

Challenges in Sustainable Agricultural Mechanization in Nepal



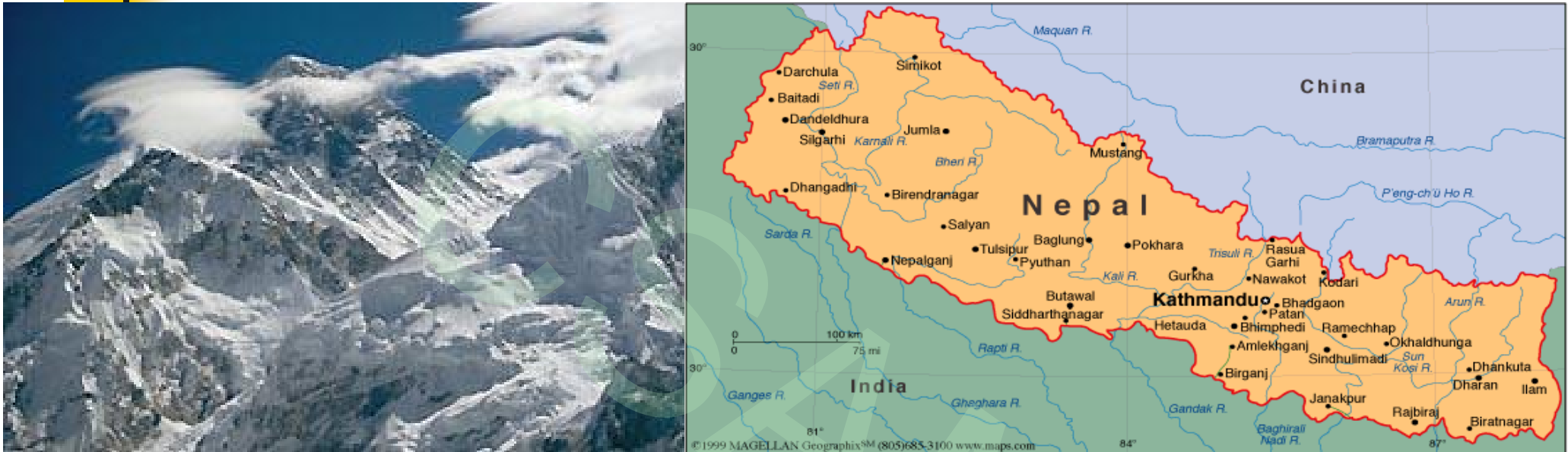
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Sustainable Agricultural Mechanization (SAM)

