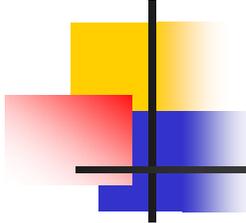


Agricultural Mechanization in Nepal



Shreemat Shrestha

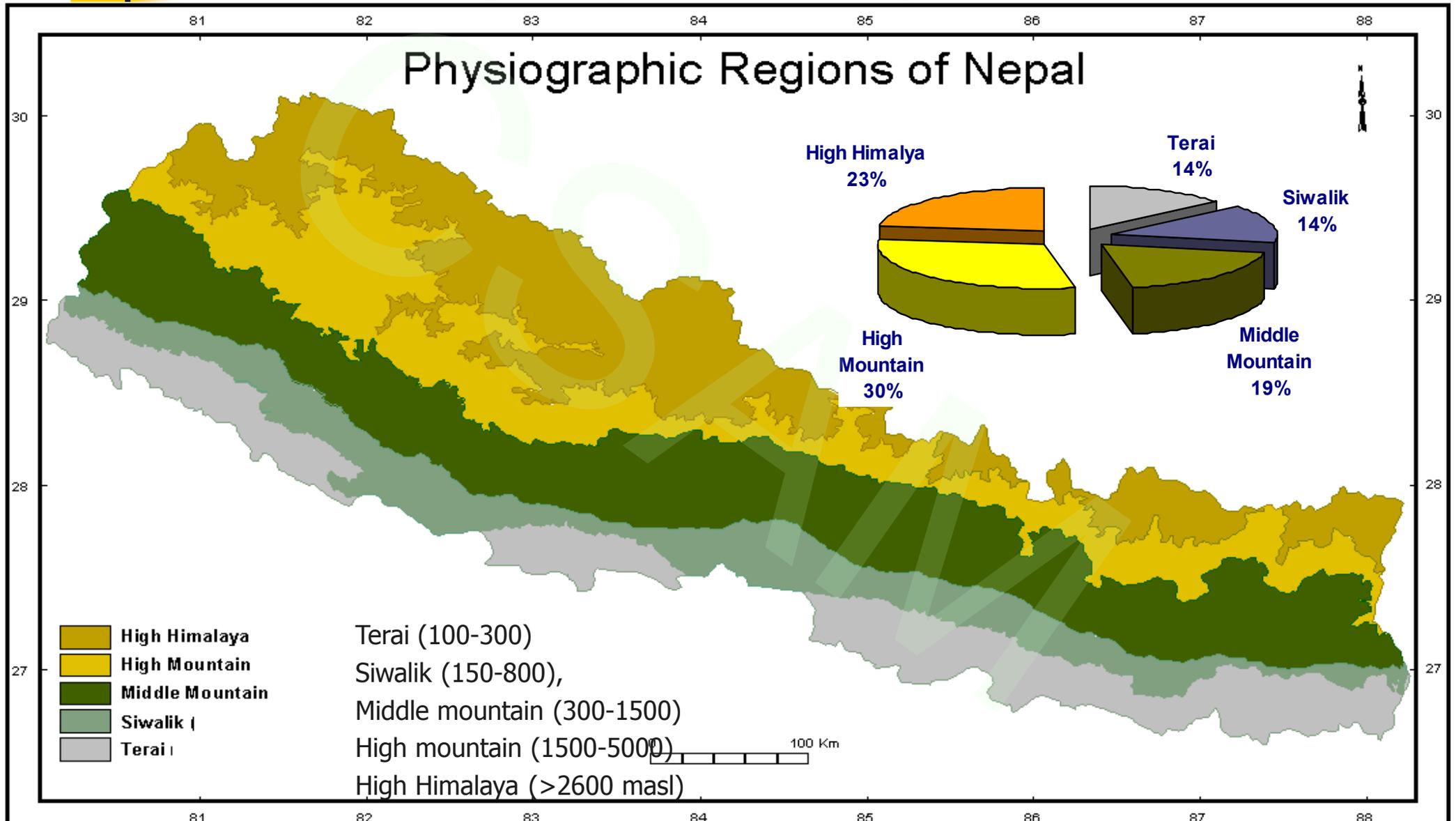
*Agricultural Engineering Division
Nepal Agricultural Research Council*



