

**Government of India**  
**Ministry of Environment, Forest & Climate Change**  
**(MoEFCC)**



सत्यमेव जयते

**Mandate :**

Protect and Preserve the Environment and Sustainable Development

M.P.Johnson, Statistical Adviser

# CLIMATE CHANGE ADOPTION IN AGRICULTURE



*“Due to Climate change, I was facing lot of problems. Everything has changed; climate shocks affect the crop yield. Farming has been passed from generations and is still the only source of income but not the sustainable one.*

Babulal Gowda (farmer from Odisha)

# Climate Change History

- Historical Emissions since 1880 has resulted in rise in global temperature by  $0.85^{\circ}$  Celsius
- **Historical carbon space occupied by various countries in 2009 (1850 as base year):**
  - **USA:** 29%
  - **Other Developed countries:** 45%
  - **China:** 10%
  - **Other Emerging Economies:** 9%
  - **India:** 3%
- **India, even though not part of problem, wants to be part of solution.**

Agriculture employs 1.3 billion people globally

In Africa, **yields will be halved by 2020** and net revenues may fall by as much as 90% by 2100, owing to climate change.

In Latin America, almost **50% of agricultural** land could be subjected to desertification and salinization.

In the Small Island developing states (SIDS) it is estimated that there will be **10% decrease in average rainfall by 2050**

In Africa where nearly 220 million people are exposed to droughts every year

In India 263 million people working in agriculture, over half of all workers; 70% small and marginal farmers

# Presentation Outline

- **Population and Resources**
- **Impact of climate change in India**
- **About Strategy**
- **Initiatives of the Government**
- **Climate Change Adaptation- Policies**
- **Vision 2022 of Govt. of India**
- **Bonn Challenge: India's leadership**
- **Importance of Medicinal Plants in India**
- **Way forward**
- **Summing Up**

# INDIA - POPULATION AND RESOURCES

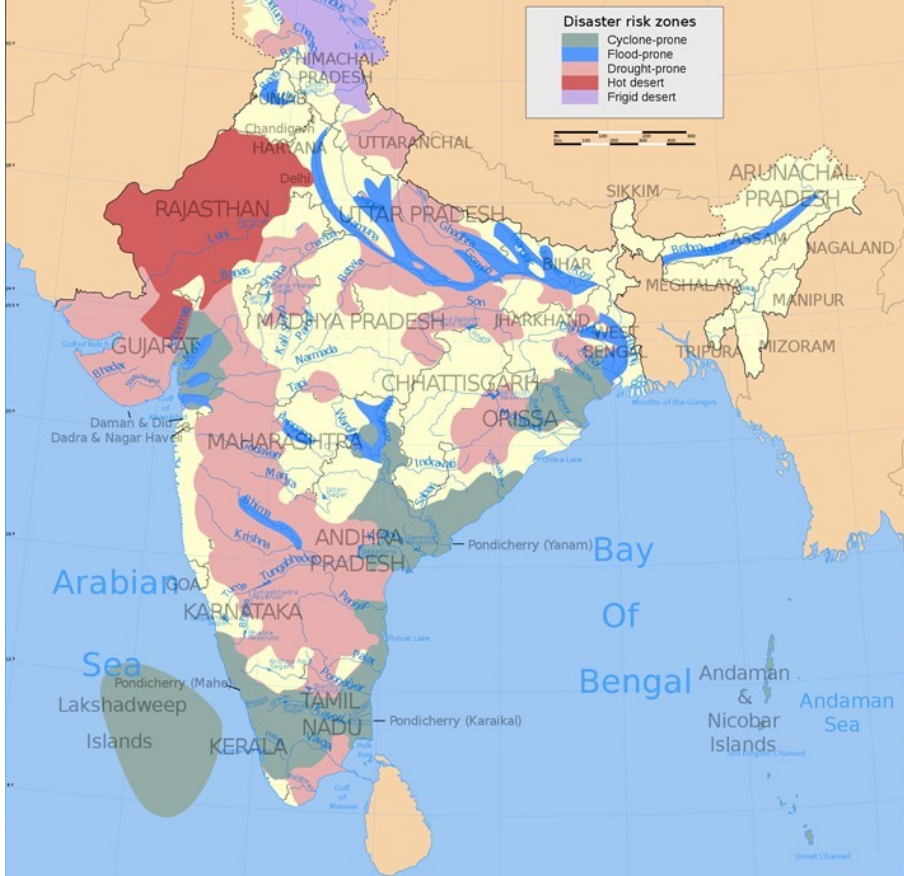
India has

- **2%** of world's land (329 mha)
  - **4%** of world's freshwater resources
  - **17%** of world's population
  - **15%** of world's Cattle Population
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- Cultivated Area (CA) 47%
  - Non-cultivated + Waste Land 30%
  - Forested Area 23%
  - Irrigated Area (produces 55%) 37% of CA
  - Rainfed Area (produces 45%) 63% of CA

