Prospect of Nepalese Agriculture: Where are We Lacking?

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- The views and opinions expressed here are my own and do not represents that of my organization I work for.
- All the web-based pictures and information used in this presentation.

Outline of this Presentation

Based on what I have seen, learnt and assembled from here and there

- Realities of Nepalese agriculture, existing situation, limitations and potentials
- Where are the gaps?
- How these gaps can be narrowed?

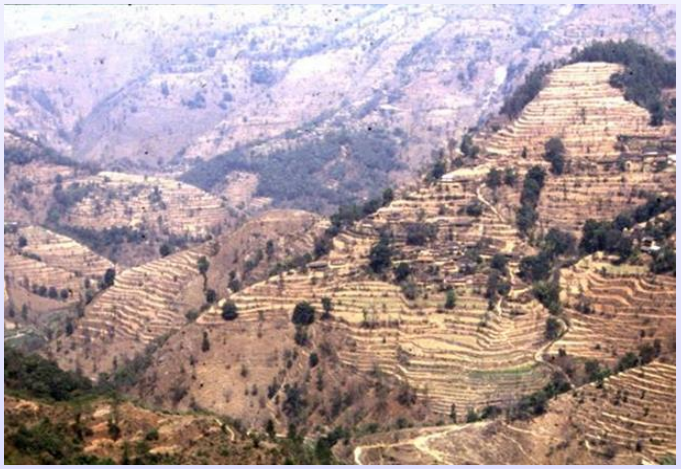
The Agricultural Sector in Nepal

Principal source of food, income and employment (means of subsistence)

- 57% employment (>85% in the rural areas)
- About 24% for GDP
- 13% trade contribution
- Main source of food security & livelihood
- Canada: 2% farming population; 7% in GDP

Features of Nepalese Agriculture

- Weather dependent/rainfed farming/unpredictable yields
- Small, fragmented & sloppy lands
- Prone to land degradation (soil erosion, flooding, sedimentation)
- Predominately (>80%) subsistence
- Labour intensive/drudgery
- Limited access to markets, roads, inputs/credits/technology



Low productivity ⇒ low farm income ⇒ food deficits

Achievements from the Past Efforts

- Increased commercial production of fresh vegetables & some fruits
- Substantial intensification in poultry, dairy and fisheries
- Introduction and adoption of improved crops & varieties: e.g. wheat, maize, potatoes, rice & vegetables crops
- Research facilities and trained manpower!

Vegetables area increased by 41% from 2001 to 2011

Key Issues: Land Degradation

Loss of productive lands

- Soil erosion- landslides, floods, sedimentation
- Unsafe construction practices (DDA!)
- Land encroachment
- Unplanned urbanization
- (One of the top 10 fastest urbanized countries)

- Urban population increased from 13% in 2000 to 21% in 2021.
- Agricultural land decreased by 1.3% in the same period.

Key Issues: Land Degradation…Urbanization

Change in urban land use (1990-2020)

Cities	% increase in built-in area (1990-2020)	% decrease in agril. land (2010-2020)
Kathmandu	**368**	**43**
Pokhara	**562**	**33**
Dhangadhi	**497**	**27**
Heatuda	**2203**	**43**

(Devkota et al., 2023; Environmental and Sustainability Indicators)

Key Issues: Decline in Soil Fertility

Change in Livestock No. (AC: 2001-2011)

Cattle: -11%

Buffalo: -9%

Yak: - 49%

Goat: +59%

Pigs: +30%

(Subedi et al., 2015)

Key Issues……shrinking cropped Area

Crop	% reduction in Cropped Area (2001 to 2011)*
Rice	+6
Maize	-12
Wheat	+6
Millet	-19
Barley	-35
Buckwheat	-40
Pulses	+21
Oil seed rape (tori)	+13

Average farm size decreased from 0.8 ha (2001) to 0.6 ha (2021);

No of parcels (Kitta) increased from 11 m (2001) to 12 m (2011)

35% of cropped land being abandoned by 2020, in hills & mountains

*National Agric Census: 2011 (2068)

Key Issues: Increased Food Imports & Trade Deficits

Major food imports in F/Y 2021 (Source: The Kathmandu Post, 29 Jul 2021)

Commodities	Price (B, NRs)
Cereals (Rice, maize, wheat, millet)	79 *
Edible fats and oil (palm, soy, sunflower)	83
Vegetables	39
Fruits	18
Animal feed/fodder	22
Tea, coffee, spices	12
Live animal, fish and meat	9

Total agricultural commodities imported > 325 B (>8 folds increase in last 10 years). *Rice commodities-Rs 48B in first 11 months of 2021!