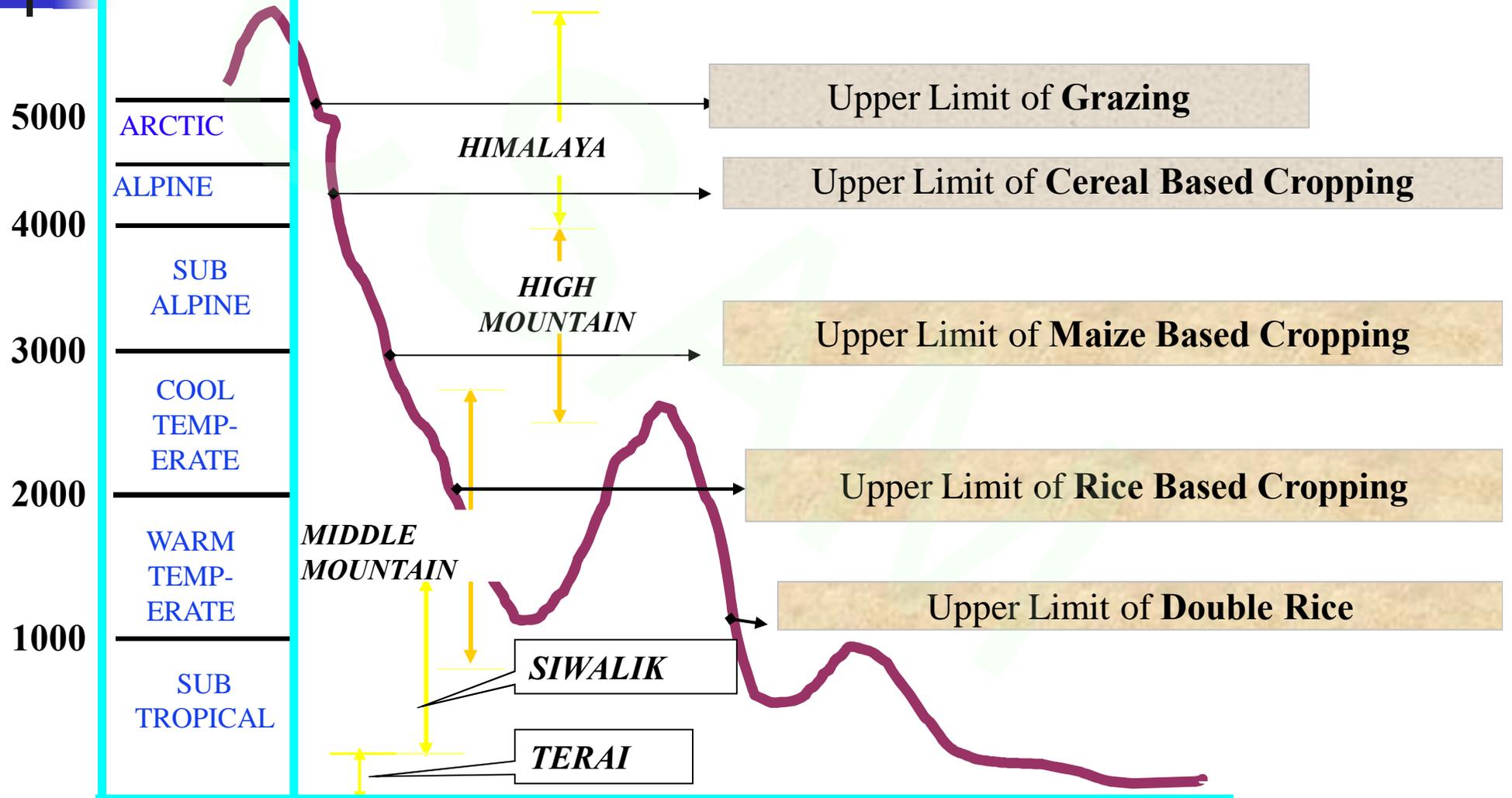
Agricultural Mechanization

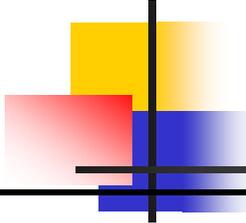
- Agricultural Mechanization often misunderstood as **Tractorization**
- **Utilization of tools, implements and machines** for agricultural land development, crop production, harvesting, preparation for storage, storage, and on-farm processing.
- With objective
 - To increase labor productivity
 - To increase land productivity
 - To reduce the cost of production
 - To reduce drudgery & farm work load