# Impact of climate change in India: vulnerable areas

- **India is one of the most vulnerable countries due to climate change.**
- **Water - high vulnerable areas include:**
  - a. **Snow/glacier-fed rivers (e.g. Ganga basin),**
  - b. **Key agricultural regions where rainfall is likely to fall (e.g., Punjab, Haryana),**
  - c. **Areas with over-exploited and critical stage of ground water development (e.g., Punjab, Haryana, parts of Maharashtra),**
  - d. **Coastal regions (e.g., East Coast),**
  - e. **Flood and drought prone areas (e.g., Bihar plains, Assam, peninsular India).**

# India Climatic Disasters Risk Map



- **11 million** affected during droughts in Odisha in 2000 and 2002
- **Over 5.7 million Ha** affected in 2009 due to late arrival of monsoon and erratic rainfall
- **10 times** increase in incidences of extreme weather events from 1930 to 2010
- **18 million hectare** of crop were damaged in 2015 alone, a loss of approximately USD 4 billion
- **9 million farmers** in Maharashtra, over were affected by drought in 2015
- **70-80%** loss in winter maize in Bihar owing to cold wave (2002-03)



# STRATEGY

*To transform agriculture into an ecologically sustainable climate resilient production system by devising appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities and contributing to economic stability at the national level.*

# Initiatives of the Government

## Adaptation Strategies

- Paramparagat Krishi Vikas Yojana - organic farming
- Pradhan Mantri Krishi Sinchayee Yojana - efficient irrigation.
- Neeranchal - watershed development.
- Namami Gange
- National Initiative on Climate Resilient Agriculture (NICRA)
- Bureau for Water Use Efficiency
- Lifestyle & culture of sustainability

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Programmes	Focus Area
<b>Paramparagat Krishi Vikas Yojna (PKVY)</b>	Organic production; Adoption of organic village by cluster approach & Participatory Guarantee System (PGS) certification; Minimizing fertilizer use; Increasing soil organic carbon and beneficial soil biota.
<b>Rashtriya Gokul Mission (RGM) and Ration Balancing Programme</b>	Promote indigenous breeds having unique characteristics of heat tolerance, tick and pest resistance, resistance to diseases and the ability to thrive under extreme climatic conditions; Mitigating Enteric fermentation and consequent GHG emission by adaptation of Ration Balancing Strategy.

## Cont..

<b>Programmes</b>	<b>Focus Area</b>
<b>National Food Security Mission (NFSM)</b>	Increasing production of rice, wheat and pulses through area expansion, and productivity enhancement through Restoring soil fertility and productivity at the individual farm level; Creation of employment opportunities; and Enhancing farm level economy.
<b>Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)</b>	Extending the irrigation coverage to a larger area; Integrating activities under one platform i.e. water conservation, distribution and efficient application to focus on end-to-end solutions in irrigation supply chain with the vision of “Har Khet Ko Pani” and “More crop per drop”.

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Programmes	Focus Area
<b>National Mission on Oilseeds and Oil Palm (NMOOP)</b>	Increasing production of vegetable oils from oilseeds, Oil Palm & Tree Borne Oilseeds; Initiatives targets to indirectly contribute towards climate change adaptation and environmental sustainability by attempting to fulfill the demands of small and marginal farmers of the country.
<b>Rashtriya Krishi Vikas Yojana (RKVY)</b>	Incentivize/ Flexibility and autonomy to States; Encourage growth in agriculture and allied sectors i.e. crop husbandry, animal husbandry, R&D, forestry & wildlife, food storage and infrastructure development etc.

