

# CLIMATE CHANGE

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**BACKGROUND TO  
UNDERSTAND THE GRAVITY  
OF THE PROBLEM**

The biggest humanitarian  
and economic challenge  
the world has ever faced.

Global problem that  
requires global solution

Human activity has contributed in increasing the concentration of carbon dioxide in the atmosphere : increasing in average global temperature

This is in addition to natural  
climate variability observed  
over comparable time  
periods.

- **FACTS**
- 2015 was the hottest year to date, previous record year being 2014.
- Sea levels are rising faster than at any time in the past 3000 years.
- China had become the world's largest national emitter. It contributed 30% of the total global emission
- US (15%), EU-28(10%), INDIA (6.5%) accounted for 61% of all CO<sub>2</sub> emissions.

- **KYOTO Protocol :**
- Commitments to reduce carbon emission.
- Industrialised countries to limit greenhouse gas emission in the year 2000 to no more than their level of 1990.
- **MARRAKESH (2001):**
- Compliance regime and compliance committee constituted to report directly to United Nations.
- Compliance Committee has two branches :
- (1) Facilitative (2) Enforcement



- **Emission Trading :**
- Kyoto Protocol says that countries “may participate in emission trading for the purpose of fulfilling their (2008-2012 emission target) commitments.....”.
- Protocol also states that emission trading shall be “supplemental” to domestic action to reduce emission.

- **COPENHAGEN (2009):**
- Creation of Green Climate Fund : to assist adaptation in developing countries.
- First time developing countries like; China, India, Brazil and Indonesia, which contributed significantly to GHG emissions, proposed emission limitation pledges.

- COP 19 in WARSAW called on parties to submit “Intended Nationally Determined Contributions” (INDCs) well before the Paris Conference.
- This is an important bottom –up feature of the emerging agreement.
- PARIS Convention :
- Adopted by 196 parties to the UNFCCC

- To limit the temperature increase to 1.5°C to achieve a balance between anthropogenic emissions by sources and removal by sinks of GHG in the second half of the century.
- It gives flexibility for countries to voluntarily fix Nationally Determined Contributions (NDC)
- Bottom-up approach to be enforced at National level
- Establishes framework for monitoring, reporting and verifying countries' action.

- It urges the developed countries to aid and assist developing countries by providing both financial and technical assistance.
- Renewed focus on Carbon Sequestration : Afforestation, transforming land from source to sink, wetland restoration as strategies
- Spread of renewable energy and move towards low-carbon world.

Climate Vulnerability  
Assessment

and

Concepts of Climate  
Adaptation

- India accounts for **2.4 %** of world surface area but supports **17.5%** of world population.
- It has largest population of global poor (**30%**).
- Around **24%** of the global population have no access to electricity.
- **30%** of the global population relies on solid bio-mass for cooking.
- **92 million** have no access to safe drinking water.

- Average annual energy consumption in India is 0.6 tonnes of oil equivalent (toe) per capita as compared to global average of 1.88 toe per capita.



# Policy Framework

- **Article 48-A** : The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country,
- **National Environment Policy, 2006** : To promote sustainable development along with respect for ecological constraints and imperative of social justice.
- **Development without Destruction.**

- The National Action Plan on Climate Change (NAPCC) : 8 National Missions : outlining priorities for mitigation and adaptation to combat climate change.

# Mitigation Strategy

- **Clean and Efficient Energy System :**

(a) **Supply Side** : Greater use of renewable energy : Solar, Wind power, Bio-mass, Hydro power, Clean Coal Policy, Nuclear Power, etc.

(b) **Demand Side** : To efficiently use energy through various innovative policy measures under the ambit of Energy Conservation Act, National Smart Grid Mission,

- Developing Climate Resilient Urban Centres  
Smart City Mission (**100 cities**), Atal Mission For Rejuvenation and Urban Transformation (Amrut in **500 cities**)
- Waste to Energy
- Solid Waste Management
- Clean Indian Mission
- Green Transport Network : Sagar Mala Project, Bharat Mala Project.