Physiographic regions



Physiographic Regions

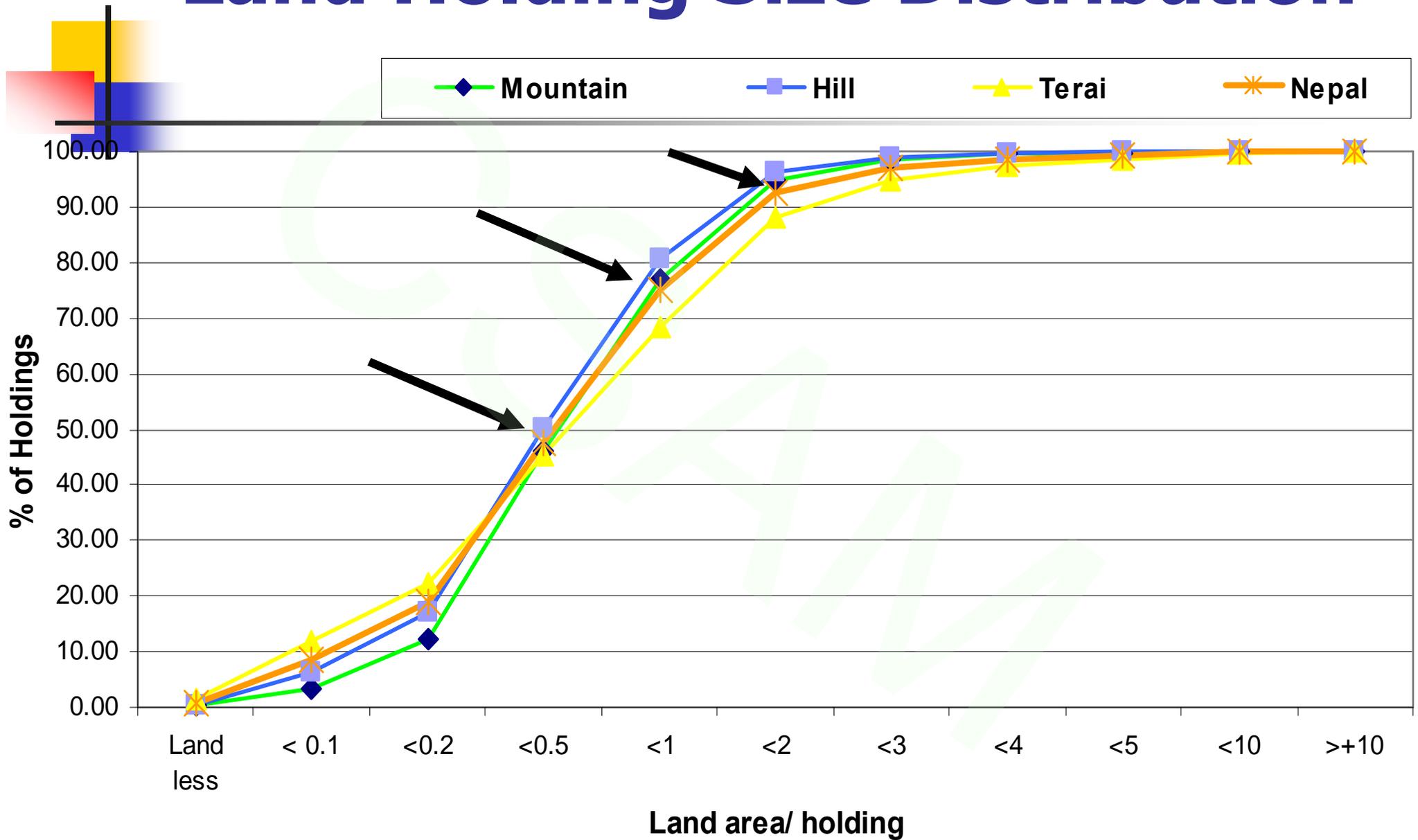


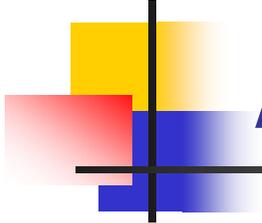


Land Holding

	No of Holding	Area of Holding	Av. holding Size, ha	Av. no of parcel/ holding	Average size of parcel, ha
Mountain	298,223	218,707	0.73	4.03	0.18
Hill	1,586,406	1,038,615	0.65	3.18	0.21
Terai	1,479,510	1,396,716	0.94	3.20	0.29
Nepal	3,364,139	2,654,037	0.79	3.27	0.24

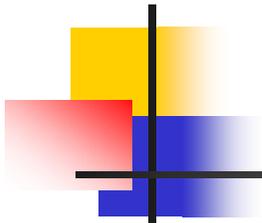
Land Holding Size Distribution





Agricultural Scenario

- Dominated by subsistence and small holder agriculture.
- Agriculture contributed 36% AGDP
