India Agriculture
- Is it secure and sustainable ?

Raj Paroda

Covid 19 Pandemic

Bengal Famine of 1943 – Between 2 to 3 million people died of hunger but not due to any disease

Covid has drawn global attention towards Food, Nutrition and Environmental Security

Also on food for good health and immunity with greater focus on local food systems

UN WFP – 957 million people across 93 countries do not have enough to eat

UN Food Systems Summit – Decade of Action for safe, accessible, sustainable and equitable food systems

The Context

India Agriculture – From Begging Bowl status to an era of Food Self Sufficiency for 1.38 billion people

54.6% people dependent on agriculture

146 million farm holdings

86% farmers are smallholders (with <2 ha)

Gross Value Added : 18.7 lakh crore (From 51.0% to 19.9%)

From an importing to 7th exporting country

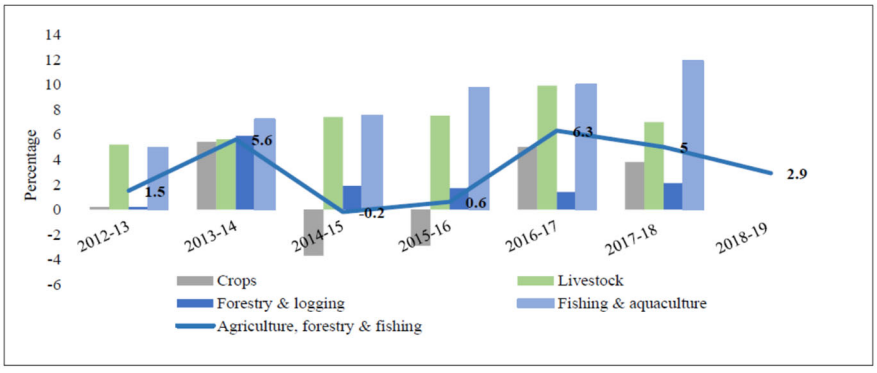
(> US$ 40 billion)

Source: (MoAFW 2018-19)

(1crore = 10 million)

GVA in Agriculture

(Expected Target : 4 %)



Impact of Green, White & Blue Revolutions

- Six fold increase in foodgrain production (50 mt – 303 mt)
- Horticulture production > 325 mt
- Reduction in poverty (From 70% - 13.4%)
- Maintaining buffer stock > 97 mt (2020)
- Milk production from 20 mt - 208 mt
- Fish production: < 1 mt – 12.6 mt
- Export > 20 mt of food grains (Rice & Wheat)

India's Global Position

Commodity	India (m tons)	World (m tons)	% world share	Rank in the world
Rice	118	741	14.8	2
Wheat	107	716	13.7	2
Pulses	23	73	31.5	1
Rapeseed	8.7	72.7	10.9	3
Groundnut (in shell)	9.3	46	16.5	2
Fruits (no melons)	86	677	12.7	2
Vegetables & Melons	167	1136	14.7	2
Sugarcane	358	1911	16.0	2
Meat (000 MT)	6215	310380	2.0	6
Milk (000 MT)	208491	746708	20.8	1




Agricultural Revolutions

Helped achieve food self sufficiency

The Cradles of Success:

1. Political Commitment
2. Institutions and Infrastructure
3. Extension System
4. Partnership

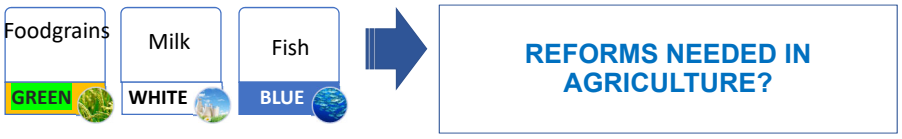
INDIAN NARS

- A strong system
- ICAR and DARE (Reorganized in 1972)
- 104 ICAR Institutes + 71 Universities
- Research, Education and Extension
(under same umbrella)
- Scientists: >35,000

