happy Nepali ."She mentioned that this vision aims to simultaneously achieve twin objectives of sustainable economic growth and individual well-being and aligns with the 2030 agenda for sustainable development. She also stated that the Constitution of Nepal recognizes citizens' food, food security, and food sovereignty as fundamental rights of the citizen.

She believed that all stakeholders, including the CGIAR research center, would play a significant role in implementing the 15th national plan of the GON. She also reported that the federal program has the vision to build Nepal as a gender-equal nation by achieving substantial gender equality by ensuring equal and meaningful participation of women. She stated that she is delighted to know that SI-MFS focuses on gender youth social inclusion aspects both in the research process and outcome for achieving it. She also stated that the SI- MFS initiative is relevant, contextual, and timely as it is directly linked with SDGs 1, 2, 3, and 5. She mentioned that scientific evidence, data, tools, and information are essential to produce solutions for developing policies and programs on sustainable food security and nutrition. She expressed her belief that CGIAR's SI-MFS Initiative will be instrumental in recommending innovative measures relevant to the climate crisis for promoting inclusive and sustainable mixed farming systems. Lastly, she wished all the stakeholders the success of the Sustainable Intensification of Mixed Farming System Initiative in Nepal. She ensured the support of the government of Nepal for CGIAR initiatives.

Mixed Farming Systems (MFS) Initiative in Nepal

Dr. Ram Krishna Shrestha, Chief, Centre for Crop Development and Agro-Biodiversity Conservation, Ministry of Agriculture and Livestock Development, presented the Mixed Farming Systems in Nepal. He highlighted the main features of MFS in Nepal, recent trends in MFS, problems, issues, and challenges in and around MFS, drivers of SI-MFS, government policies, programs, and initiatives supporting MFS, and potential entry points for SI-MFS in Nepal.

A discussion followed the presentation.

Discussion

Questions

Dr. Doj Raj Khanal, Director, Livestock and Fisheries Research, NARC

i. According to national data, there are around 30,000 hectares of barren land. What can be done to improve this situation? Is MFS able to overcome this?
ii. Does the project plan include local government? Local government involvement and ownership is very critical for the program to succeed.
iii. Learning and earning models should be introduced by Agriculture and forestry universities.
iv. These days mono-cropping and cash crops are gaining popularity. How do we increase MFS production so that people recognize the benefits of MFS?
v. How do we plan to integrate forest and agriculture policy?

Ms. Sarita Lama, HIMAWANTI

i. I think MFS is good for subsistence farming, but to earn more, we must shift to large-scale farming. I wanted to do mixed farming, but it was challenging. How can we transform small-scale MFS into profitable earnings? How can we promote small-scale as well as advance it to large-scale farming?

ii. Krishi Gyan Kendra (Agriculture Knowledge Center) has given many subsidies to farmers, but small and marginalized farmers are deprived of these subsidies. Extension services have also become weak. Farmers have no information about inputs and markets; they are less organized; hence, the selling price also fluctuates within a few hours and with different buyers. How can we control the whole system?

Mr. Jas Bahadur Bishwokarma, President, NEPSCON, Surkhet

i. How can soil be saved? Soil quality has decreased and become very hard due to chemical fertilizers, lack of rainfall, and extreme heat; hence, how can soil quality be improved?
ii. The lifestyle of livestock farmers is degrading; how can forests and animals be integrated into MFS? Many organizations, including local municipalities, have given each goat to farmers to improve their earnings. However, raising one goat takes lots of time investment; instead, they can earn NRs. 500 per day if

they work as a laborer. Hence, how can the SI-MFS Initiative address such challenges for the farmers?

iii. Many people face health issues due to extensive chemicals; how can this problem be addressed through MFS?

Responses

- There is no doubt that we work collaboratively with the local government. Nepal's Constitution has given local governments the authority for local-level development. I also believe that governments at all levels should work collaboratively, and development activities should be implemented for a successful outcome. This action research also aims to work with local governments and involve them in all steps. Our organization works with 309 local government units to give direct subsidies to farmers who utilize/restore their barren land. If we go through MFS and can contribute towards supporting farmers to earn a profit, I think barren land will be gradually utilized.
- Learning and earning are also a priority of the government. The government has also made a strategy, but its implementation part is weak.
- In a few pocket areas, MFS practice is increasing. Otherwise, in many regions, mono cropping is gaining popularity. This is a worldwide trend and the current trend in Nepal too.
- The large-scale farming scope is less in Nepal because most farmers are small landholder farmers. However, through SI-MFS, farmers can produce more from the small land and earn profit. We should also focus on making it sustainable.
- I disagree with the statement that the lifestyle of livestock farmers is degrading due to livestock farming; even in the worst-case scenario, it is found that farmers feed their families by selling their livestock. So, now our focus should be on how to integrate it with MFS and make it more profitable. HEIFER International's livestock support model has also brought many changes; it has also contributed to gender social inclusion and empowerment of the farmers.