- Rice based and maize based cropping system are dominant in terai and hills respectively.
- Cattle, buffalo and goat and poultry are major livestock
- Diversity in agriculture due to variation of agro-ecological diversity
- Vegetable cultivation, cash crops viz. tea, coffee, cardamom, ginger etc.



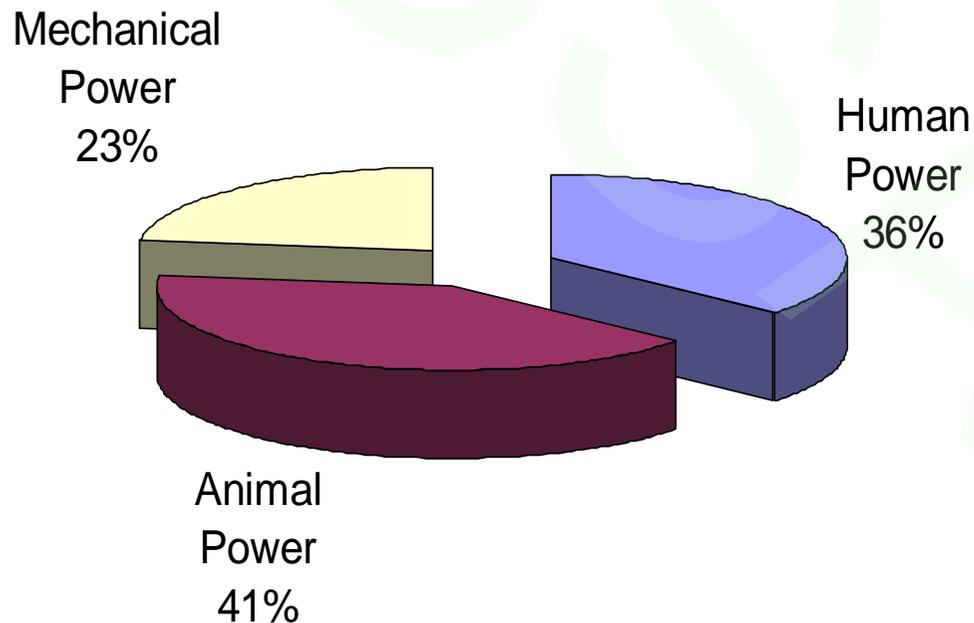
Area and Production of Cereal Crops, 2010/2011

Crops	Area (ha.)	Production (mt.)	Yield (kg/ha)
Paddy	1496476	4460278	2981
Maize	906253	2067722	2281
Millet	269820	302691	1122
Wheat	767499	1745811	2275
Barley	28461	30240	1063
Buckwheat	10304	8841	858
Total	3478813	8615383	2477