- Manufacture of Hybrid and Electric Vehicles
- National Policy on Biofuel
- Planned Afforestation under Green India Mission
- Abatement of Pollution : Continuous Emission Monitoring System, Common Effluent Treatment, Fly ash Utilization Policy, Zero liquid discharge policy, National Air Quality Index.

# Adaptation Strategy

- **Agriculture**

- (a) National Mission on Sustainable Agriculture
- (b) Mission for Integrated Development of Horticulture
- (c) Paramparagat Krishi Vikash Yojana (Organic)
- (d) Pradhan Mantri Krishi Sinchayee Yojana
- (e) National Mission on Agriculture Extension and Technology

- **Water :**

(a) National Water Mission

(b) Rain Water Harvesting

(c) Neeranchal Yojana (Watershed Development)

(d) Ganga Action Plan (Namami Gange)

(e) National River Conservation Programme

- Health

(a) National Health Mission

(b) Integrated Disease Surveillance Programme (IDSP)

(c) National Vector Borne Disease Control Programme (NVBDCP)



- Disaster Management
- Protecting Bio-diversity and Himalayan Eco-system
- Rural Livelihood Securities (NRLM)

- India's INDC (Intended Nationally Determined Contribution) : To reduce emission intensity of its GDP by 33 to 35 % by 2030 from 2005 level.
- To create an additional Carbon Sink of 2.5 to 3 Billion Tonnes of Carbon dioxide equivalent through additional forests and tree cover by 2030

# India's Water Resources

Water is a valuable but finite resource

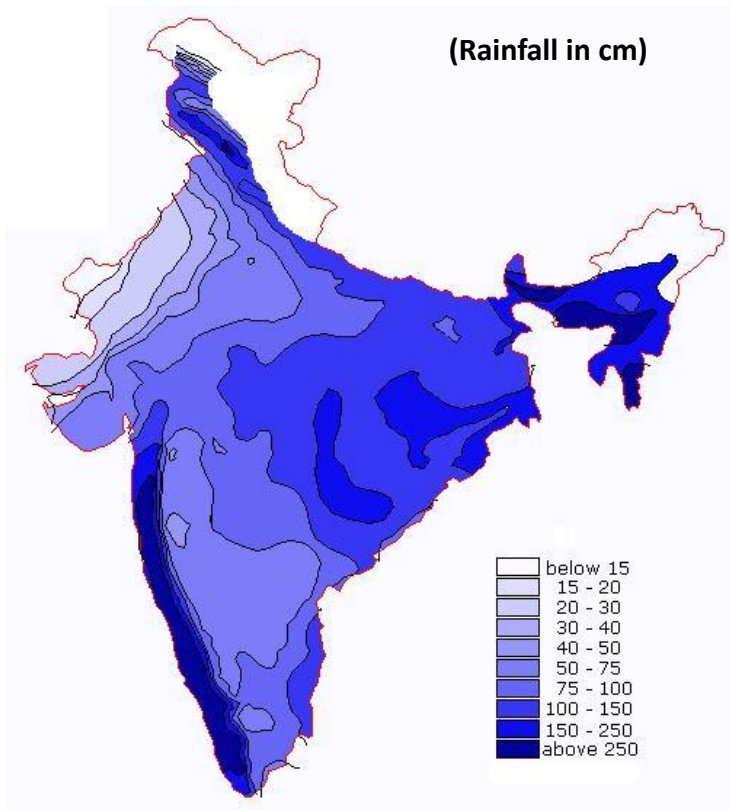
<b>Estimated average annual precipitation (including snowfall)</b>	<b>4000 BCM</b>
Average annual potential (in rivers)	1869 BCM
Estimated utilizable water	1123 BCM
(i) Surface water	690 BCM
(ii) Ground water	433 BCM
Per capita water availability (based on census 2011)	1545 Cubic Metre
Storage Capacity of Major & Medium Completed Projects	253 BCM
Per capita water storage	208 Cubic Metre
Estimated Surface Water Utilization	450 BCM
Annual Ground Water withdrawal	245 BCM