Highlights of the Work Packages

The next session was on introduction to work packages of SI-MFS. Dr. F. Muthoni and Dr. Santiago Lopez gave a virtual presentation on work package 1: Status, trends, and future dynamics of MFS and Work Package 2: Building methods and tools (M&T) for SI MFS. Later, it was realized that the virtual presentation was not interactive; hence, the program shifted to physical presentation and group discussions.

Gender and Social Inclusion in the SI-MFS Initiative

Ms. Gitta Thapa, National Researcher, IWMI, presented in the SI-MFS initiatives on Gender and Social Inclusion (GESI). Her presentation highlighted the importance of incorporating GESI in bringing transformative changes in SI-MFS, the integration of GESI in Work packages of the overall SI-MFS Initiative globally, and the Nepal initiative plan to include the GESI aspect in the research activities. The participants had a few suggestions on gender issues and general questions for the project team.

Discussion

Questions

Dr. Sujata Tamanag, Researcher/Policy Analyst, Forest Action Nepal/Alliance of Agriculture for food

i. Do we also mean using chemical fertilizers when we talk about sustainable intensification?
ii. How do we include unprivileged females in farming?

Mr. Keshab Raj Shrestha, Tarahara, Province 1, NARC

i. Surkhet and Khotang districts are two project sites. Will these sites represent Nepal overall? If --Terai is omitted, the project's objective may not be fulfilled.

Dr. Manju Sharma, Joint Secretary, Department of Water Resources and Irrigation

i. The concept of sustainability and diversification is not clear.
ii. This Initiative focuses on sustainable agriculture or principally increasing the farmer's economy; this is unclear.

Response

Dr. Nirman Shrestha, Researcher, IWMI

- Our recent field visit to Khotang and Surkhet districts shows that crops produced from the farm are insufficient to feed the family the whole year. So we are discussing the possible entry point with you; our current interest is that at least they can produce sufficient food and dairy product for a year so that they don't have to purchase them, but if the possibility of making crops for a year is not possible in the areas we have to think of alternative approach such as giving more priority to livestock farming so that the money they earn from it can be spent in buying food and they could be independent. We are focusing on providing long-term and sustainable solutions.
- We are looking at everything from a system approach. GESI will come as cross-cutting in every package of this Initiative.
- Regarding the research area, we are not focusing on the city centers of the Surkhet and Khotang districts. Typically, a mixed farming system is followed in mid-hills. Our site is Gurbhakot municipality of Surkhet district and Haleshi Tuwachung municipality of Khotang district. The sites selected in Surkhet and Khotang districts are in the mid hills, above 1000m. I want to assure you that this is just the initial phase. This is just the project's entry point, but if we succeed and can scale up, we might extend the project to other areas in the

future. First, we took eastern and western parts of Nepal, and during the scoping visit, we found many differences between these two places.

Dr. Ram Krishna Shrestha, Chief, Centre for Crop Development and Agro-Biodiversity Conservation, Ministry of Agriculture and Livestock Development

- I think CGIAR centers must be clear about the differences between integrated MFS and diversification of MFS and how to proceed. We should also focus on a self-sustainable system using fewer external inputs, including fertilizers. We have now realized the green revolution's negative impact, so we must also consider natural farming.

Group deliberations

Considering the number of participants, the group discussion was reduced to three work packages. Group 1 was asked to discuss and present on Work Package 3: Participatory co-design of MFS with evidence-based validated SI innovation packages. Group 2 was asked to discuss and present Work Package 4: Advancing and supporting scaling of innovations (WP4). Group 3 was asked to discuss and present Work Package 5: Capacity building for SI- MFS design and analysis (WP5). Each group was given a flex chart describing each work package. Group facilitators and note-takers were provided to each group.

Group 1: Participatory co-design of MFS with evidence-based, validated SI innovation packages (WP3)

Firstly, Nirman Shrestha, Researcher IWMI, presented the general description of the possible sites of the Surkhet and Khotang districts so that the group has a better understanding of both areas. The table below highlights the constraints, opportunities, and entry points drawn by Group 1 from their discussion.