Agricultural Work in Gender Perspective

Operation	Crop Intensive Pocket area			Vegetable Pocket area		
	Female	Male	Children	Female	Male	Children
Tillage	1%	97%	2%	0%	94%	6%
Planting	64%	35%	1%	64%	32%	4%
Weeding	58%	41%	1%	64%	33%	3%
Harvesting	57%	42%	1%	61%	36%	2%
Threshing	40%	58%	2%	32%	64%	3%
Drying	60%	39%	1%	58%	38%	3%
Processing	54%	45%	2%	44%	53%	3%
Transportation	42%	58%	1%	32%	65%	3%
Marketing	25%	73%	2%	17%	80%	3%

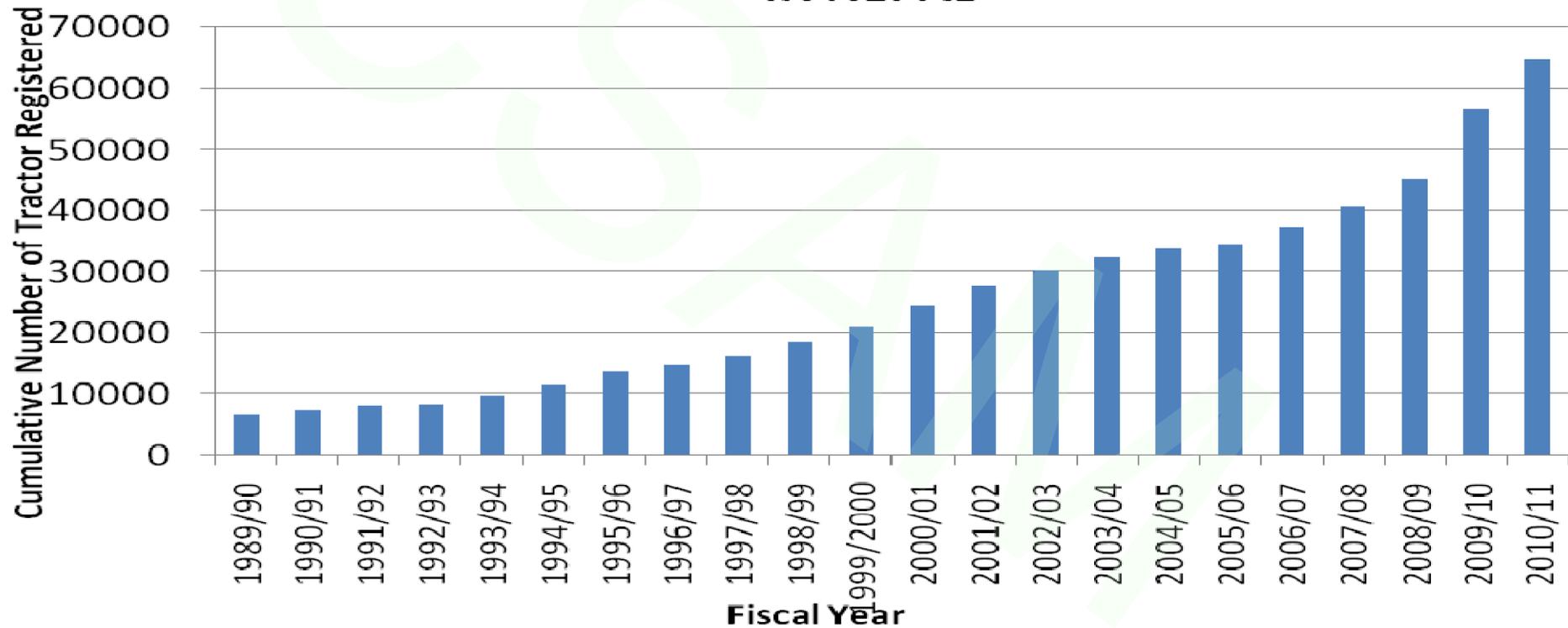
Farm Power Availability



- Animate power major source
- Stationary engine , two wheel power tiller and 4 wheel power tiller 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



Transformation 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
- 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