PCAARRD, PARC, NARC, BARC, CARP were established
on ICAR model but lack both status and unified functions

Growth Indicators
(1970-2020)

Area (Million ha)	1970-71	1980-81	1990-91	2000-01	2011-12	2019-20
Net sown	140	140	143	141	141	140
Gross cropped	165	172	186	185	196	198
Net irrigated	31	39	48	55.2	66	68.3
Gross irrigated	38	49.8	63.3	76	91.7	96.5
HYV	NA	15.4	43	65	67	70.0
Fertilizer use (m tones)	2.2	5.5	12.5	16.7	27.8	33.6



DESPITE THESE REVOLUTIONS ?

CHALLENGES

(Agriculture – A State Subject)

COUNTRY RELATED:	FARMER RELATED:
SDGs - No Poverty & Zero Hunger Climate Change - Paris Agreement	- Low Income - Good Knowledge - Retaining Youth - Linking to Market

Emerging Second Generation Problems of Green Revolution

- Factor Productivity Decline
- Decline in Soil Health and Water Table
- Nutrient Imbalance & Use Efficiency
- Increased Incidence of Diseases and Pests
- Dependence on Costly inputs
- Non availability of labour
- Need for Farm Mechanization
- Reduced Farm Profitability

Crisis vs Complacency – A Concern

Paris Agreement

(Global temperature not > 1.5 degree C)

20/20/20 Targets; Effective since November, 2016

Nationally Determined Contribution (NDC)

1. **Reduction in Emission intensity Target - 35% - on track**
2. **Energy by non-fossil fuel sources Target - 40% - on track**
3. **Additional carbon sink (forest)**

Target - 3 billion tons of CO_2 equivalent

Forest cover : From 25 to 33% ?

(Shall be possible through CA and Agro-forestry)

A WAY FORWARD

Policy Reforms Needed

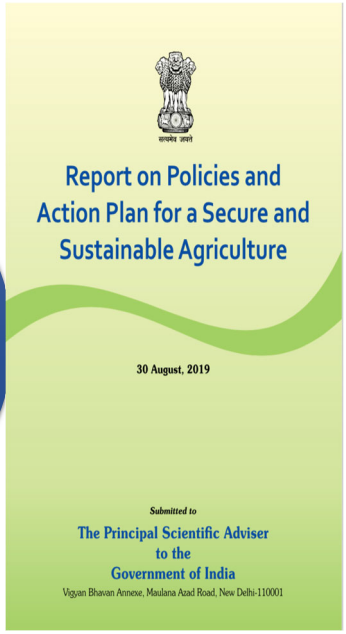
Global	**1. India's commitment to meet SDGs**
	2 . Paris agreement for Climate Change
National	**1. Increasing farmers' income**
	2. Diversified and sustainable agriculture

RECOGNIZING ABOVE,
A COMMITTEE WAS CONSTITUTED BY GoI TO:

- **Review agricultural policies**
- **Suggest strategies/action plan for a secure and sustainable agriculture**

Committee on Agriculture

www.psa.gov.in



Vision

From Agriculture First to Farmer First

Farmer Needs

- Good land and healthy soils
- Adequate good quality water
- Timely supply of key inputs/technologies
- Knowledge sharing and efficient extension services
- Access to credit at low interest rate
- Linkage to national and global markets
- Respect and dignity in the society

Suggested Strategy

- Farmer **FIRST** Approach
- **Increased capital investment, monitoring and coordination**
- **Harnessing science, technology and innovation through institutional reforms and enabling policies**

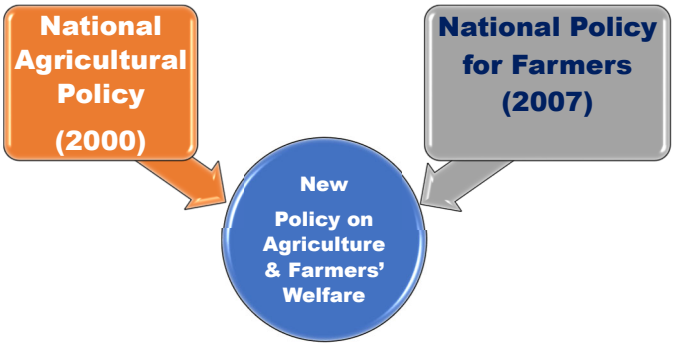
Technologies Needed For ?