*Note: BCM = Billion Cubic Metre = Cubic kilometre*

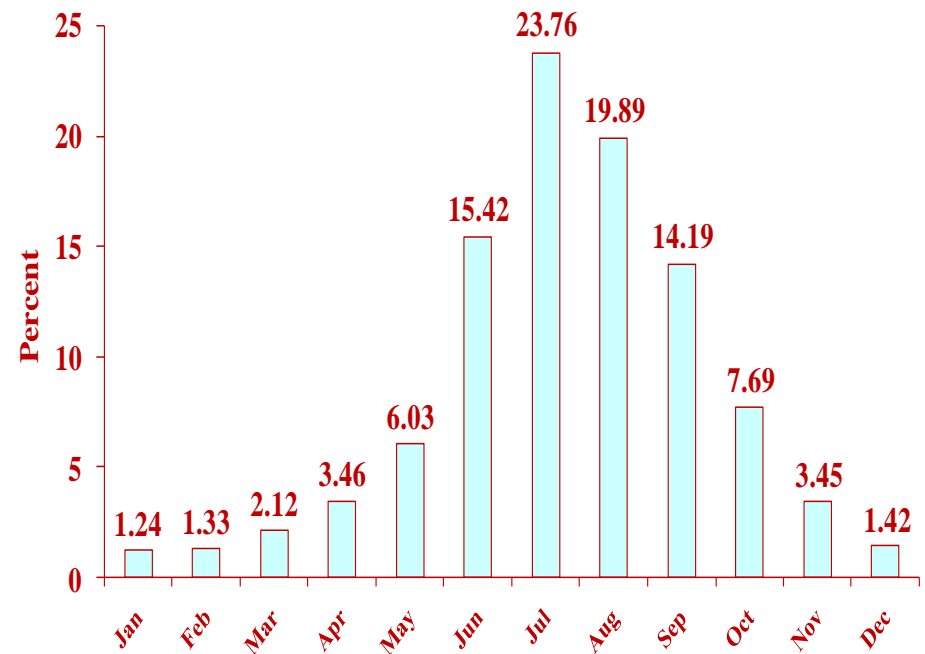
# Variability in Water Availability

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- High variability in space and time



