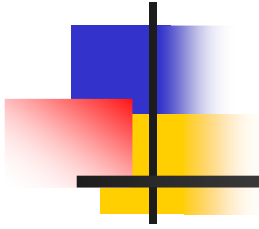


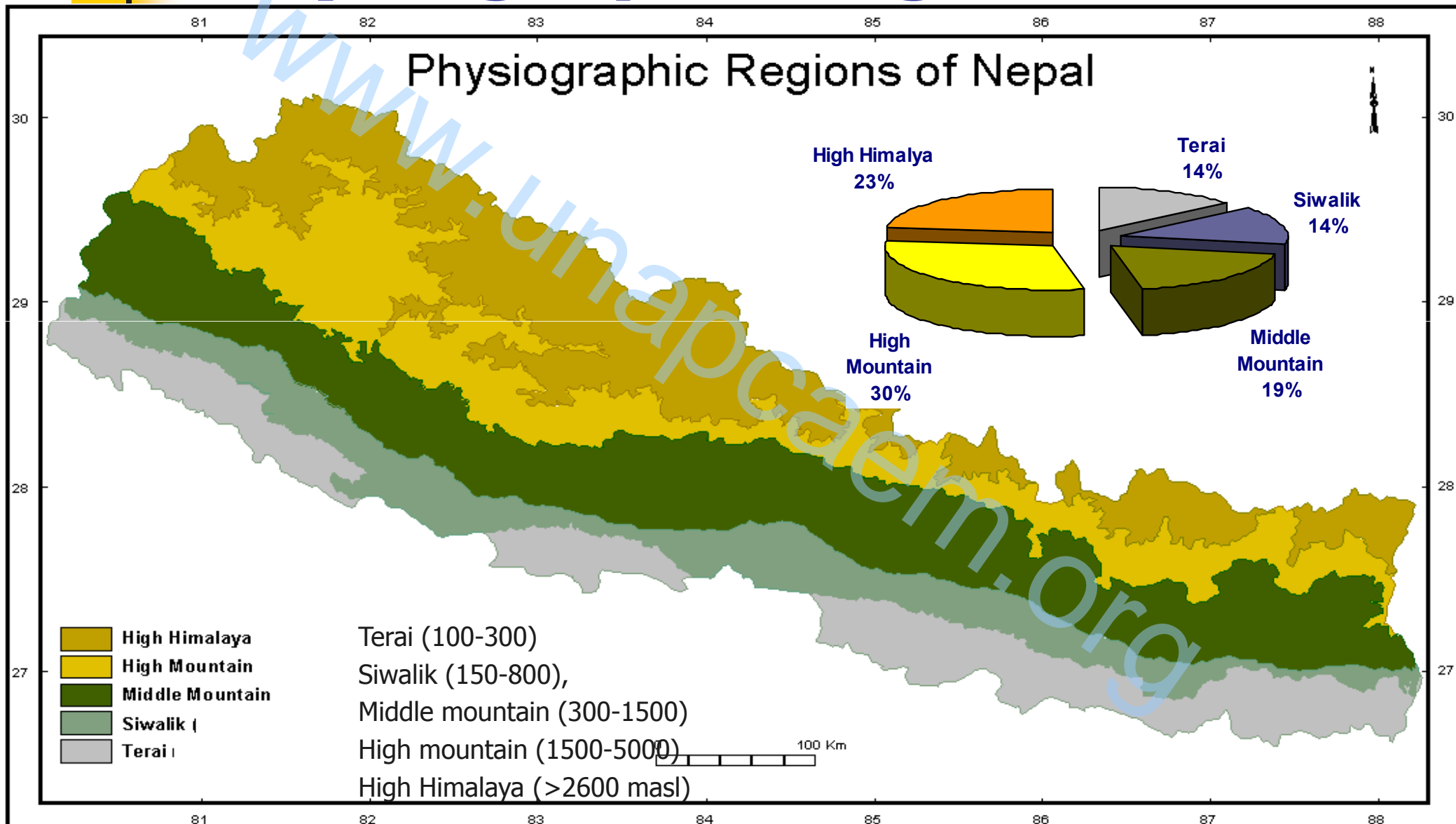
Agricultural Mechanization in Nepal



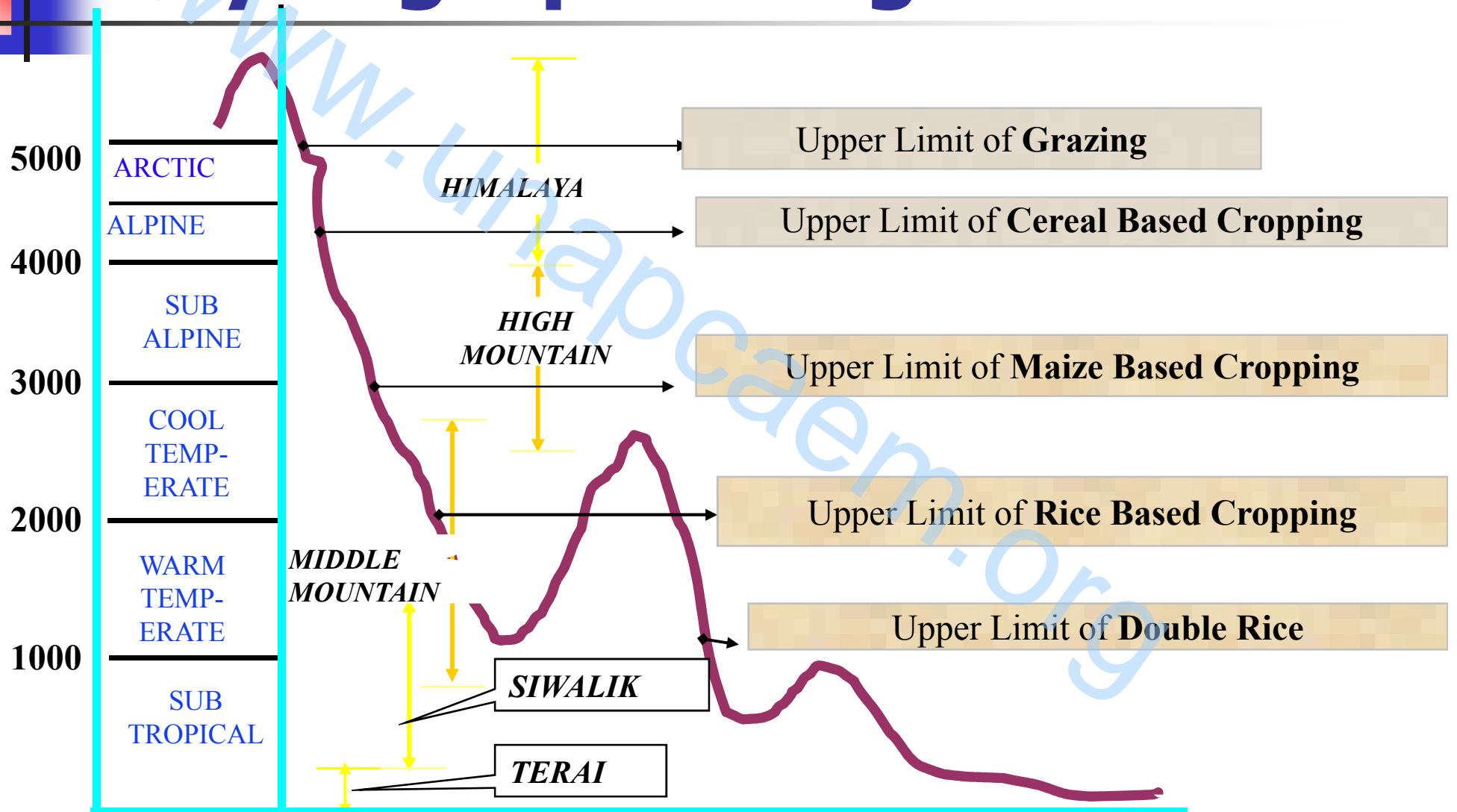
Shreemat Shrestha