- Increase in Crop Yield and Income
- Improving Soil Health – OM & NUE
- Water Harvesting and Water Use efficiency
- Farm Mechanization and GAP
- Agricultural Diversification (Horticulture, Dairy, Poultry, Fishery, Agro-forestry etc.)
- Post-harvest Processing, Value Addition (losses : 10-30%)

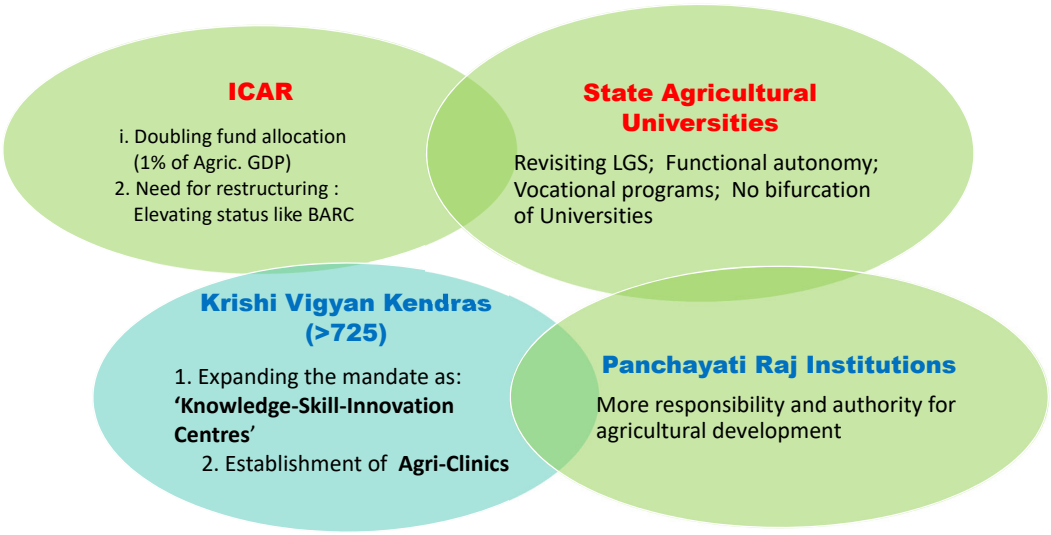
Issues Needing Attention

- Monitoring and Evaluation
- Coordination & Convergence
- Incentives but not Subsidies
- Emphasis on Scaling Innovations
- Motivating Youth

Revisiting Agricultural Policies



Strengthening Institutions



High Returns for Agricultural GDP

	1960s-1970s	1980s	1990s
Roads	19.99	8.89	7.66
Education	14.66	7.58	5.46
Irrigation investment	8.00	4.71	4.37
Irrigation subsidies	5.22	2.25	2.47
Fertilizer subsidies	1.79	1.94	0.85
Power subsidies	12.06	2.25	1.19
Credit subsidies	18.77	3.00	4.26
Agricultural R&D	8.65	7.93	9.50