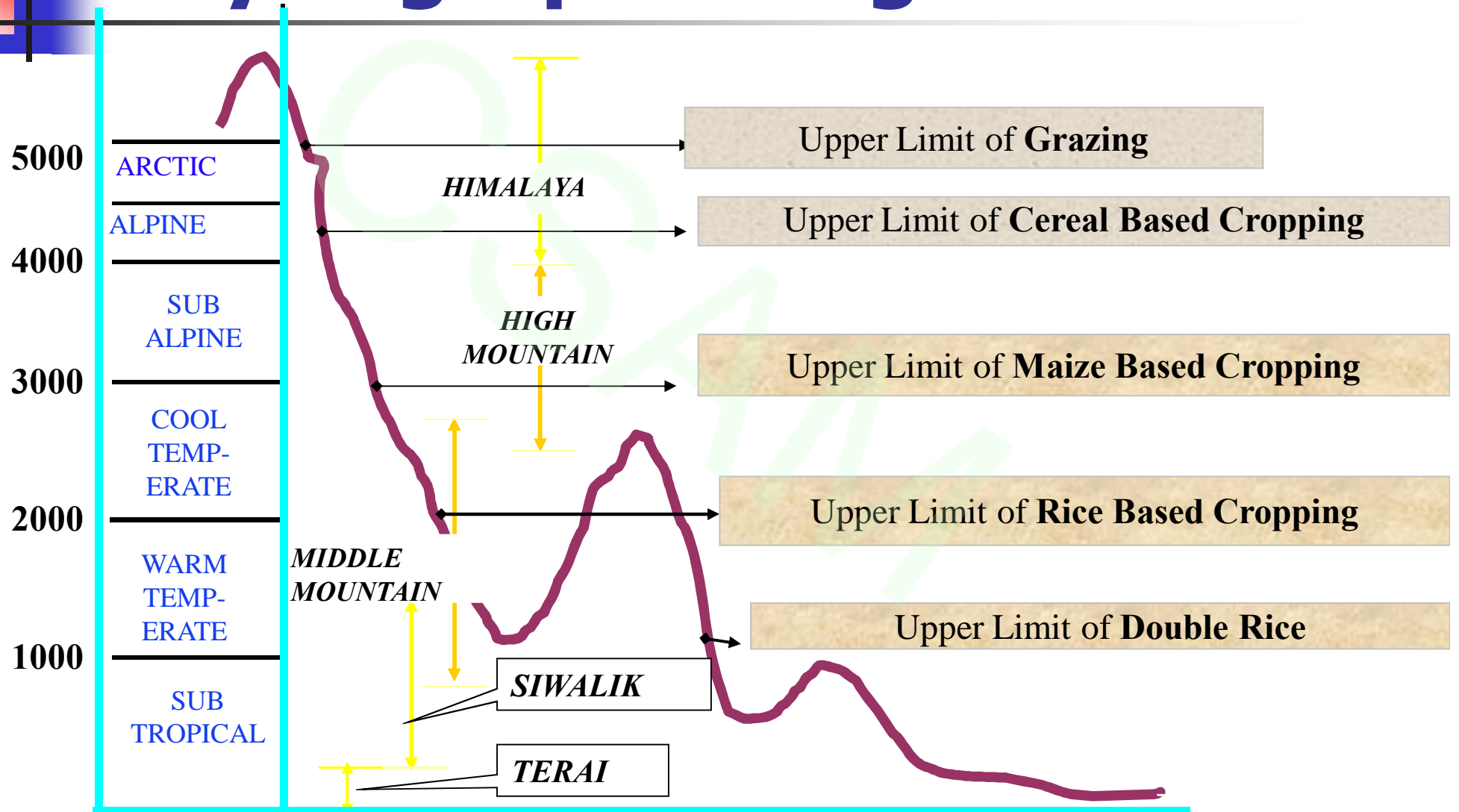
- Activities involved in the **value chain on utilization of tools, implements and machines** to perform Agricultural Operation leading to
 - Increase labor productivity
 - Enhance land productivity
 - Reduce the cost of production
 - Reduce drudgery & farm work load
- With
 - No or little damage to environment
 - Safe to operator, consumer and environment
 - Appropriate in time , space and socioeconomic condition

Nepal



- Land Lock country sandwiched between India and China
- Land area 147181 sq km & Population 2.7 M
- Three geographical region Terai, Hill & Mountain
- Elevation ranges from 70 m to 8848 m
- Climate temperate to sub tropical
- Rugged terrain and diversity (in all sence) the typical feature of Nepal