***Agricultural Engineering Division
Nepal Agricultural Research Council***

Physiographic regions



Physiographic Regions

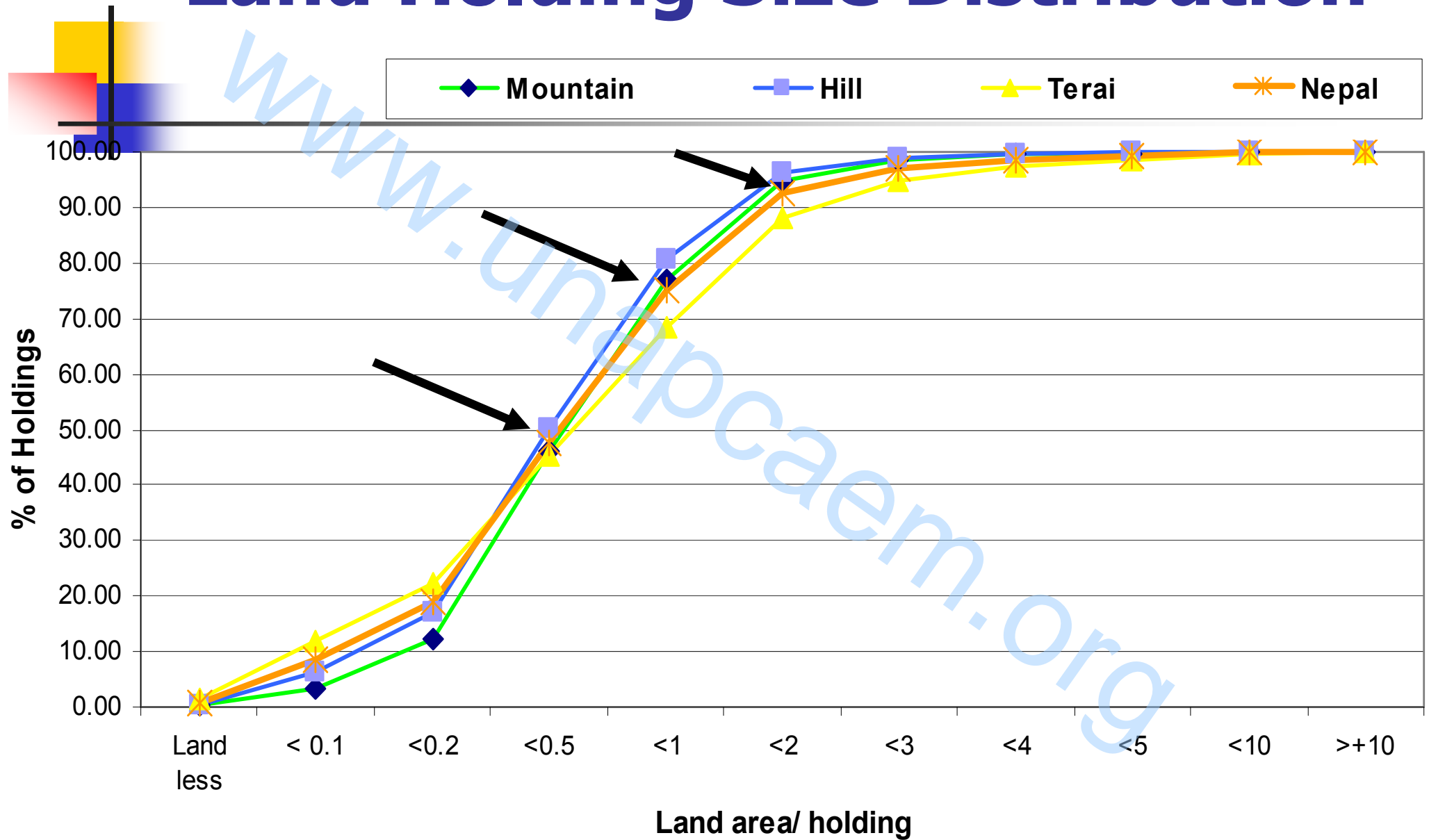




Land Holding

	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