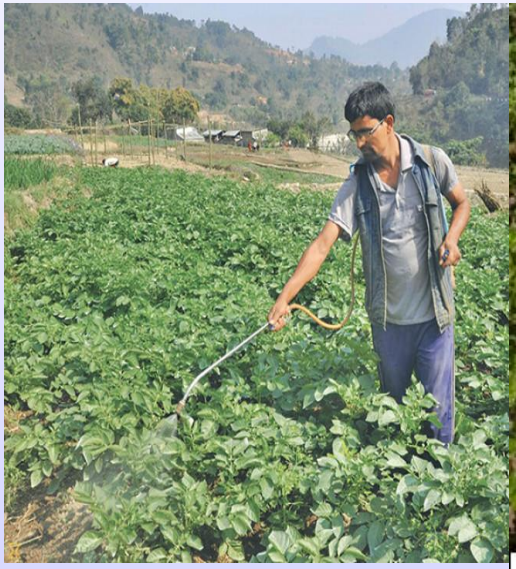
Food import contributes over 17% of trade deficit!

Key Issues: Food Deficits and↑Food Imports

- Increased population (29.2 m)
- Subsistence farming/poor productivity
- Shrinking productive land/land abandonments
- Droughts, floods and natural calamities
- Shortage of farm labor - outmigration (~3 m)
- Changes in food habits!!!

Key Issues: Misuse of Agrochemicals

- Pesticides
- Fertilizers
- Hormones/PGR
- Antibiotics



Issues:

- RTI, PHI
- No safety measures/PPE
- Excessive and/or unnecessary/ off label uses
- Compliance issues

!!! Serious health and environmental hazards!

Potentials of Nepalese Agriculture

Crop production = capturing and converting solar energy into chemical energy (biomass)

(Light + CO_2+ Water) = biomass or yield

Natural Gifts	Crop Management
Light/Radiation	Genetic materials/varieties/seed
Temperature/heat	Choice of growing season
Air (CO_2/O_2)	Pest Management
Water	Water management/irrigation
Essential plant nutrients	Soil & nutrients management

Potentials of Nepalese Agriculture

- Unlimited solar radiation, temperature/ heat and CO_2 (<1200 m)

(Compare with the Northern US/Canada!)

- Huge water resources, if trapped!
- Incomparable niches for diverse crops and livestock (tropical to temperate agro-ecosystems; 100-4000 m).
- Hard working and dedicated farmers
- Huge neighboring markets for agric. products

Potentials: Low hills, valley/plains- intensive cropping systems

- Intensive cropping systems (3 crops in a year),
- Assured irrigation and inputs supply (double yields)

Yield Potentials and Gaps

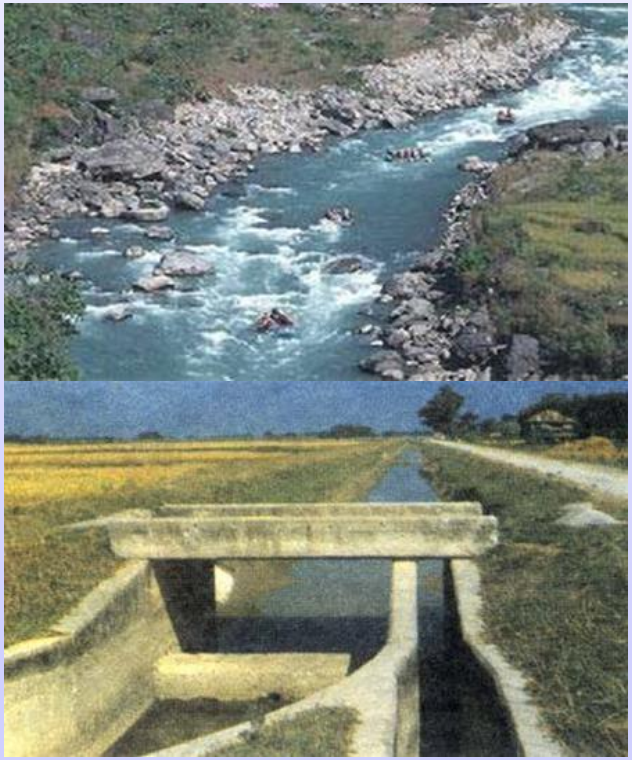
Average yields (t/ha)

Countries	Rice	Maize	Wheat	Potato
Nepal	3.67 (-4.8%)	2.76 (-47%)	2.95 (-16%)	15.18 (-27.5%)
India	3.85	3.01	3.33	22.56
China	6.92	6.30	5.63	18.76
Canada	-	9.24	3.32	34.39
USA	7.62	10.51	3.47	48.15
World	4.60	5.76	3.52	20.95

Sources: FAS Reports and Database/USDA; FAOSTAT

Where to Focus?

Focus 1. Irrigation



Why?

Weather-dependent/rainfed agriculture: key reason of low and fluctuating crop yields.

- Under-utilized water resources: several rivers of perennial source.
- < 25% of total agricultural land with year-round irrigation!
- Over 68% of the total agricultural land (2.64 m ha) is irrigable (ADB, 2020).

Irrigation: Where to learn from?

- California
- Egypt
- Israel
- Punjab and Haryana (Green Revolution)
- Can we imagine, what would have been there if there was no water management????