# Climate Change Adaptation- Policies

Policy	Mandate
<b>National Environment Policy</b>	Identification of key vulnerabilities of India to climate change, in particular impacts on water resources, forests, coastal areas, agriculture and health, assessment of the need for adaptation to climate change and encouragement to the Indian industry to participate in the Clean Development Mechanism (CDM).
<b>National Policy for Farmers</b>	Aimed to achieve annual growth of more than 4 per cent in the agriculture sector on a sustainable basis, through the efficient use of natural resources and combination of other measures.



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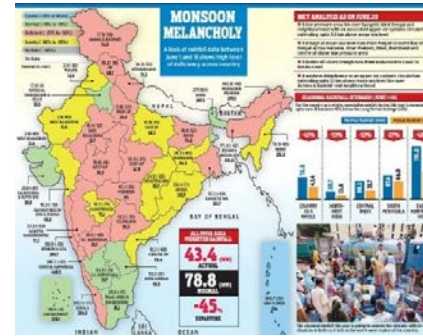
## Low rainfall in central India to affect crops

IMR study finds that increasing El Niño effect over Indian Ocean will disrupt weather monsoon this year; agri industry continues to believe monsoon could be good

**By Anand Kumar**

NEW DELHI: The monsoon season in India is expected to be a good one, according to the Indian Meteorological Department (IMD). However, a study by the International Centre for Integrated Mountain Development (ICIMD) has warned that the monsoon could be disrupted due to the increasing El Niño effect over the Indian Ocean. The study, which is part of the International Centre for Integrated Mountain Development (ICIMD) project, found that the monsoon could be disrupted due to the increasing El Niño effect over the Indian Ocean. The study, which is part of the International Centre for Integrated Mountain Development (ICIMD) project, found that the monsoon could be disrupted due to the increasing El Niño effect over the Indian Ocean.

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## Vision 2022 of Govt. of India: Double farmers incomes by 2022

- 80 million hectares under agriculture is dependent on rains
- 263 million farmers and Agricultural Labor dependent on rains
- 70% are small and marginal farmers



# Bonn Challenge: India's leadership

- So far, 124.32 million ha committed by 38 national and sub-national and private sector organization
- India is the first BRICS and South Asian country to support the Bonn Challenge by announcing a target of putting under restoration 13 million hectares by 2020 and another 8 million by 2030 at GLF in Paris in 2015
- It builds on several existing initiatives like the Green India Mission and NAEB's programs, integrated watershed development programs and several other initiatives by civil society organisations.



# Conservation and Management of Medicinal Plants:

- Socio-economic relevance of medicinal plants in India and their rising demand to meet needs of growing wellness sector .
- Diminishing wild populations of medicinal plants and factors affecting their re-establishment
- Strategies for conservation and management of medicinal plants including for adaptation to climate change

# Importance of Medicinal Plants in India

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- More than 6000 plant species used for health care in India under folk and codified Indian Medical Systems.
- Raw drugs obtained from 1178 plant species are in active trade with annual trade volume of >5 lakh MT.
- Trade value of medicinal herbs for the year 2014-15 has been pegged at Rs. 7000 crores (>\$ 1000 million).
- Poor forest-side people form a significant beneficiary group of this trade

# Factors Affecting Wild Populations

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- Excessive and destructive harvesting
- Increasing biotic pressures in harvested areas
- Overtaking of harvested areas by invasive species
- Diminishing habitats – especially niche areas
- Weakening resilience of root stock/ germplasm to re-establish