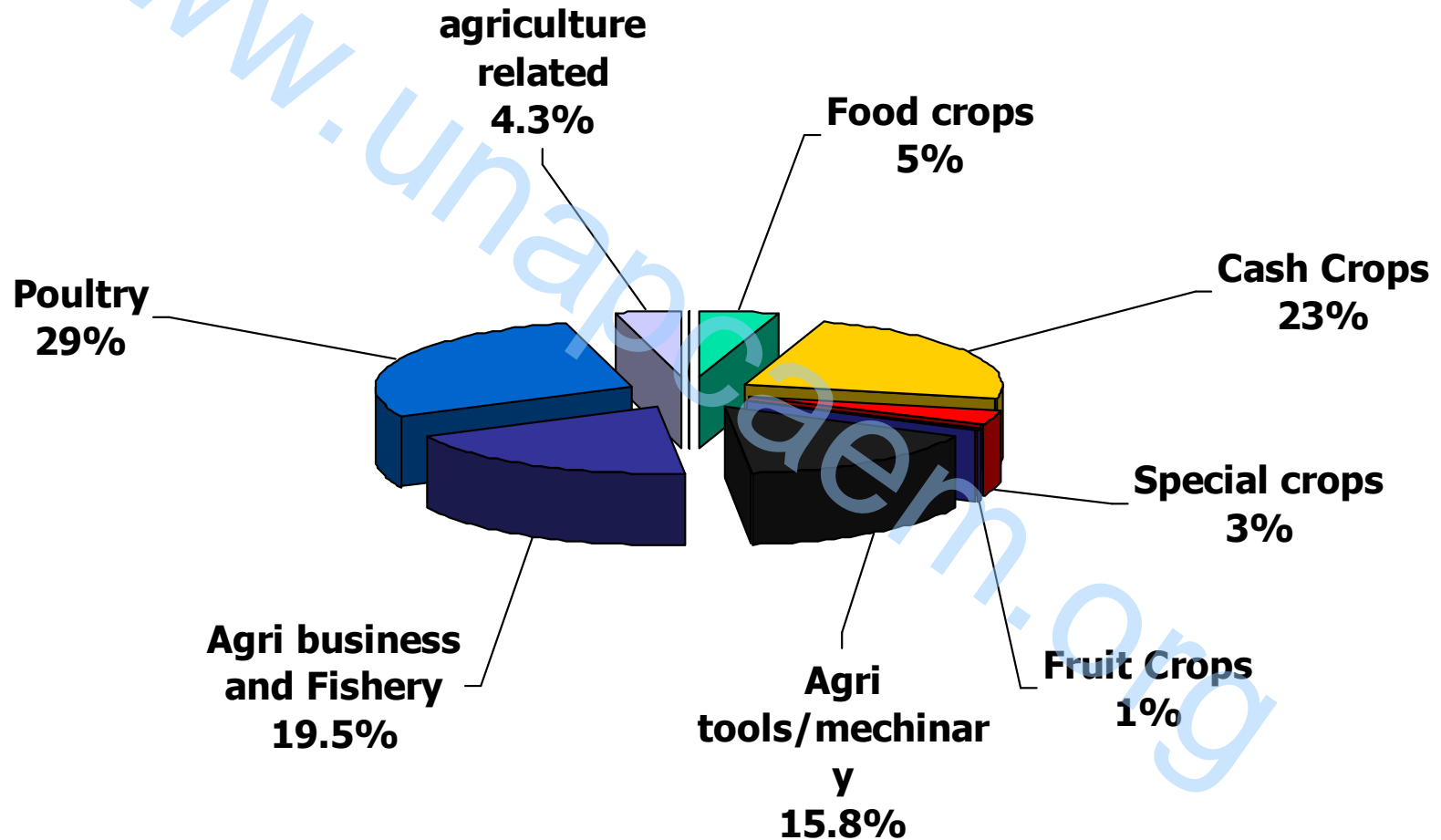
- Dominated by subsistence and small holder agriculture.
- Agriculture contributed 35% AGDP
- Rice based and maize based cropping system are dominant in terai and hills respectively.
- Cattle, buffalo and goat and poultry are major livestock
- Diversity in agriculture due to variation of agro-ecological diversity
- Vegetable cultivation, cash crops viz. tea, coffee, cardamom, ginger etc.



