Nepal

Challenges in Sustainable Agricultural Mechanization in Nepal

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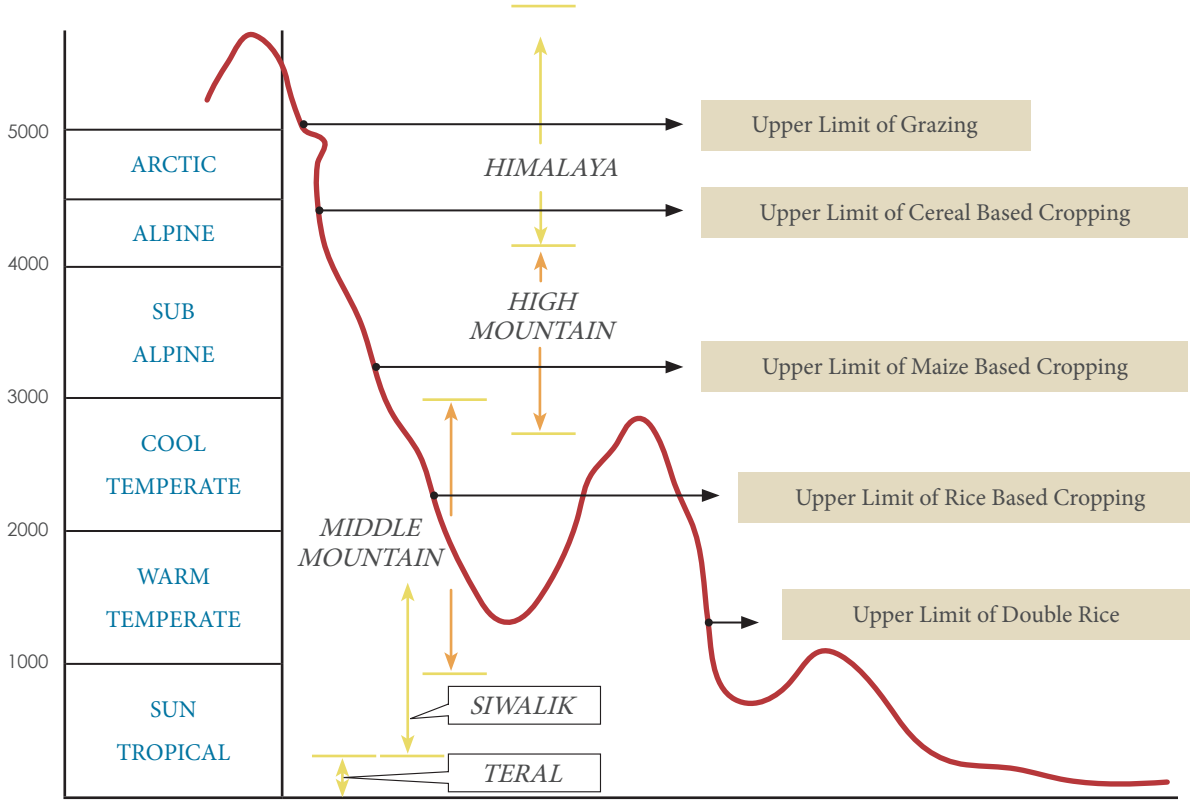
Mr. Shreemat Shrestha obtained Bachelor Degree in Agricultural Engineering from Kerala Agriculture University in India in 1991, and Master Degree in Agricultural Engineering from Govinda Ballav Pant University of Agriculture and Technology (GBPUAT) in India with distinction. Mr. Shrestha is the Division Chief of Agricultural Engineering Division of Nepal Agricultural Research Council. He's been working as an agricultural engineer research scientist in different capacities in Nepal Agricultural Research Council (NARC) since 1994. Mr. Shreemat Shrestha involved in the design and development of appropriate agricultural implements, viz. jab seeder, pedal operated millet thresher, cornpeeler, low cost solar dryer, cardamom dryer, coffee pulper, tunnel solar dryer, ginger washing machine, etc and modification of strip till drill, bed planter and animal drawn zero till drill. He also directly involved in field validation and promotion of resource conservation technologies (RCTs) in rice wheat system through participatory demonstration, field trials and farmers' training in the hills of Nepal under different projects. As a member of agricultural mechanization policy drafting committee, he contributed to the preparation of the upcoming agricultural mechanization policy of Nepal.

Nepal is a land-locked country sandwiched between India and China. Its land area is 147,181 Km2. Population in Nepal is 2.7 Million. There are three geographical regions in Nepal, namely Terai, hill and mountain. Elevation in the country ranges from 70 m to 8,848 m. Its climate type varies from temperate to sub tropical. The typical feature of Nepal is rugged terrain and diversity in all scenes.