Urgent Need to Double Allocation of DARE/ICAR

₹ Crore

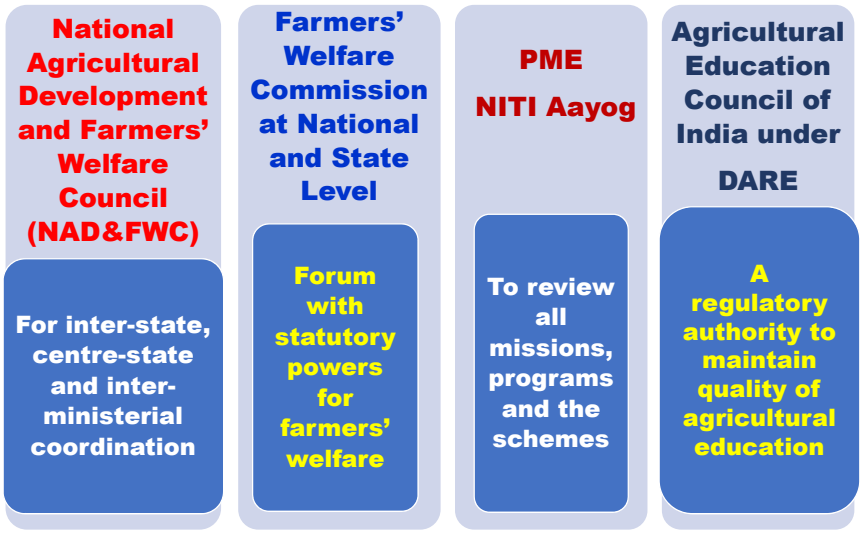
Year	Budget Estimate	Revised Estimate	Actual Expediture
2009-10	3241.40	3261.36	3210.42
2010-11	3818.05	5165.00	5385.83
2011-12	4957.60	5007.60	4729.31
2012-13	5392.00	4620.00	4509.75
2013-14	5729.17	4881.08	4730.76
2014-15	6144.39	4884.00	4840.01
2015-16	6320.00	5586.00	5572.90
2016-17	6620.00	6238.00	5995.20
2017-18	6800.00	6992.00	6989.91
2018-19	7800.00	7953.73	7943.59
2019-20	8078.76	Nil	5675.00

0.39% of agricultural GDP

Expenditure on AR4D

India – 0.39% (around 2 billion)
China – 1.0% (around 4 billion)
Brazil – 1.5%
South Africa – 2.0%
Australia – >3.0%
USA - 3.0%

Urgency for New Institutions



No Poverty & Zero Hunger

Two National Acts:

1. MANREGA Act, 2005

(Guaranteed 100 days wage employment)

Budget for 2020-21 – 75,000 crore

2. National Food Security Act, 2014

(To provide subsidized food grains to 2/3rd of people)

800 million

Annual Budget - > Rs 2 Trillion

Total of Central and State Government Subsidies (2017-18)

Subsidy Category	Amount (Rs crore)
Central Government	
Fertilizer	70,000
Credit	20,000
Crop Insurance	6,500
Price Support	30,000
Sub-Total	**1,26,500**
State Government	
Power	91,000
Irrigation	17,500
Crop Insurance	6,500
Loan Waivers	1,40,000
Sub-Total	2,55,000
Total (Centre & States)	**3,81,500**

Incentives in place of current Subsidies

1.For input use efficiency :

fertilizer use on soil test basis, laser leveling, ferti-cum-seed drill, micro-irrigation, use of solar energy,

2. For environmental services:

Crop diversification, use of legumes, Conservation Agriculture, agri-horticulture, agro-forestry, climate smart agriculture etc

(Rs 10,000 / acre / family up to a maximum of 10 acres)