Other Related Scenario

- Poor infrastructure (road, electricity, market, communication etc.)
- Agriculture provides employment to 73.9% of population
- Irrigated area 43% of cultivated and only 18% is year round irrigated.
- Lack of agricultural labor in Peak agricultural season
- Migration of rural youth to abroad and nearby cities in search of jobs.
- Poor investment capacity of farmers

Share of loan by ADBN 2009/10

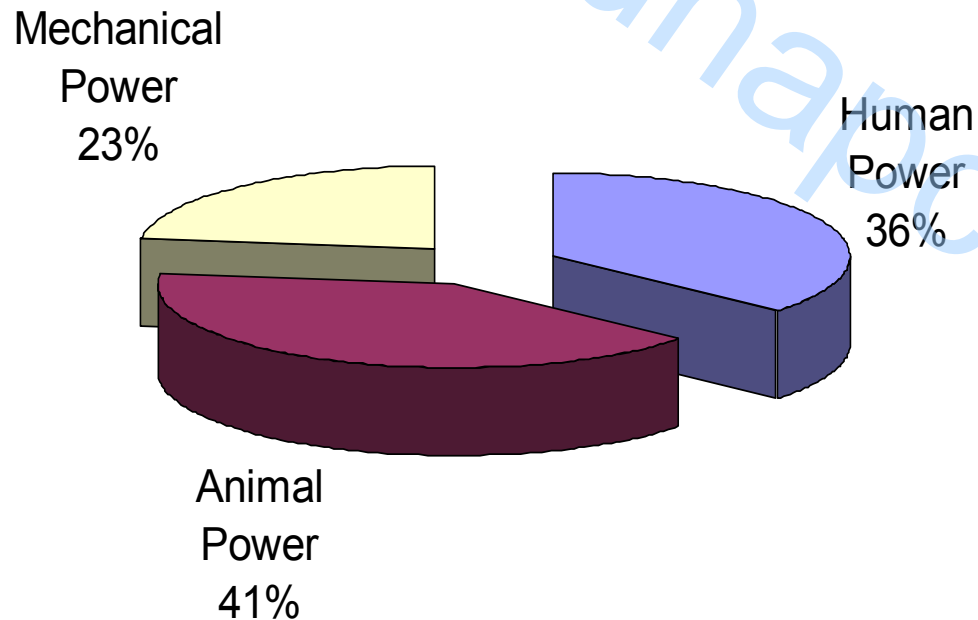




Historical Perspective

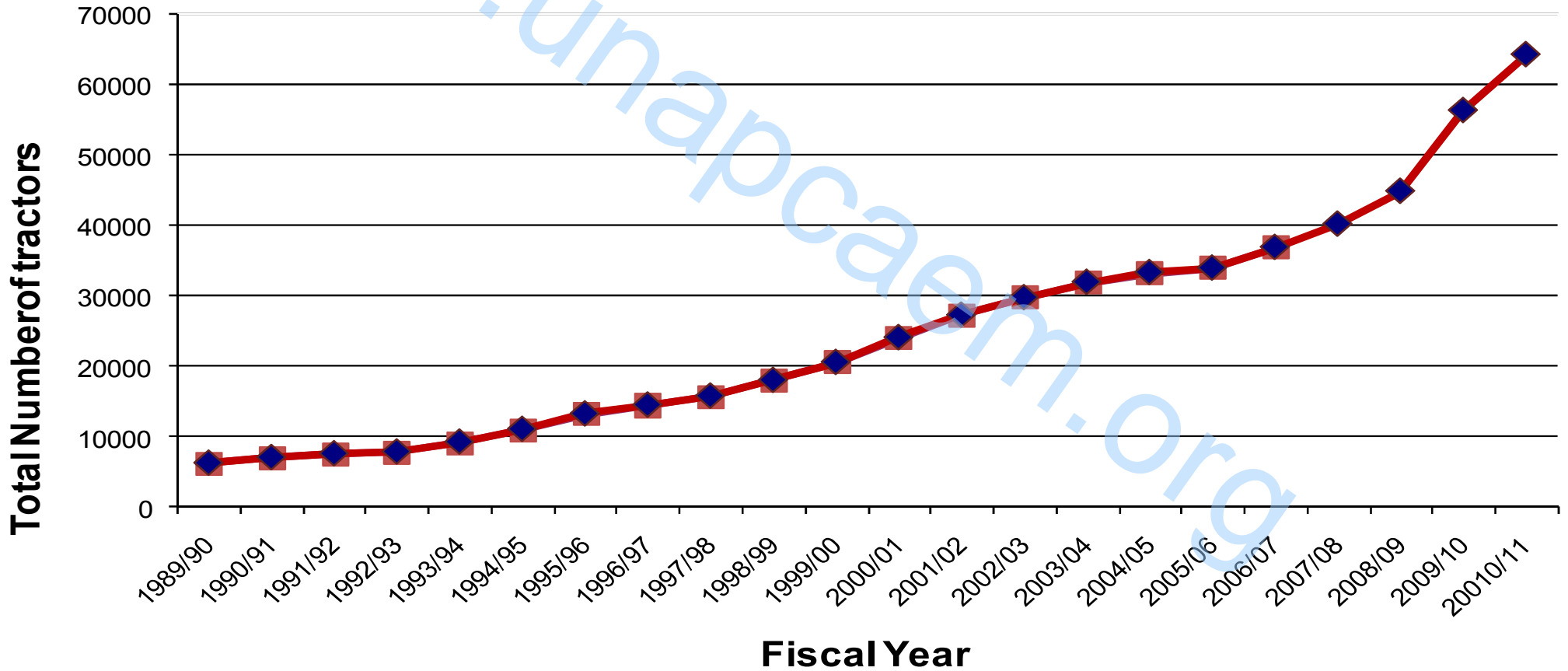
- 1924- First tractor single cylinder(K B Thapa Biratnagar)
- Mid 60s - Tractor (64) and pumpsets(30) introduced
- 1964- Establishment of ATF (USSR)
- 1970s- Tractor import by National Trading Limited
Agriculture credit projects finance availability
- 1980-85- ADBN discouraged financing tractor/ machine
- 1991- Establishment of NARC -AED
- 1995- Removal of subsidy in pump sets
- 1996- Privatization of ATF
- 2004- Establishment of Agricultural Engineering
Directorate