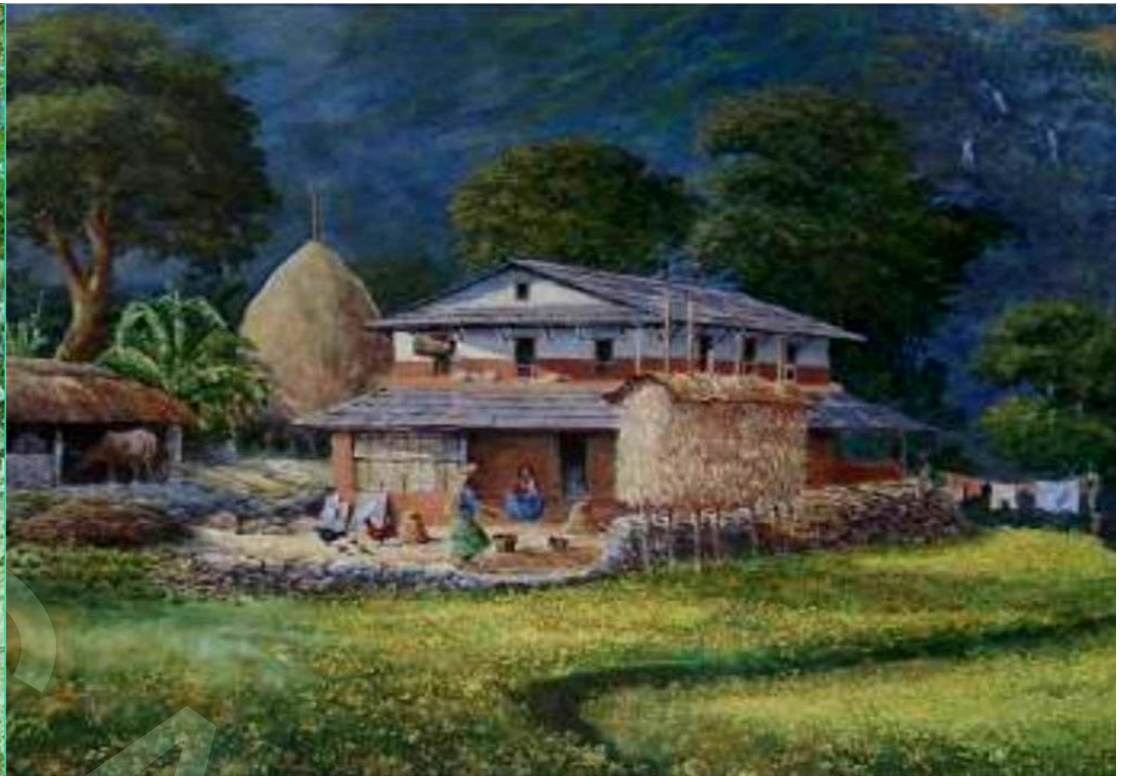
Physiographic Regions

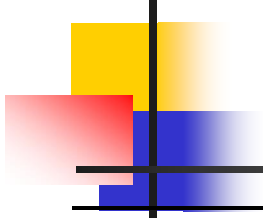




Agricultural Scenario

- Dominated by subsistence and small holder agriculture Average land size <0.8 ha.
- Agriculture contributed 36% AGDP and employment to about 60 percent of population
- Rice based and maize based cropping system are dominant in terai and hills respectively.
- Cattle, buffalo and goat and poultry are major livestock
- Vegetable cultivation, cash crops viz. tea, coffee, cardamom, ginger etc.

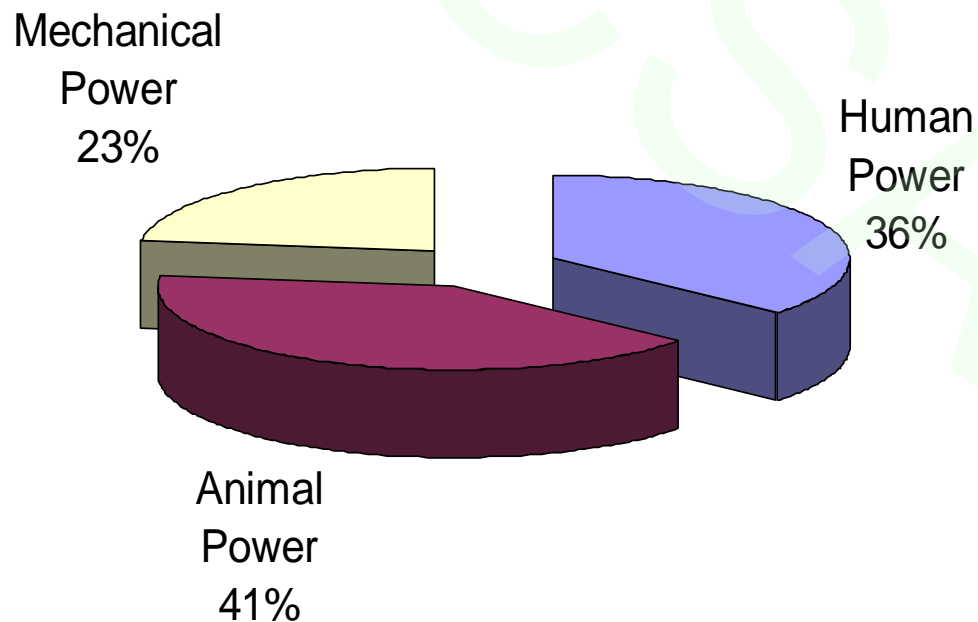




Area and Production of Cereal Crops, 2011/2012

Crops	Area (ha.)	Production (mt.)	Yield (kg/ha)
Maize	871387	2179414	2501
Wheat	765317	1846142	2412
Buckwheat	10339	10021	969