The Pphysiographic regions in Nepal are showed below:



Agriculture in the country is dominated by subsistence and small holder agriculture with average land size below 0.8 hectares. Agriculture contributed 36% to the GDP in Nepal, employing 60 percent of its population. Rice-based and maize-based cropping systems are dominant in Terai and hills respectively. Cattle, buffalo, goat and poultry are the major livestock. Besides cereal production, Nepal also produces vegetables, and cash crops, viz tea, coffee, cardamom and ginger, etc.

The areas and production of cereal crops in Nepal for the year 2011-2012 are showed below:

Crops	Area (ha.)	Production (mt.)	Yield (kg/ha)
Paddy	1531493	5072248	3312
Maize	871387	2179414	2501
Millet	278030	315067	1133
Wheat	765317	1846142	2412
Barley	27966	34830	1246
Buckwheat	10339	10021	969
Total	3484532	9457722	2710

In Nepal, tillage is generally conducted by animal power. Only 26% of farmers use iron plough; while just 8% use tractors and the proportion could reach 18% in Terai areas. Most of the tractors use cultivators. Custom hiring of tractors in Nepal is common. And power tiller is getting popular. In terms of planting and seeding, rice is manually transplanted; wheat is broadcasted; and maize & vegetable seeds are dibbled. More than 64% of the farm work in Nepal are performed by women. Zero-till drill-and minimum till drill are promoted by NARC & DOA. For inter culture operation, rice, potato, maize and vegetables all need major interculture operations. Hand tools are used, and bullock drawn local plough is also used for maize inter culture. More than 60% of inter-culture operations are carried out by women. 42% of arable areas in Nepal are irrigated, while 18% could have year round irrigation. Only 242,000 hectares of arable land is irrigated by groundwater (GW) in which 208,746 hectares is through shallow-tube wells (STW) and 33,732 hectares by deep-tube wells. 14% in the terai areas in Nepal use cystic fibrosis (CF) pump mainly for shallow tube well; and there are more than 100,000 treadle pumps in Terai areas. And simple low cost drip system and sprinkler irrigation are being used for vegetable cultivation. Harvesting in Nepal is usually performed manually by using locally made sickles; and serrated sickles locally made are also popular. There are more than 30 Combine harvesters in operation in Terai; and 4 wheel tractors operated reapers, power tiller & mini tiller operated reaper are also getting popular. In terms of processing, both manual and mechanical power are used. Majority of cereal crop processing operation is mechanized. Sheller, huller, grinding mill, oil expeller and beaten rice mill are commonly used in Nepal. There is need for appropriate technology in processing of perishables / cash crops.

The inappropriate equipment use of agricultural mechanization in Nepal causes severe consequences. In Terai, the 9/11 tyne cultivator used for land preparation requires 6-7 pass for land preparation, which increases the cost of tillage. Frequent accidents occur, specially in the agro processing mills with exposed flat beltand operating tractors mainly due to lack of safety feature and lack of training for operation. In Nepal, the machinery supply chains cover multi-players, including black smiths, small agricultural machinery fabricators, agricultural machienry importers, dealers/ Sub dealers, service providers (custom hiring, repair and maintenance) and farmers.

To promote sustainable agricultural mechanization in Nepal, challenges include not only socio-economic

and technological issues, but also policy and institutional issues. The socio-economic reality in Nepal is that small and fragmented land holding is dominating; and young people are not interested in agriculture. In addition, traditional blacksmiths are in poor condition; and there are gender concerns and capital constraints as well. In terms of technological issues, realization of small holder agricultural mechanization and availability of spare parts remain challenging; local agricultural machinery fabricators are in poor condition; and there is a lack of technical and safety standards. Specific to policy issues, Nepal lacks sound agricultural mechanization policy; and there is no recognition of farm machinery custom hiring enterprise. For institutional issues, the research and extension system is weak and institution for testing and quality control is absent in Nepal; and there is need for capacity development for private sector and farmers.

Due to the above mentioned issues and challenges, interventions are needed in the following aspects:

- Development, adaptation, and promotion of efficient hand tools through capacity development of local blacksmiths and commercialization of their skill;
- Development, adaptation, and promotion of efficient animal drawn implements;
- Development, adaptation, and promotion of efficient processing machinery of high value commodities;
- Agricultural mechanization with conservation agriculture;
- Cooperative farming/ command area development;
- Assured and efficient irrigation for commercialization; and
- Promotion of renewable energy in agriculture.

In promoting Public & Private Partnership for promoting sustainable agricultural mechanization, the key stakeholders shall play different roles. The government should formulate and implement favorable policies and act as facilitator and coordinater among key stakeholders; it should also ensure that testing and quality control measures are in place and demonstration, training and research capacities are strengthend. The private sectors, on the other hand, should strengthen their roles in manufacturing, importing, distribution, marketing, and service provision. While for financial intermediaries, they need to establish appropriate mechanisms and enhance their capacity to facilitate easier access to credit by the private sectors and farmers. In conclusion, Public & Private Partnership is crucial for achieving sustainable agricultural mechanization that requests cohesive collaboration efforts.