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



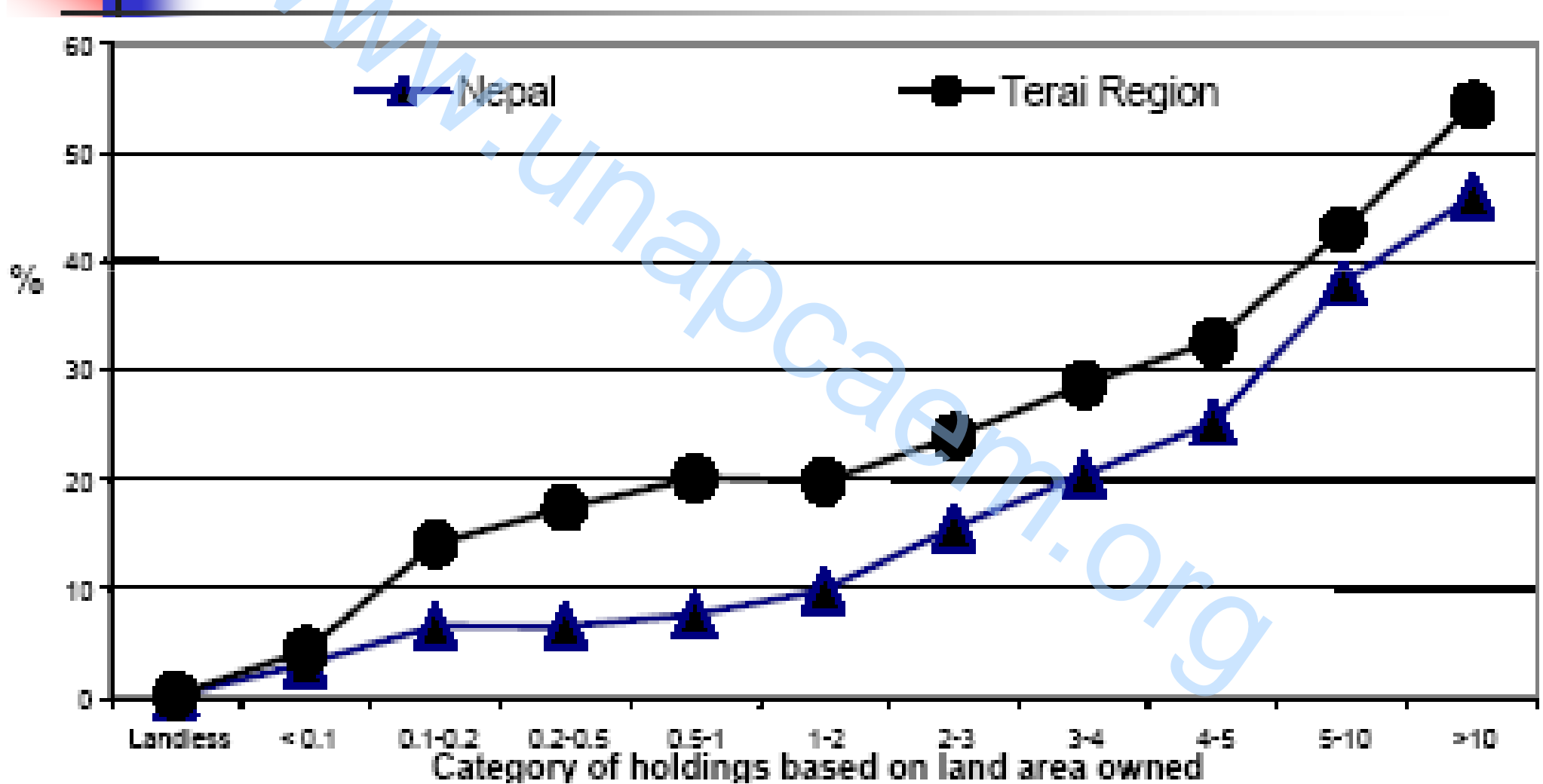
Status of Agricultural Mechanization

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



Distribution of holdings using tractor



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

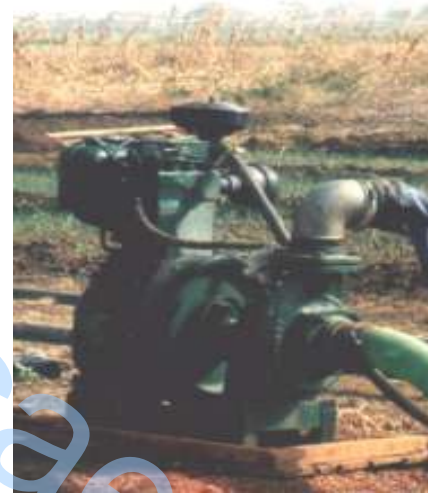
- Rice, Potato, maize and vegetables need major inter culture operations
- Khurpi and sickles, Kuto etc. are used
- Bullock drawn local plough is also used for maize inter culture
- More than 60% of inter-culture operation by women



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 80000 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



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



Tools & Implements Used in Hills

Agricultural Operations	Manual Tools/ device	Animal drawn implements	Power drawn implements
Tillage	Spade	Wooden plough, iron MB plough plank	Cultivator, disc harrow Rototiller
Planting	Hoe	Traditional wooden plough	Minimum / zero till seed drill
Intercultural	Hoe	Traditional wooden plough	
Plant protections	Compression type Sprayer		
Irrigation	Low cost drip, micro sprinkler and sprinkler		Petrol/diesel engine & electricity operated Pump set