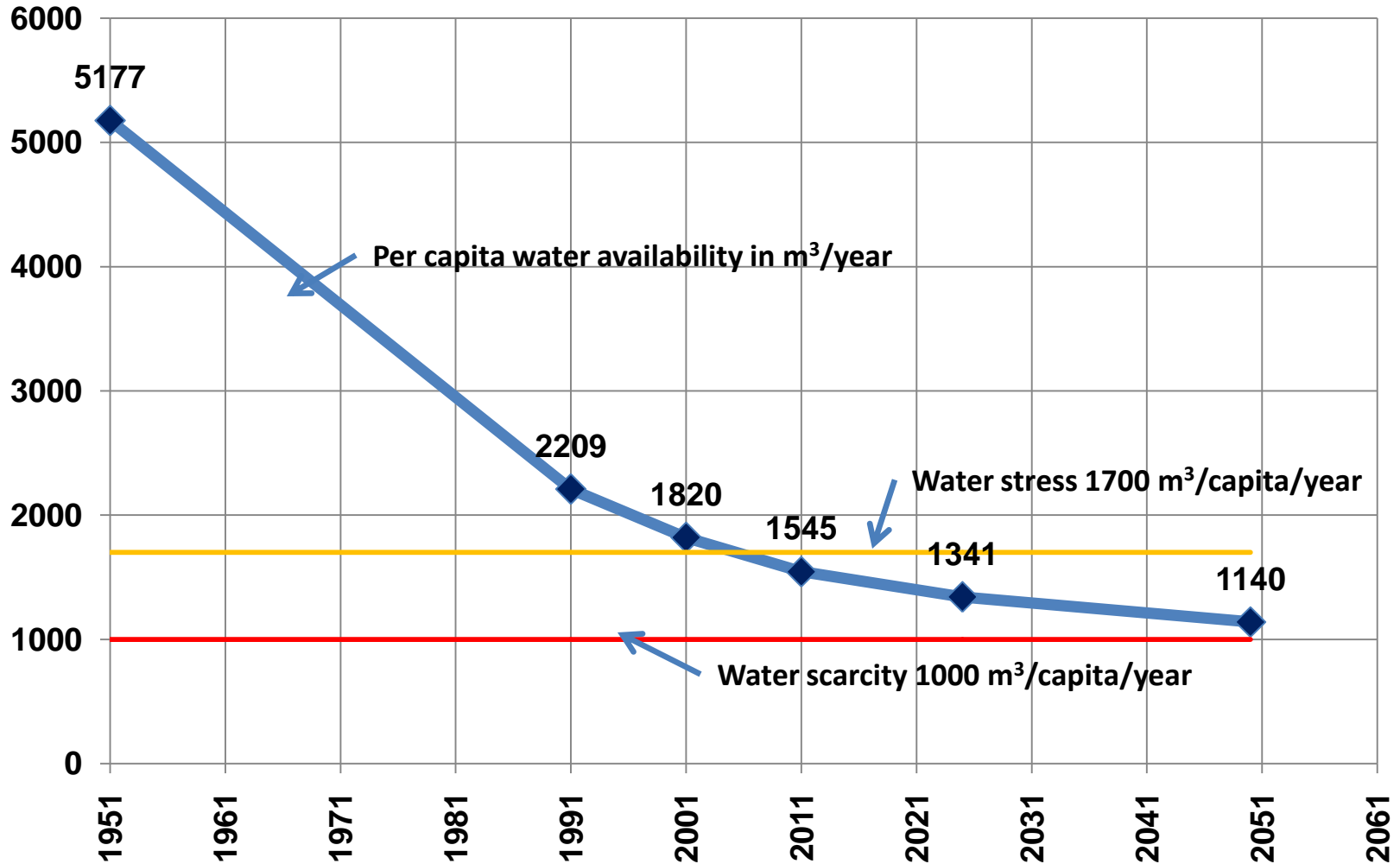
> 1,000 cm in north eastern region to  
< 10 cm in western part of Rajasthan