Many of these factors are triggered by changing climate

## Way forward

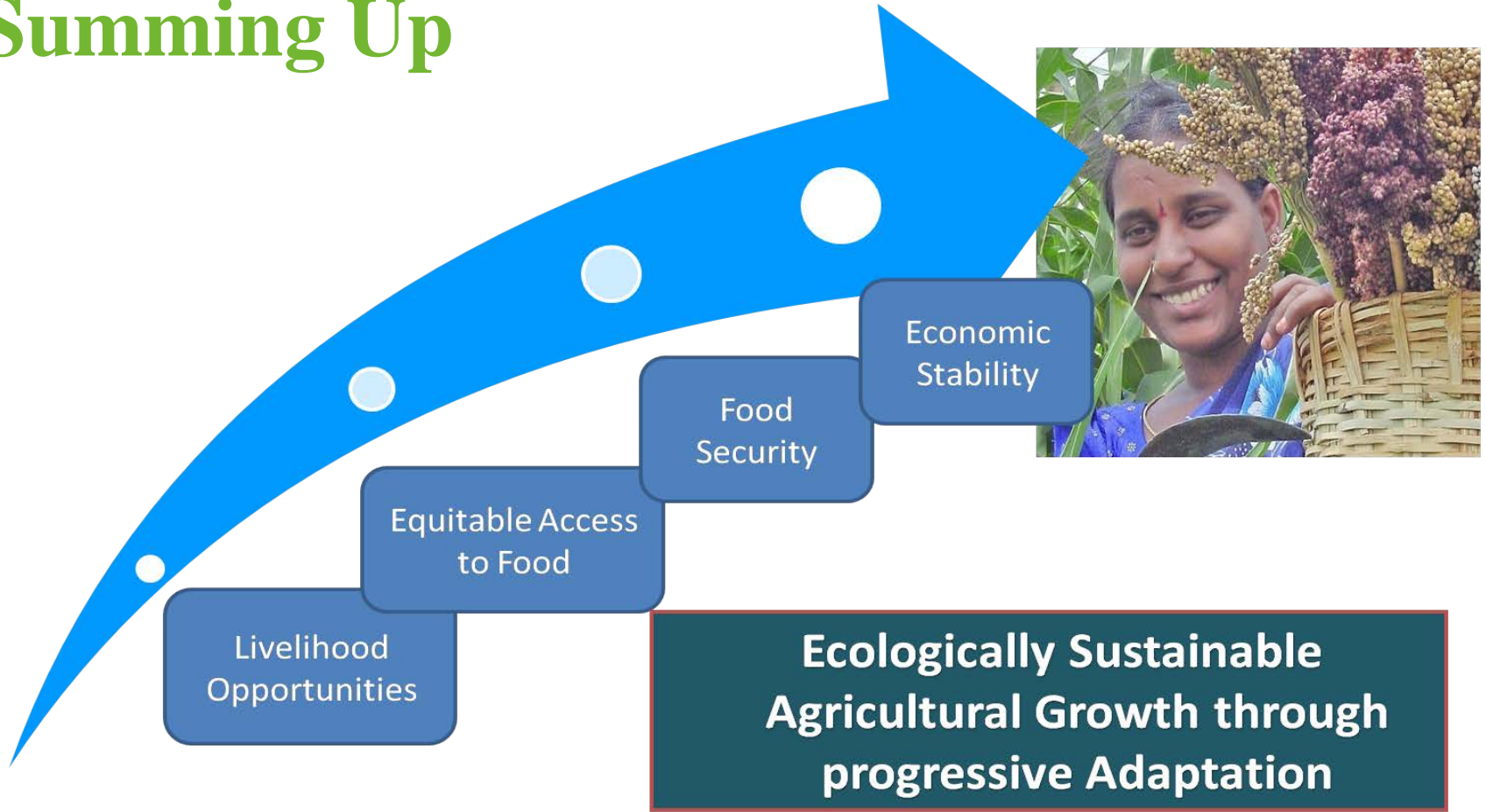
- Need to increase R&D funding keeping in view the magnitude and extent of climate change impacts and required studies,
- Need to develop and implement Decision Support Systems/Tools for optimum water management in changing climate.
- Capacity building - Scientific manpower in R&D in water sector requires to be increased,
- Adaptation measures (infrastructure development) needs to be identified and started urgently,
- India has vision and potential for scientific leadership in Asia, Africa, . . .

# Way forward

- Integration of forest landscape approach in existing and new programs
- Pilot testing Restoration Opportunities Assessment Methodology (ROAM)
- South Asia Regional events for learning and experience sharing of FLR approach.
- Scaling up experience/models of financing large scale restoration
- Addressing of legal and governance frameworks.
- Enhancing inter-departmental cooperation .

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# Summing Up



Come Forward..

Join hands..

Save Agriculture..to

sustain ourselves..



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# Conservation and Management Strategies

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- Delineate *in situ* conservation reserves for priority medicinal plant species for long term conservation of genetic resource of these species
- Generate time series data to assess the impact of climate change – establish permanent plots in different agro-climatic regions.
- Create awareness amongst wild gatherers and build their skills about sustainable harvesting practices

# Sustainable Lifestyle

- Goal:
- To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.
- Extravagant lifestyles will require 5 planets.
- Sustainable lifestyle will require 1 planet.
- Promote “Sustainable Lifestyles” based on needs based consumption.