Harvesting	Sickle		
Threshing & Winnowing	Drum/ stone, maize sheller, pedal thresher, flail	Treading on threshing floor	
Milling & grain processing	Dhiki, Janto, Okhal	Kol	Huller, sheller, oil expeller watermill
Transportation	Doko	Mule, chyangra, Nak Backpack	Tractor/ power tiller trailer

Tools & Implements Used in Terai

Agricultural Operations	Manual Tools	Animal drawn implements	Power drawn implements
Tillage	Spade	Wooden plough, MB plough, disc harrow, culti, wooden plank	Tractor cultivator, disc harrow, leveller, power tiller cultivator
Planting	Hoe	Wooden plough	Zero till and minimum till seed drill
Intercultural	Hoe	Wooden plough	
Plant protections	Compression type Sprayer		
Irrigation	Hand Pump, Rower Pump, Treadle pump, drip system		Diesel engine & electricity operated Pump set
Harvesting	Sickle		Reaper and combine harvester
Threshing & Winnowing	Drum/ stone, maize sheller, winnower	Treading on threshing floor	Wheat and multi crop thresher
Milling/ grain processing	Dhiki, janto		Huller, sheller mills, chakki mill, modern rice mills and flour mills
Transport	Cycle, basket	Bullock cart	Tractor/ PT trailer



Stake Holders in Ag. Mech.