Nirman Shrestha presenting on the possible implementation sites. Photo credit: IWMI/Onion Films.

Table 1. Constraint, Opportunities, and Entry points of the possible sites-Surkhet District

Constraints	**Opportunities**
- Mostly, rain-fed irrigation system - In areas with irrigation, water leakages- irrigation infrastructure is not well maintained; hence, water management is a problem. - Small landholder farmers. - Land kept fallow in the dry season. - Seasonal migration. - Farmers are not self-sufficient- the farm produces enough only for 3-6 months. - Social conflict- caste-based and gender discrimination. - Limited knowledge-crop suitability for different soil types. - Change in consumption pattern- increasing dependence on purchased food- a shift from Maize and millet to rice. - Market Access (open-border) -Selling raw materials to middlemen from India, and India process them and sells them back to Nepal- Hence, policy intervention is necessary. - Pests and diseases management. - Lack of extension services in many areas. Agro-vet advice followed. - Lack of crop insurance could motivate farmers to try new crops/ Or crop insurance against disaster. - Study area -Ward has limited boundary- better to select Municipality.	- Water availability. - Collaboration with Local municipality/NEPSCON for fieldwork (60 staff in the field). - Cash crop – Ginger, Turmeric, yam. - Remittance could be an opportunity to invest.
Entry Point	
- Strong baseline survey-farm characterization, a household survey of the study area. - Surkhet municipality is already conducting a baseline survey, so it's an opportunity for SI-MFS Initiative to collaborate with them. - Test the present production level and conduct a study on a profitable and sustainable MFS system. - Water Management/ Soil Management/ Crop plantation as per the water availability and soil quality. - Introduce high-quality seeds to the farmers- especially to increase maize production. - Manure management /Improve soil fertility measures. - Cropping system- Market plus high-quality local seeds.	

- Surkhet is a milk pocket area, so intervention to increase milk production is necessary.
- Seed management.
- Strengthen market linkage - Surkhet is Province's headquarters, linking the project area with the market areas of Surkhet.
- Small-scale mechanization tools (Promotion + availability) are user-friendly (female+ elderly).
- Promoting indigenous crops- and food processing - and linking it with food programs to displace packet food.

Table 2. Constraints, opportunities, and entry points of the possible sites-Khotang District

Constraints	**Opportunities**
- The dry land-drought area declared by GoN. - Rain-fed system. - Smallholder farmers. - Increasing male and female migration. - Farm products are sufficient only for 3-6 months. - Lack of access to the market. - Wildlife-monkeys terror. Crops are eaten, and monkeys destroy the farm. We need special techniques to deal with this problem. - Dry season-land kept fallow from Nov-April.	- Rai women with shared decision-making power which is not common in Nepal. - Good demand for milk. - Good fodder and forage availability.
Khotang Entry Point	
- Good market for milk- Religion tourism in Haleshi -Haleshi market has milk shortage, so it could be a good market. - Intensification of piggery- most households have pigs - Water conservation techniques. - Horticulture during monsoon. - Intensification of goat farming-fodder availability. - Improving fodder quality plus productivity. - Good variety of crop production (e.g., Maize). - Fallow land management by introducing alternative crops suitable for the dry season. - Collaboration with UNDP's DCRL project – which works on water, forest, and agriculture conservation in the area. - Plantation of high-value crops and modernization of the farming system. - User-friendly (women, elderly) agro mechanization could also be small. - Action research is required to study the production system and assess profitability. - Rainwater harvesting/ pond water harvesting.	

The team suggested discussing with the community and local government to decide on the relevant and necessary interventions in both areas. The presentation was followed by a question from one of the participants.

Question: We are discussing MFS, livestock integration, manure from livestock, and mechanization. On the one hand, we are talking about using bullocks for agricultural purposes, and on the other, we are promoting agro-mechanization.

> **Response:** Mechanization is not only about using tractors machine. It is also about using improved ploughs, such as iron ploughs, instead of wooden ones. It is also essential to decide whether the mechanization is social, economic, and environmentally friendly for the targeted area. The government has introduced agro mechanization in Khotang District, but the way they have introduced in not sustainable. Farmers are not given proper training to maintain the machines. Hence, we need to focus on sustainable interventions.
>
> **Response:** Likewise, post-harvest mechanization is also essential. In one of the areas visited, women said they are happier now because their life has become easier after small machines such as grinding machines were introduced in the village.

Group 2: Advancing and supporting scaling of innovations (WP4)

Ongoing group discussions. Photo credit: Sanju Koirala/IWMI.