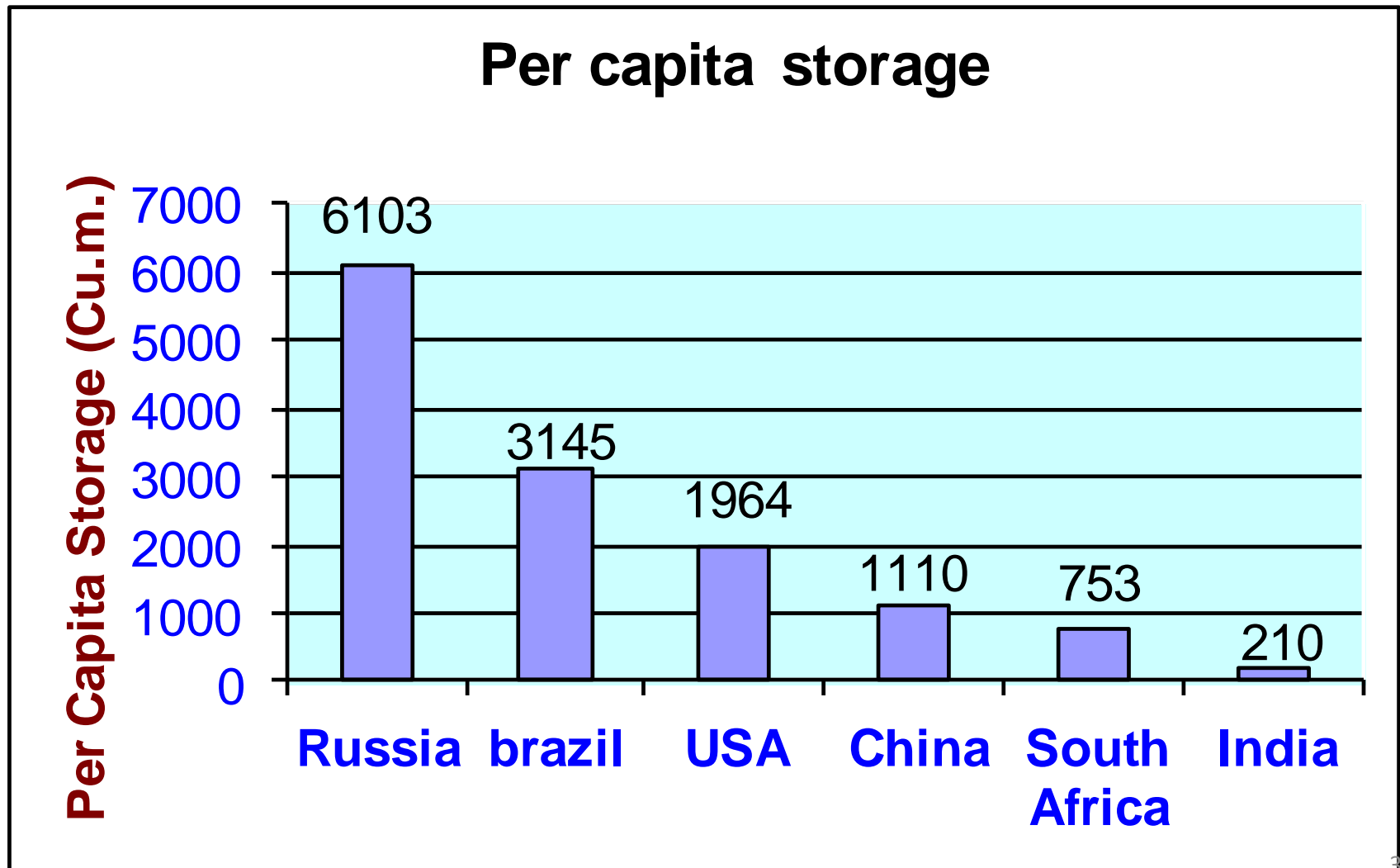
(75% annual rainfall in four months)