Revision of Acts

1. ECA (1955)
2. Model APMC Act (2003)

Approval of Pending Bills

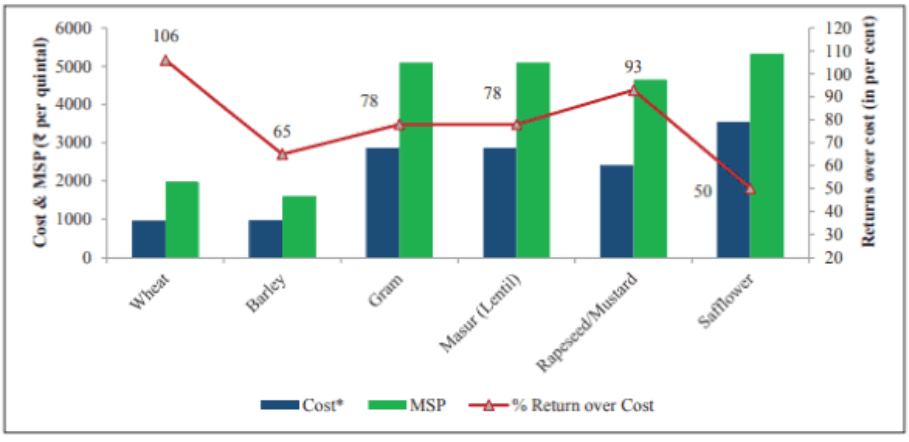
1. Seed Bill
2. Pesticide Management Bill
3. BRAI Bill

Need for Policies

1. Policy on MSP
2. EXIM Policy (for long term)
3. Policy on Biotechnology
4. Land Utilization Policy
5. Livestock Breeding Policy

MSP (At 1.5 times of cost C2)

Expected Returns for Rabi Crops (2020-21)

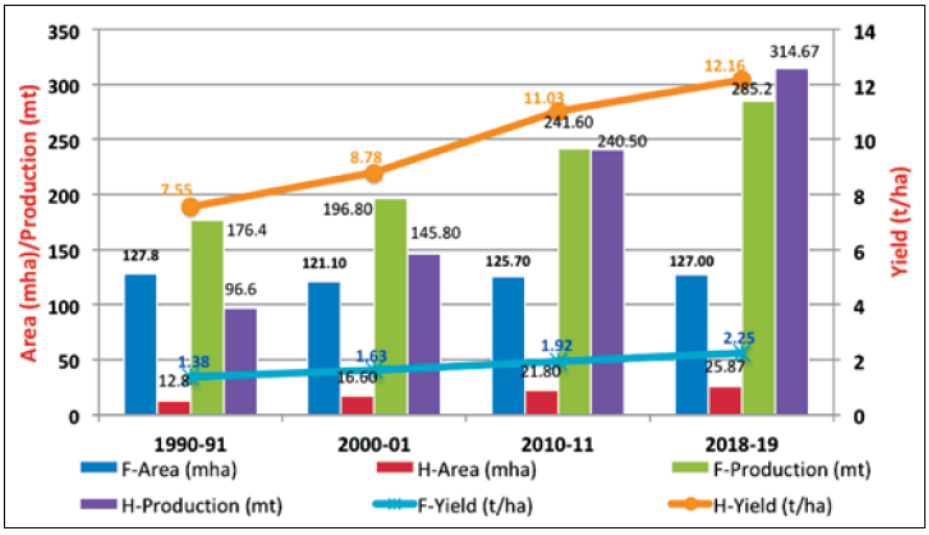


Review of Missions

- **New Missions:**
  - Fishery
  - Conservation Agriculture (CA)
  - Protected Cultivation
  - Quality Seed and planting Material
  - Youth in Agriculture

Reorientation of existing Missions and their effective monitoring

Impact of Horticulture Mission



Livestock Sector

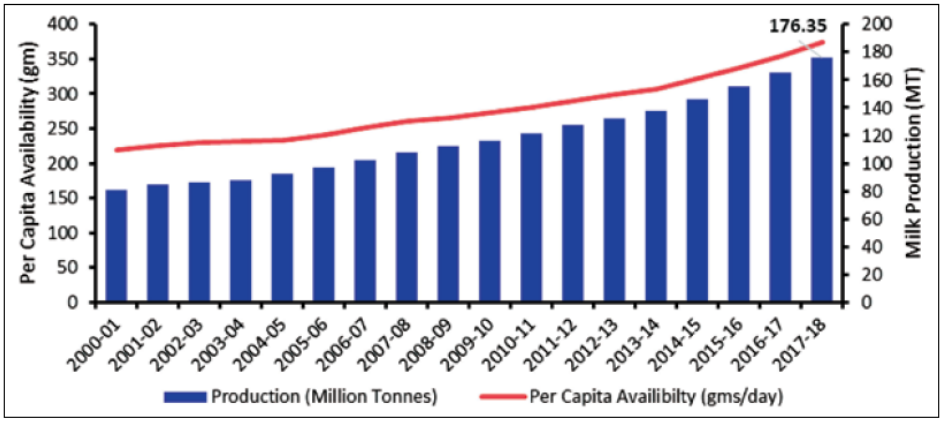
- Livestock Sector contributes 20.5% to Agricultural GDP
- Globally Ranks 1st in Population, Milk Production, Cattle and Buffalo Population,