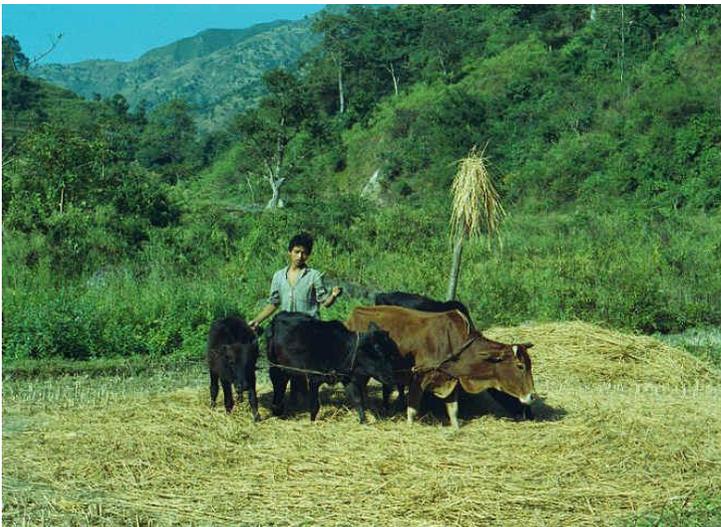
- Manually performed by using Locally made sickles
- Serrated sickles locally made is also popular
- 9 Combine harvesters are in operation in Kapilbastu, Nawalparashi, Rupandehi
- 4 wheel tractor operated reapers are also getting popular



Status of Agri. Mechanization (cont.)

Threshing

- Beating on stone/ drum
- Animal/ tractor treading
- Threshers 15 percent in terai use thresher (2001) at present it is estimated that more than 60%



Status of Agri. Mechanization (cont.)



Transportation

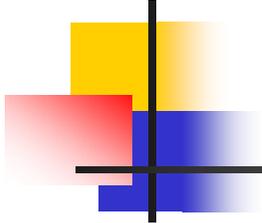
- Human , animal and mechanical power
- Tractor, animal, cycle, cart etc.
- One of the most drudgerous activity in hills
- 18% of farmers in terai use bullock cart

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

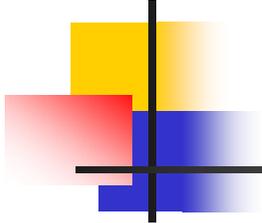
- In terai 9/11 tyne cultivator is used for land preparation which requires 6-7 pass for land preparation increasing the cost of tillage
- Now a days 4 wheel tractor operated rotoator is used in terai (due to fine tilth and single pass for tillage) which destroy the soil structure and compact the soil 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



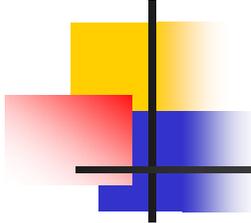
Tractor Use





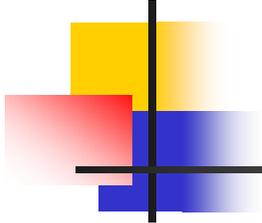
Machinery supply chains

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



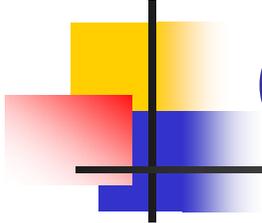
Policies related to AM

- Majority of policy neutral to AM
- Agricultural policy -Commercialization
- Energy Policy
- **(Civil Code) 2020- Causes Land Fragmentation**
- **Land Reform Policy- yet to be implemented**
- **Low Duty on Imported agricultural Machinery (not all)/ high on raw materials**
- **No policy to establish agril machinery industry**
- **No focus on research and developemnt of agril machinery (weak institutions related to AM)**
- **Lack of policy on testing of AM**



Proposed Agricultural Mechanization Policy 2070

- Through appropriate agricultural mechanization, the **Nepalese agriculture will be made more competitive, sustainable and commercialized** by enhancing productivity and profitability
- Through the collaborative effort of **government, private and cooperative sector, agricultural mechanization service and enterprise will be enhanced and accessibility of appropriate agricultural machine will be enhanced**
- **Women and environment friendly agricultural mechanization will be enhanced.**
- **Institutional development for agricultural mechanization and quality of agricultural machinery used in Nepal will be regulated.**