# Reducing per Capita Water Availability

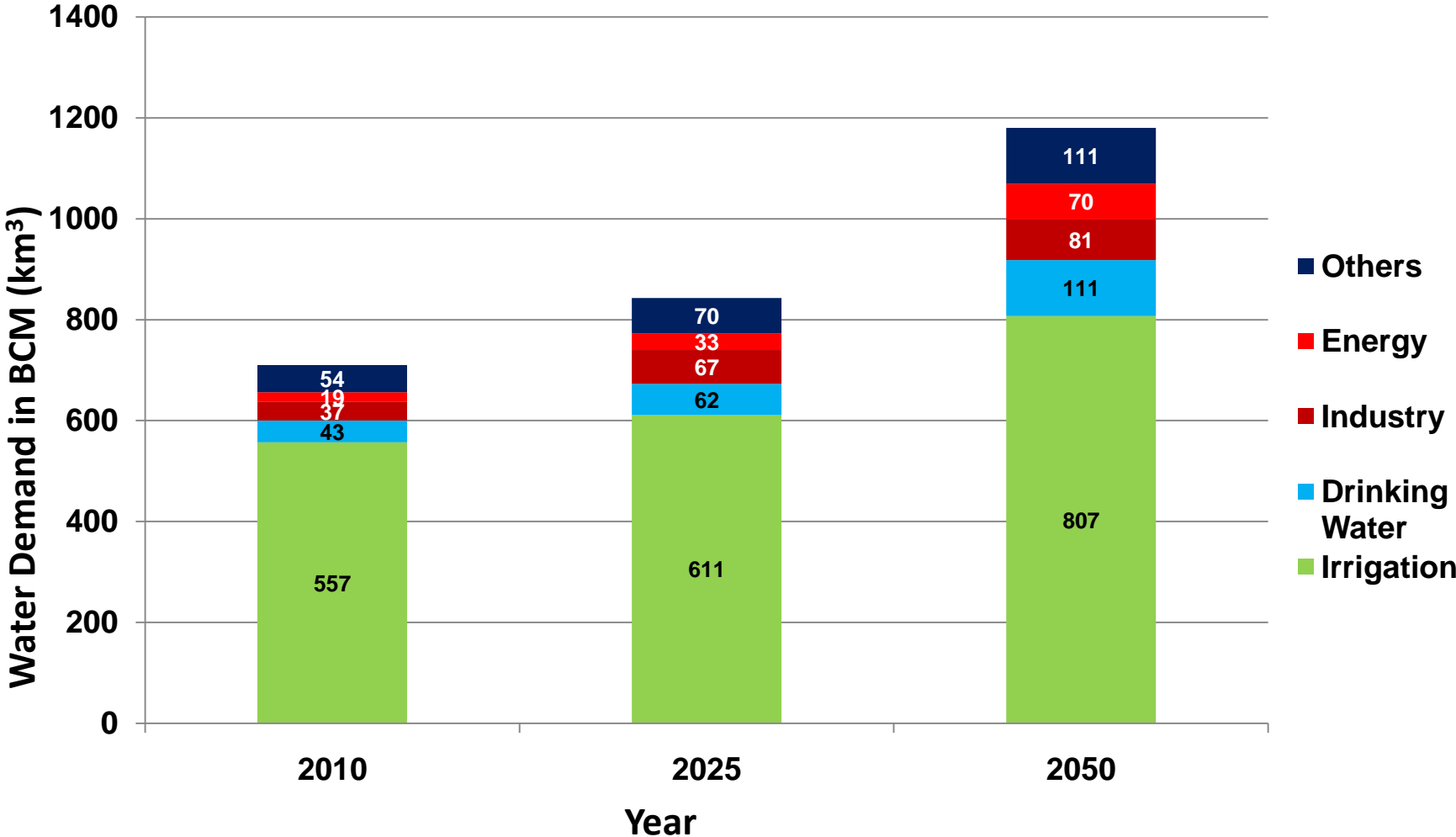
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# Low per Capita Storage



# Increasing Sectoral Demands



# Climate Change Projections for 2030 (base year 1970)

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- Annual mean surface air temperature rise by 1.7-2°C
- All India summer rainfall increase by 3-7%
  - Himalayan region: increase in annual rainfall by 60-206 mm
  - West coast: increase in annual rainfall by 69-109 mm; winter rainfall to decrease by 19 mm
  - East coast: increase in annual rainfall by 2-54 mm; winter rainfall to decrease by 14 mm
  - North-East: increase in annual rainfall by 0.3-3%; winter rainfall to decrease substantially

**The variability is further increasing**

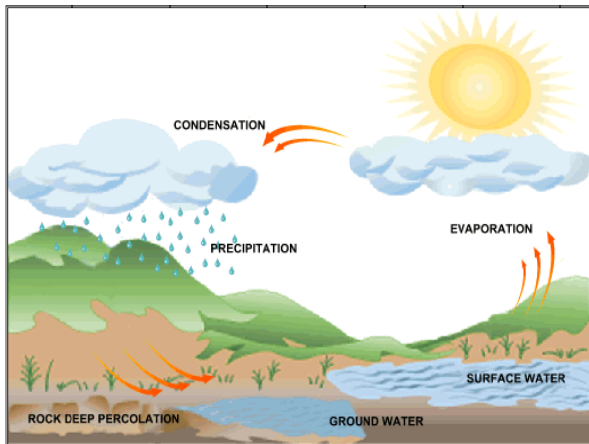


# National action plan for climate change

- A policy document prepared by Hon'ble Prime Minister's council on Climate Change unveiled in June 2008 declaring eight missions for adaptation to impacts of Climate Change:
  - National Solar Mission
  - National Mission for Enhanced Energy Efficiency
  - National Mission on Sustainable Habitat
  - National Water Mission (NWM) – Apr.2011
  - National Mission for Sustaining the Himalayan Ecosystem
  - National Mission for a Green India
  - National Mission for Sustainable Agriculture
  - National Mission on Strategic Knowledge for Climate Change