Group 2 mentioned that integrated mixed farming Systems, agroforestry, and integrated livestock management already exist. So, the focus should be on activities such as slight improvement in farming practices or livestock breeding based on current opportunities. The group also mentioned that the innovation could be a new product or institution (e.g., promoting cooperative farming so that farmers' dependency on middlemen is reduced) or process intervention to enhance access to the market. The opportunities and challenges drawn by the group are mentioned in the table below.

Table 3. Cropping practices, opportunities, and challenges

Opportunities	**Challenges**
- Organic farming (niche method) - Reduced dependency on chemical fertilizers-we want to intensify - so do we want to use chemical fertilizers or just focus on organic farming - Also, help to save soil - Products diversification (promote neglected crops) - Awareness - Seed and technology support, marketing, supply chain - Conservation of resources	- Technical know-how-poor capacity - Less profitable - Change in food habits-preference for rice over locally produced crops or preference for foreign products over national products - Overall, agriculture is looked at as the less profitable sector-so; how do we make it attractive - Increasing male labor migration - Need for women and elderly-friendly technologies. - How to onboard all stakeholders into the common understanding of SI-MFS - Are local governments even interested? - The limited budget is given to agriculture at local level
Bottlenecks	
- Previous experience shows that most elite farmers got the training. They did not reciprocate with other farmers, so only elite farmers benefitted.	

Table 4. Livestock farming: Opportunities and Challenges

Opportunities	**Challenges**
- Productivity enhancement - Shed management - Feed management at household-locally made and food waste using - Capacitate local government-Subsidy that goes to the local government usually freeze; hence the subsidy is frozen.	- Shortage in the supply of quality breeds of livestock - How do we use the subsidy - Lack of labor - Need for women and elderly-friendly technologies - Are local governments interested? - How to onboard all stakeholders?

Bottlenecks
- Previous experience shows that most elite farmers got the training. They did not reciprocate with other farmers, so only elite farmers benefitted.

Group 3: Capacity building for SI- MFS design and analysis (WP5)

The group shared that system, and component-level knowledge is important to initiate the intervention. Determining the possible trade-offs between different interventions, opportunity cost, and the most profitable intervention is also essential. The group recommended conducting research to identify profitable and sustainable interventions, making it easier for decision-makers to convince farmers.

Table 5. Stakeholder analysis, existing gaps, and possible interventions

Stakeholders	Existing Capacity	Gap	Possible Interventions
Producer level: (Farmers/Groups/ Cooperatives WUAs/CF UG/	- They know traditional farming, substantial farming system- but they don't t know the difference between it and MFS - Low volume of production - Market is not a problem- due to less volume of product market is not well developed, due to which farmers also have less bargaining power	- Less knowledge of the profitability of MFS - Low productivity - Low bargaining power - Each gap should be analyzed, segregating gender and size of land holding (marginalized/tenants)	- Identify factors that motivate farmers to adopt MFS - Package of Practice - Identify intervention through piloting.

	- Weak horizontal linkages among producers.		
Private sector (Service providers): Service providers, agro-vet, input suppliers, seed producers	- Only rely on profit /commission	- Lack of sustainable practices	- Capacity building in quality input support - Involvement in innovation
Government Research Organization (NARC) Universities, Agriculture, and Academic institutions Govt. extension/AKC Local/Province government	- Low level of human resources - No updated technical knowledge - More engagement in administrative work (Less focused on demonstration work)	- Less involved in technical matters/mandates (trainings)	- Capacity building with updated technologies - Active Field engagement in MFS. - (Providing training and information is a standard recommendation, but we want to go one step ahead and deep by recommending a study to find out factors that motivate farmers to adopt MFS.
Actors involved in post-production: Millers/Local market/ haat bazar Other value chain actors Traders/Middleman/Wholesaler	- No assurance of supply	- Insufficient linkages/networking to market	

The group also presented the second approach that could be followed for capacity building for MFS design and analysis.

The second approach:

- Review and analysis of MFS at the national and international level—Then, identify the most appropriate system for Nepal
- Review design and analysis of national and international experiences on MFS
- Identification of more appropriate MFS
- Find out the status of the implementation of the MFS design
- Analyze the lacking/constraints/ limitation in designing MFS at the local level/project level based on which capacity development can be initiated
- Develop measures to resolve limitations on designing MFS design and analysis
- Identification of targeted beneficiaries/stakeholders at the project, farmer, and stakeholder level
- Proposed methods/techniques to enhance capacity building of the targeted stakeholders
- Identification of suitable technologies for the design and analysis of MFS
- Field implementation on capacity development of the stakeholders

Closing remarks and vote of thanks

Dr. Manohara Khadka, Country Representatives, IWMI, requested Mr. Lekh Raj Timilsina, Secretary, Karnali Province, Dr. Doj Raj Khanal, Director General, NARC, Ms. Sarita Lama, Program Officer, HIMAWANTI, and Mr. Binaya Jha, Chief technical advisor, DCRL to come forward on the stage and give final remarks on the SI-MFS Initiative and the inception workshop.