Carabeef Production and Goat Milk

- Beef export : Rs 45,000 crore in 2017-18

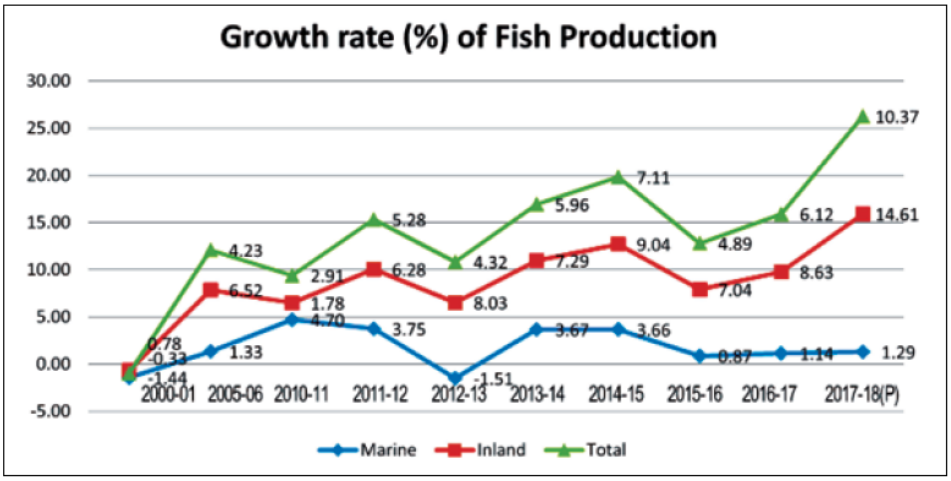
India : Largest Milk Producer (208 MT)

Due to 'Operation Flood' around value chain



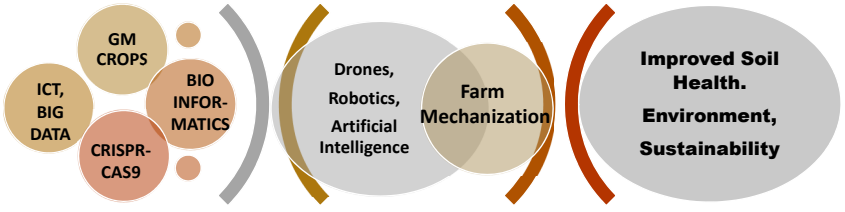
Productivity : Cows - 2.8 litres
Crossbreds – 7.5 litres
Buffaloes - 5.2 litres

Fish Production in India



Coastal Area : 7,500 km
Export of 1.3 mt in 2019-20 : US $ 7 billion

Harnessing Science for New Gains



NEW SCIENCE | **PRESICION AGRICULTURE** | **ECO-REGIONAL PLANNING**

PPP and IP Protection Must

Scaling Innovation

- **Hybrid Technology:** (maize, bajra, sorghum, rice)
- **Biotechnology - GM crops:** (cotton, soybean, mustard, maize, brinjal)
- **Conservation Agriculture** (5.0 to 20 m ha)
- **Protected Cultivation** (expand area from 50,000 ha to 0.5 m ha)
- **Micro-irrigation** (discourage use of flood irrigation) – From 6 to 10 m ha
- **Bioenergy/Biofuel** (use of sugar cane and maize - initially 20%)
- **Biofortified Crops** (Quality protein maize, iron & zinc rich rice, iron rich bajra, zinc rich wheat, Vit. A rich banana)
- **ICT for Knowledge Sharing– ex. e-Chaupal by ITC**