# National Water Mission - Objective

NATIONAL WATER MISSION  
under  
National Action Plan on Climate Change



COMPREHENSIVE MISSION DOCUMENT

Volume - I

New Delhi  
April 2011

Conservation of water,  
Minimizing wastage  
and  
Ensuring its more equitable  
distribution both across and  
within States  
through  
Integrated Water Resources  
Development and  
Management

Fifth report of United Nations Intergovernmental Panel on Climate Change (UNIPCC):

## **Some food for thought**

“If the world continues on its current carbon-spewing course, global temperatures will hit a staggering **4.8<sup>0</sup>** above pre-industrial levels by the end of the century.”

**Disastrous consequences:**

**for humanity,**

**ecosystems and,**

**sustainable development.**

# It is already harming people and ecosystems:

- melting glaciers,
  - disintegrating polar ice,
    - thawing permafrost,
      - changing monsoon patterns,
        - rising sea levels,
          - changing ecosystems and
            - fatal heat waves.
              - + acidic ocean waters,
                - frequent extreme weather events

(floods, cyclones, cloud bursts, unseasonal excessive rain, drought. )

## IMPACT:

These will worsen by continued and increasing emissions of green house gases:

burning of fossil fuels and deforestation.

CO<sub>2</sub> was in the range of 180-280 ppm which has increased to more than 400 ppm in the northern hemisphere. This should be taken as wakeup call.

## Will impact:

Economic growth,  
Overall health and development,  
Poverty reduction efforts,  
Food security programmes,

The Maldives, China, India, Pakistan, Bangladesh and Sri Lanka will be among the most affected country in Asia.

## Impact continued....

Climate change may be a determining factor in national security policies.

Coastal flooding will kill people and cause destruction, it will affect tourism.

Changing precipitation or melting snow are altering hydrological systems, affecting water resources in terms of quantity and quality.

**Nobody on the earth is going to be untouched by the impact of climate change.**

**Now about India and our State.....**



# ECOSYSTEMS OF INDIA

INDIA



# About Forests and Bio diversity of Chhattisgarh

- Recorded Forest Area : 59,772 Sq. km.  
(44.21% of geographical area)

Reserved Forest Area : 43.13 %

Protected Forest Area : 40.21 %

Un-classed Forest Area : 16.65 %



- Classification of Forests in terms of Forest Canopy Density Classes :

Very Dense Forests : 4,163 sq. km

Moderately Dense Forests : 34,811 sq. km.

Open Forests : 16,600 sq. km.

- Protected Area Network
- 3 National Parks (0.29 Million Ha.) &  
11 Wildlife sanctuaries (0.36 Million Ha.)  
3 Tiger Reserves
- Total Area under protected area network  
(0.65 Million Ha.= 4.79 % of geographical  
area)

# Key Issues

- Depletion of vegetative cover in order to expand agriculture. (Grow more food campaign)
- Increased rate of consumption of bio-resources:

Ever growing population of humans & cattle

The collection of fuel wood, NTFP,

Uncontrolled grazing,

Food security,

- Diversion of forest lands for non-forestry purpose like:

Mining leases

Industrial Estates

Roads

Minor and Major Irrigation Projects

Other Development Projects

(Resulting in reduction in the dense and very dense forests)

About 192 sq km and a proportionate increase in open and non-forests between 2004-09.

- Invasive alien weeds like **Parthenium**, **Lantana**, **Eupatorium** poses serious hindrance in germination and growth of indigenous species and local biodiversity.
- **Destructive harvesting** and collection practices of NTFPs & Medicinal plants:  
(Unsustainable removal of tubers, roots, bark, flower, fruits and seeds have contributed to forest degradation.)