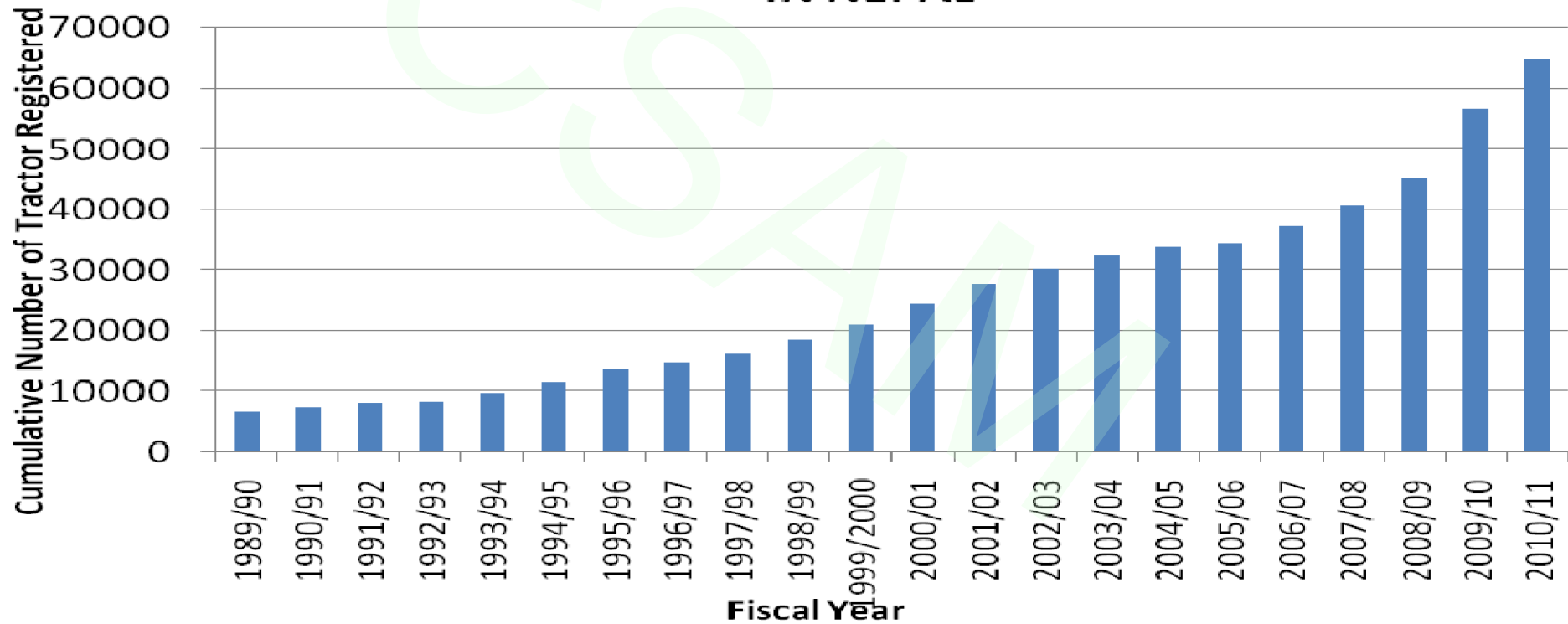
Farm Power Availability



- Animate power major source
- Stationary engine , two wheel power tiller and 4 wheel tractors are considered
- The mechanical power is concentrated in terai 92%

Tractor Population Trend

FIG. 3: CUMULATIVE NUMBER OF TRACTOR REGISTERED IN NEPAL



Status of Agricultural Mechanization

Tillage

- Majority of tillage by animal power
- Only 26% of farmers use iron plough
- In Nepal 8% use tractor & in terai 18%
- Most of the tractor use cultivator
- Custom hiring of tractors is common
- Power tiller is getting popular



New Initiatives in tillage



Status of Agri .Mechanization (cont.)

Planting / Seeding

- Rice is manually Transplanted
- Wheat is broadcasted
- Maize & vegetable seeds is dibbled
- More than 64% is performed by women
- Zero till drill & minimum till drill is promoted by NARC & DOA



Status of Agri. Mechanization (cont.)

Inter-culture Operation

- Rice, Potato, maize and vegetables need major inter culture operations
- Hand tools- Khurpi and sickles, Kuto etc. are used
- Bullock drawn local plough is also used for maize inter culture
- More than 60% of inter-culture operation by women



Status of Agri .Mechanization (cont.)