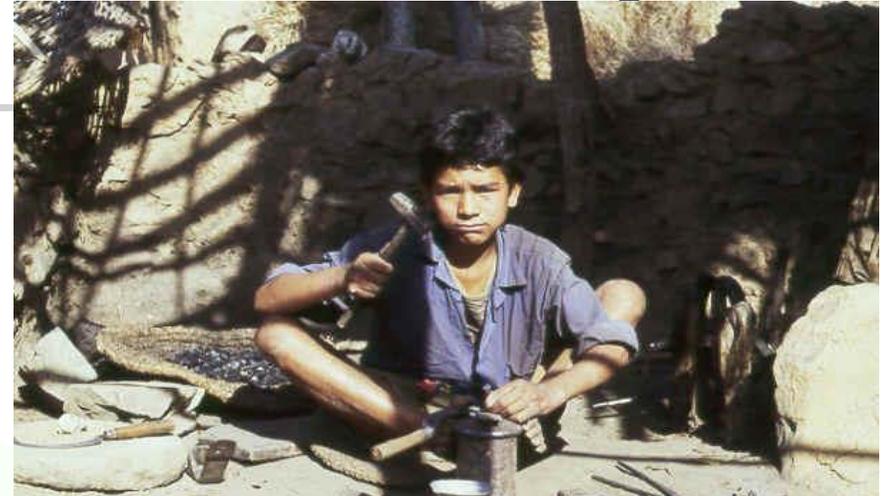
Challenges of AM in Nepal

- Small and fragmented land holding
- Subsistence nature of agriculture
- Poor infrastructure is major constraints for mechanization and commercialization of agriculture in Nepal.
- Need of easy access to credit & awareness of financial intermediaries
- Need of easy access to appropriate AM technology
- Weak Research and development system on AM
- Lack of clear-cut policy and strategy on AM

Opportunities of AM in Nepal

Development Adaptation & Promotion of Efficient Hand Tools

- Upgrade the skill level & facility of Blacksmiths & support for BDS of hand tools
- Continuous R & D on efficient hand tools
- Corn sheller, efficient hand hoes, fruit harvester, weeder, metal bins, stoves, improved plough etc.



Opportunities of AM in Nepal (contd.)

Development Adaptation & Promotion of Efficient Animal Drawn Implements

- Continuous R & D on efficient animal drawn implements & promotion
- Single yoke harvesting
- Shifting to buffalo for draft power in terai
- Train local blacksmiths in fabrication of efficient animal drawn implements



Opportunities of AM in Nepal (contd.)

Development Adaptation & Promotion of Efficient processing machinery

- Continuous R & D on appropriate processing value addition equipments
- Locally fabricate and bring in to supply chain
- Create favorable condition for small fabricators/ manufacturers



Opportunities of SAM in Nepal (contd.)

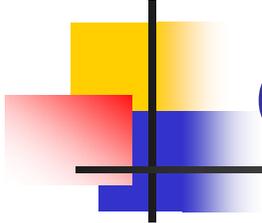
Agri. Mechanization with Conservation tillage

- Land preparation and sowing cost is 1/3 that of traditional practice. (Rs. 988 vs Rs. 2891/ha)
- Saves up to 100 lit of diesel/ha in land preparation.
- Saves at least 20% of irrigation water
- Better nutrient use efficiency
- Better yield (10-20%) than the traditional practice



RCT in wheat





Opportunities of AM in Nepal (contd.)

Cooperative farming/ command area development

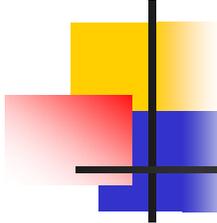
- Address the problem of small holders
- Improve land/ labor productivity
- Create favorable condition for agril mechanization & commercialization
- Easy for development of infrastructure/ facility at farm level

Opportunities of AM in Nepal (contd.)

Efficient Irrigation for commercialization

- Promotion of STW in terai
- Electricity facility at farm level
- Promotion of drip and sprinkler
- Adaptation of laser leveling for better water management & land productivity

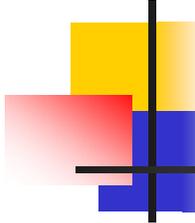




Opportunities of AM in Nepal (contd.)

Mechanization through custom hiring

- BDS of custom hiring as enterprise
- Support custom hiring of AM (training, tax reduction on spare parts, operation & maintenance)
- Exposure to improved agricultural machinery



Opportunities of AM in Nepal (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 AAM**

Thank You