Many species are in various stages of threat which were available in abundance few years back.

- Loss of Soil cover due to degradation of forest cover  
(in 40 percent of the State's managed forests)
- Inadequate emphasis on watershed management,
- Problems with natural regeneration of Sal,
- Repeated man made fires,
- Epidemics affecting forest stands and fauna are also key factors.

- Opening of new mines & mineral based industries in the recent past has led to destruction of rich habitats.

(The State is among the richest India State in terms of mineral wealth, with 28 varieties of major mineral including Diamonds and ranks second in the country in mineral products. State has Coal, Iron-ore, Lime stone, Dolomite, Bauxite, Tin as key minerals.)

Increasing demands on the mining sector pose a serious threat to biodiversity.

Northern districts of the State have witnessed installation of thermal power plants on pit heads. Resulting in thermal emissions and fly ash: serious threat to biodiversity

It has contributed to loss of forest cover and degradation of surrounding flora and fauna.

(Nearly 29 percent of forests, spread over 16,700 sq km, are degraded, and require urgent revitalization).



# Threat to Agriculture Bio-diversity

- Introduction of high yielding varieties and improved farming practices:

Threat to the indigenous domestic biodiversity.

- Development of uniform cultivars (species and varieties of desirable qualities), and spread of these cultivars:

Erosion of primitive crop genetic variety and loss of agro-biodiversity.

- Increased use of fertilizers and pesticides:

Decline in agro-biodiversity,

Decline in adjoining wild biodiversity,

Increased chemical toxicity of soil & water,

(Diminishing marginal returns and increasing threat to local biodiversity and human life)

# STRATEGIES:

1. Enriching the sink,
2. Reducing the source

- **Enriching the sink**

- Restoration of native bio-diversity with enhancing carbon sink in forests.

- Restoration of ecosystems and habitat diversity (e.g. grassland and pastures, wetlands and other critical ecosystems).

- A key role for local communities in project governance and implementation.

- (by creating eco-awareness and engaging them in green mission)

- Development, protection and preservation of State's wetlands.
- Reducing Emissions from Deforestation and Forest Degradation (REDD)
- + Incentives for positive elements of conservation, sustainable management and enhancement of forest carbon stocks. (REDD+)

- **Implementation of the State Biodiversity Strategy and Action Plan**

(Documentation, dissemination and keeping vigil on threat status of biodiversity resources.)

- **To sequester and store carbon in the forests**

(by Ensuring full stocking, maintaining health & hygiene by reducing losses owing to tree mortality, natural calamities, wildfires, insects and diseases and stand density management by prudent tree removal.

## Strategies Continued.....

- In open forests, large scale gap plantation of indigenous species and promotion regeneration of rootstocks.
- Soil and moisture conservation, run off reduction and integrated watershed management.
- Active Community participation in plantation activities and protection.
- Growing species which provide NTFP, fodder and fuel wood and addressing other livelihood needs.

## Strategies Continued.....

- Agro-forestry, farm-forestry, plantations along Canals, River embankments:

(to promote tree cover outside the forests.)

- Promoting need based research and documenting studies.

- On indigenous species to assess their vulnerability to climate change,
- assessing and documenting additional threats to bio-diversity and wildlife,
- population dynamics and movements of wildlife,
- monitoring carbon stock and bio-diversity at regular intervals.

- **Reducing the source:**

- Addressing drivers of degradation, firewood, grazing, soil runoff, requires sectoral convergence

- (e.g. livestock, forest, agriculture, rural development, energy depts. etc.)

- Addressing pollution issues, (source apportionment studies for air, water and soil pollution- mitigation measures also require sectoral convergence.)

- Creating eco-awareness among policy makers, implementers and common people.



## - Convergence

Better linkages and co-ordination with agriculture, energy, watershed management, water resources, mining and other departments and agencies of the State Government.

Linkages with universities, forests research institutes, national bodies, international development agencies, private sector, financial institutions, civil society, community based organizations

→ necessary for enhancing **GREEN COVER**.

THANKS