- **Irrigating in uplands Tars, Terai and river basins can increase cropping intensity up to 300%**

Focus 2: Manufacture fertilizer

- Next to water, nutrients are the most important yield limiting factors
- Limiting organic sources- Increasing dependency
- Over 520,000 tons required annually (2023); <50% supplied!
- Tendering/shipping/distribution: availability in time: hues/cries!!
- Lowest use in South Asia (8 kg/ha arable land)
- Rs 38.5 B subsidy paid in 2023!

No further excuse to deny/delay establishment of fertilizer manufacturing in Nepal!!!

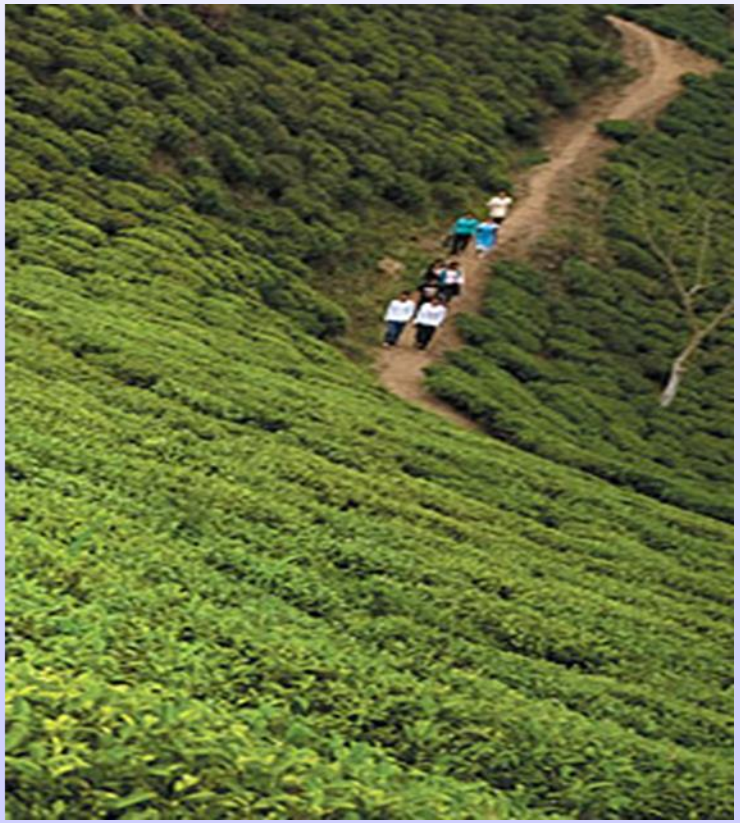
Focus 3: Assured Improved Crop Varieties and Seed Supply System

- Combined with irrigation, manure and fertilizers, improved genetic materials/varieties has a vital role in agril production
- Low access and availability of improved/quality seed through formal/public sources
- Supplied through informal sources for hybrid seeds such as maize, rice and vegetables but there are price and quality issues

Focus 4: Commercialization of Agriculture & Income Generation

- Consolidate crops production based on niches and market potentials
- Assured irrigation, inputs, credits, road & markets
- High value crops: production, processing and promotion (P3)
- Competitiveness, value addition, quality assurance.

Focus 5: Combine soil Conservation with Cash/income Generation



- Soil conservation/stabilization/Environmental protection
- Rural income generation/export oriented production

Focus 6: Farm Mechanization Where Feasible

Why?

- To meet labour shortage
- To reduce physical burden on farm labors/ drudgery
- To increase the efficiency of farm operations
- To attract young generation to farming

Focus 7: Newer Prodn Technologies

- Urban and peri-urban areas where farmlands are limited

(Off-season veg & herbs)

- High efficiency production systems:
  - **Greenhouse and hydroponic technologies**
  - **Tunnel farming**
  - **Roof-top farming**

Summary- Where to Reach?

Existing	Transformed
Subsistence	Commercial/market oriented
Generalized	Niche-based/specialized farming
Conventional	Modernised/improved/mechanized
Rain-fed/weather dependant	Assured irrigation/water managed
Indiscriminate use of agro-chemicals	Reduced-risk pest management
Fragmented land parcels	Consolidated lands based on farmers group and commodities
Hand-to-mouth	Farm-to-bank!

Summary & Recommendations

1. Prosperity is possible only through agril transformation
2. Strong political will/commitment/policy interventions
3. Regulate land: agricultural, residential, industrial, forest, --
4. Invest on irrigation/water management
5. Manufacture fertilizers in Nepal & combine it with manure
6. Combine irrigation and fertilizers with improved seeds
7. Concentrate cereals and cash crops in terai and foot-hills with irrigation (3 crops in a year; 300% cropping intensity)
8. Niche-based cash/high value crops with access to road and market
9. Commercialization: internal/external trade, competitiveness
10. Combine crop production with soil conservation
11. Judicial and reduced-risk use of agro-chemicals
12. Mechanize farming, where feasible/applicable


Thank you