Bt Cotton – Only GM crop released in India

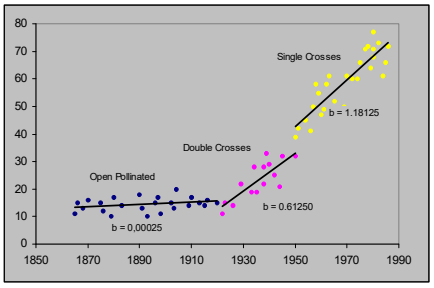
A policy decision to release in 2001

Partnership between MAHYCO & Monsanto

- India since 2015 the largest cotton producer surpassing China
- The area under Bt cotton is now between 11-12.0 m ha
- The cotton production has almost tripled (from 13.6 to 37.5 million bales)
- Pesticide consumption reduced by 40.0%
- Export of cotton between US $3.0 – 4,0 billion annually

Cumulative benefits expected: US$ 84.7 billion

SCALING HYBRID TECHNOLOGY



Maize Production in USA

Single Cross Maize Hybrids in India

- No SS hybrid due to policies till 2000
  - New Seed Policy (1988)
  - PPVFRA in 2001
- First Public bred hybrid in 2001
- Production doubled till 2011 : 25 mt
- Production currently : 37.5 mt
- Productivity increased by 150 %
  (From 1.8 to 3.0 t/ha)
- Area : 9.0 m ha (under hybrids : 60%)
- Global rank – 4th in area (9 m ha)
  and 7th in production

Highest growth (>4.0%) rate among Cereals for the last one decade

Conservation Agriculture for Sustainable Intensification

Area covered : 5.0 m ha under irrigated R-W system
Potential area : 10 m ha
Dryland Area : Almost 45% ?

Globally : 200 m ha mainly in drylands

GAP for Climate Smart Agriculture

Rain-water harvesting + Solar energy + sub-surface fertigation + CA

Shift Needed Towards Precision Farming

Use of Decision Support Systems

New Ecosystem Approach :
Had Been Highly Rewarding

- Rice and Sugarcane in the North
- Groundnut in Gujarat
- Potato in Indo-Gangetic Plains
- Maize in Eastern India - A winter crop in Bihar
  (Av. yield; 6-7 t/ha)
- Soybean in Central India (>10 m ha)
- Chickpea and Sunflower in South
- Pigeonpea in North West ?
- Maize, Mustard and Lentil in North East ?

Eastern India : A Sleeping Giant
Need for Capital Investment

Motivating & Attracting Youth in Agriculture (MAYA)

200 Million Youth (including women) in Rural India

As 'Job Creator and not Job Seeker'

-Youth as extension agent

(Efficient private extension)

- Youth as input and service provider

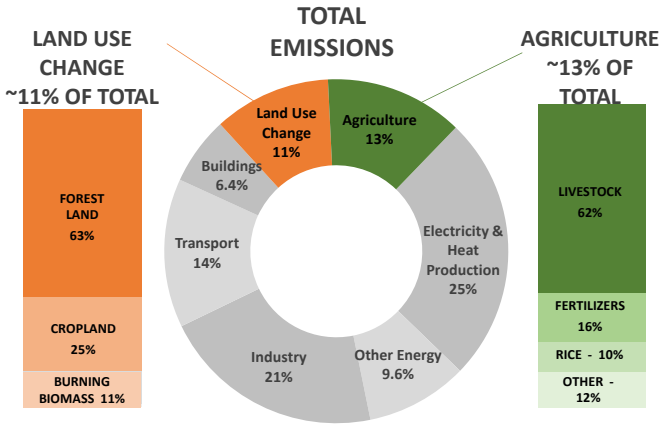
-Youth as Entrepreneur

To establish Agri-Clinics
in each KVK (725) & make them
Knowledge-Skill-Innovation Centres