Lekh Raj Timilsina, Province Secretary, Karnali Province

Mr. Timilsina stated the government of Karlani province wants to promote organic farming in the province. He shared that the Karnali province cannot compete with other provinces in food production; hence, the government seeks to promote high-value and organic crops. He suggested that the Initiative should also research the promotion of organic crops in the area. He also showed interest in scaling up the Initiative to other districts. Mr. Timilsina also stated that Karnali province has rivers and streams with abundant water, but the problem is the lack of a mechanism to lift water to the farms. He also mentioned that the provincial government has invested in irrigation, but irrigation systems are without water. Hence, he also requested the Initiative to research the appropriate models of irrigation systems in the area. The proposed irrigation system should also be small/poor farmers friendly and can be used independently. Mr. Timilsina also suggested discussing the Initiative at Municipality with Mayor, Deputy Mayor, and other members so that they will own the research and scale it up to other Municipalities as well.

Dr. Doj Raj Khanal, Director, Livestock and Fishery, NARC

Dr. Khanal stated that MFS was practiced for a long time in Nepal-farming system was integrated with agriculture and livestock. He mentioned that recently the trend has been decreasing and as a result, our productivity is also decreasing. He further stated Municipality leaders and farmers should also be consulted before interventions. He also mentioned that in Khotang district, farmers would be benefited from integrating livestock (goat/pig/cow/buffalo/all) farming with agriculture and horticulture. He also stated that many farmers have left intercropping and relay cropping and are focused on mono-cropping. Still, our previous system of multiple cropping was not weak-NARC has also, conducted a lot of research on it which should also be revisited. He also stressed that the MFS system model would rely on appropriate types of irrigation facilities available/possible in the area. He also recommended selecting two research sites in the Terai area. He mentioned that the provincial government is happy to collaborate and work with the project team.

Ms. Sarita Lama, HIMAWANTI

Ms. Lama stated that MFS had been practiced for a long time; however, it seems like we have lost our path. She stressed the right path should benefit ecosystems and humans, including women, youth, marginalized groups, and poor farmers. She also emphasized creating an enabling environment, so the farmers and other stakeholders feel ownership. The intervention should be technically simple so that farmers are not confused and can practice it. She recommended promoting youth

farmers and returnee migrants willing to work in agriculture. She also suggested collaborating with governments at all levels for the Initiative.

Mr. Binaya Jha, Chief technical advisor, DCRL

Mr. Jha informed that GON, UNDP, and GEF are jointly implementing the Developing Climate Resilient Livelihood (DCRL) project downstream of the Dudhkoshi area to tackle the impact of climate change. He started to focus on three areas while discussing SI-MFS-first human, second land, and third environment. He stated that the main objective should be to benefit the targeted population of the areas, and 80 percent of the targeted population in Khotang belongs to the Rai community, who are vulnerable.

He highlighted that while discussing land, attention should be given to enhancing land productivity, which depends on land fertility and soil moisture. He stated that DCRL is also collaborating with the Department of Hydrology and Metrology to set up a hydro met station that tests soil moisture and evaporation- it will inform farmers about the soil condition at different year periods. He mentioned that 40 percent of the water has decreased in the area; hence, MFS intervention is not possible without ensuring water availability. He also gave an example that the farmers are gradually reducing the numbers of livestock as they are not able to feed water to them. He also shared that DCRL focuses on total water management, including solar water lifting, rainwater harvesting, and runoff water harvesting. He also suggested researching drought resistance crops as the land in most of the proposed sites of Khotang district is left fallow in the dry season (Oct/Nov-April). He also suggested growing drought-resistant grass/fodder in barren land and utilizing it for livestock feeding. He requested NARC support farmers in insect and pest control by disseminating information through mobile apps. He recommended collaborating with local government in all stages and giving the role of resource monitoring so that they are informed and can support scaling up the best practices. This will also help in the sustainability of MFS in the long term.

The program ended by thanking all the guests, presenters, facilitators, and the support team that contributed to making the inception workshop successful.

END.