- Government Ministries (agriculture / finance/ land reform / labor/ trade & commerce)
- Department of Agriculture & Agricultural Engineering Directorate,
- Nepal Agriculture Research Council and Agricultural Engineering Division (AED & Agriculture Implement Research Center (AIRC), Ranighat
- Institute of Engineering Purbanchal Campus
- Agricultural Development Bank and other financial intermediaries.
- Private Sector (importers/ distributors/ fabricators of agri machineries)
- NGOS/ Projects
- Blacksmiths

Contribution of Agricultural Engineering in AM



- Hand Hoes (Local Blacksmiths and artisans)
- Iron Plough (ATF, Dealers)
- Tractors (ADBN, Dealers)
- Power Tillers (NARC, Dealers)
- Conservation Tillage(NARC, MOAC)
- Sprayers (Importers, Dealers & DOA)
- Shallow tube wells (ADBN, Dealers, DOI)
- Sprinkler irrigation (ADBN, Suppliers, DOI)
- Drip Irrigation & Treadle Pump (IDE, SIMI, DOI, NGOs)
- Reapers (NARC, Dealers)
- Combine Harvester (Entrepreneur/ Service Provider)
- Threshers (DOA, ATF, Suppliers, Fabricators)
- Processing Machinery (Importers, Dealers, ADBN, NARC, Fabricators)



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



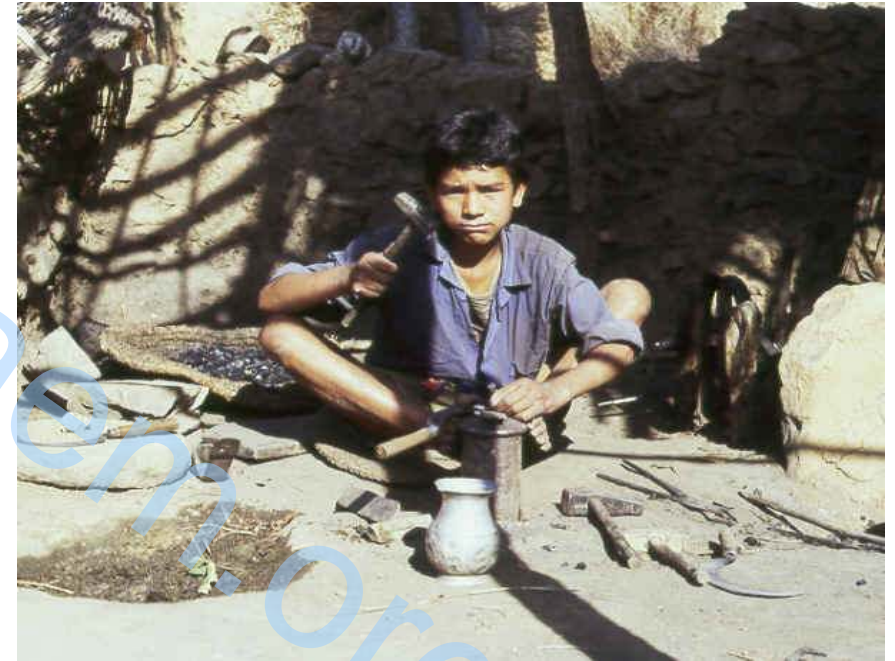
Issues & Constraints

- Needs specific Policy & program for agro ecological, small holders and medium holders
- Since, women farmer has got dominant role in crop production activities their drudgery problem is need to be addressed.
- Major technological constraints with farmer's perspective spare parts, training on O & M, lack of skilled mechanic and workshop
- Indigenous skill and technology of blacksmiths is at the verge of extinction from the community, due to lack of commercialization and modernization.
- Custom hiring of farm machinery is taking place in an informal way

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 AM 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





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 Appropriate Agricultural Mechanization

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



Opportunities of AM in Nepal (contd.)

- Agricultural mechanization for **national food security**
- Agricultural mechanization for **commercialization in agriculture**
- Agricultural mechanization for **reducing cost of cultivation & income generation**
- Agriculture mechanization for **reducing the drudgery**
- Agricultural mechanization for **attraction of youth farmers** in Nepalese agriculture for **New Nepal**

Thank You