Protected Cultivation Area

India - (50,000 ha) China - (2.0 m ha)

The Agri-Food System - A PART of Climate Change Problem (30%)



Post-harvest losses : Around 6 %

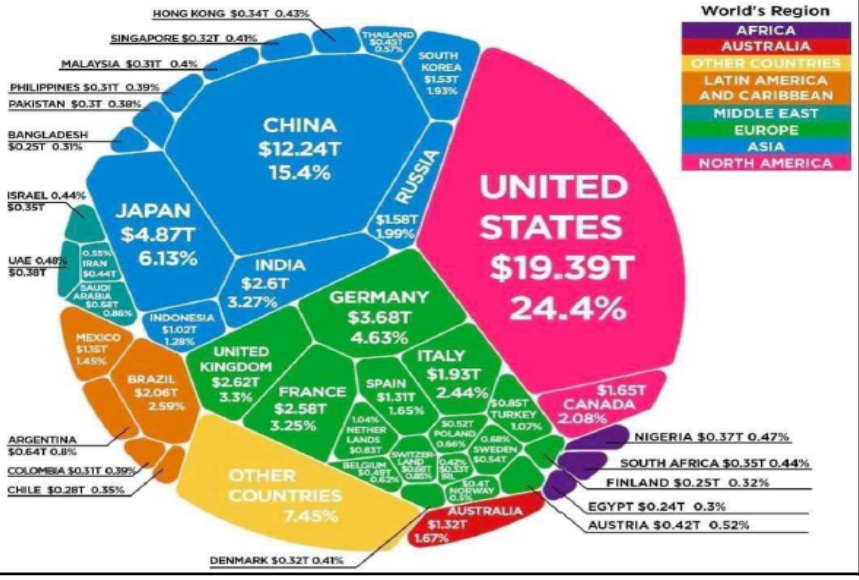
IPCC 2014

WORLD BANK GROUP Agriculture

80 Trillion Dollar $ 😳

India – 5 Trillion Economy
Agriculture (20%) – 1 Trillion

World Economy in a Single Chart 👇



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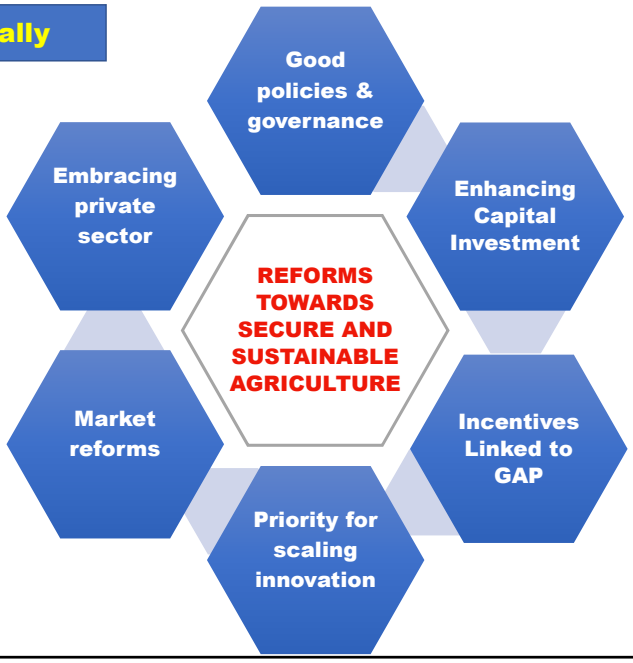
Good policies & governance
Enhancing Capital Investment
Incentives Linked to GAP
Priority for scaling innovation
Market reforms
Embracing private sector
REFORMS TOWARDS SECURE AND SUSTAINABLE AGRICULTURE


Farmer First
Agriculture