Irrigation

- 42% of area irrigated and 18% year round
- only 242000 ha is irrigated by GW in which 208746 is through STW and 33732 ha by deep tube wells
- 14% in terai use CF pump mainly for shallow tube well
- More than 100000 treadle pumps in terai
- Simple low cost drip system and sprinkler irrigation is being used for vegetable cultivation



Status of Agri .Mechanization (cont.)

Harvesting

- Manually performed by using Locally made sickles
- Serrated sickles locally made is also popular
- More than 30 Combine harvesters are in operation in Terai
- 4 wheel tractor operated reapers, power tiller & mini tiller operated reaper are also getting popular



Status of Agri. Mechanization (cont.)

Threshing

- Beating on stone/ drum
- Animal/ tractor treading
- It is estimated that more than 60% of threshing in terai is performed by thresher



Status of Agri. Mechanization (cont.)



Transportation

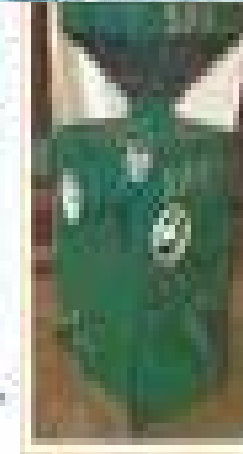
- Human , animal and mechanical power
- Tractor, animal, cycle, cart etc.
- One of the most drudgerous activity in hills
- 18% of farmers in terai use bullock cart



Status of Agri. Mechanization (cont.)

Processing

- Manual and mechanical
- Majority of cereal crop processing operation is mechanized
- Sheller, Huller, grinding mill, oil expeller, beaten rice mill is common
- Need of appropriate technology in processing of perishables / cash crops





Consequences of inappropriate equipment use

- In terai 9/11 tyne cultivator is used for land preparation which requires 6-7 pass for land preparation increasing the cost of tillage
- Now a days 4 wheel tractor operated rotoator is used in terai (due to fine tilth and single pass for tillage) which destroy the soil structure and compact the soil below top soil.
- Frequent accidents occurs specially in the agro processing mills with exposed flat belt
- Frequent accidents of tractor due to lack of safty feature (ROPS), lack of training to the operator etc.
- 4 wheel tractor is mainly used in other than agricultural works specially stone and gravel export in terai.



Tractor Use





Machinery supply chains

- Black smiths
- Small Agricultural Machinery Fabricators
- AM importers
- Dealers/ Sub dealers
- Service providers
 - Custom hiring
 - Repair and maintenance
- Farmers

Issues and Challenges on SAM in Nepal

Socioeconomic Issues

- Small and fragmented land holding
- Youth people are not interested in agriculture
- Poor Conditions of traditional Blacksmiths
- Gender Concerns
- Capital Constraints

■ Technological Issues

- Small holder agricultural mechanization
- Availability of spare parts:
- Poor condition of local agricultural machinery fabricators
- Lack of technical and safety standards



Issues.....

■ **Policy Issues**

- Lack of agricultural mechanization policy
- Lack of Recognition of Farm Machinery Custom Hiring Enterprise
- Fragmentation of land holding

■ **Institutional Issues**

- Weak Research and Extension System
- Lack of institution for testing and Quality control
- Capacity development of private sector and farmers

Opportunities and Intervension Needed Areas

- **Development Adaptation & Promotion of Efficient Hand Tools** through capacity development of local blacksmiths and commercialization of their skill
- **Development Adaptation & Promotion of Efficient Animal Drawn Implements**



Opportunities and Interventions needed ..(contd.)

- **Development Adaptation & Promotion of Efficient processing machinery of high value commodities**
- **Agri. Mechanization with Conservation agriculture**



Opportunities and Intervension needed ..(contd.)

- **Cooperative farming/ command area development**
- **Assured and Efficient Irrigation for commercialization**
- **Promotion of renewable energy in agriculture**





Opportunities & Interventions Needed.. (contd.)

Public & Private Partnership for promotion of Sustainable Agricultural Mechanization

- **Government's role:** favorable policy & facilitator, coordinating, testing quality control, demonstration, training and research
- **Private sector:** manufacturing, import, distribution, marketing, service providing
- **Financial intermediaries:** easy access to credit
- **PPP joint collaborative effort for promotion of SAM**



Thank You!