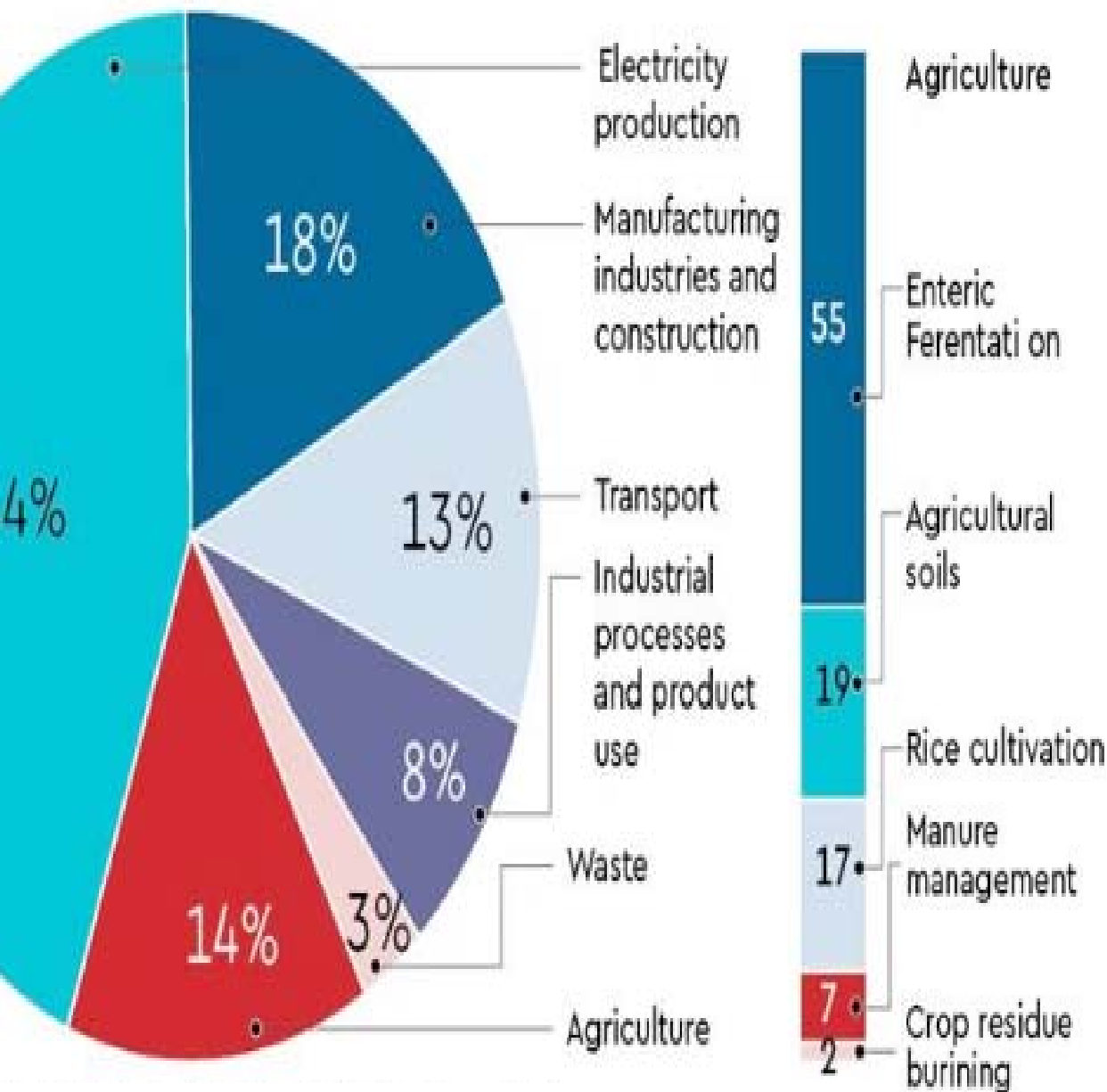


# Soil Health Management for Mitigating Climate Change



**Dr. A. R. PATHAK**  
**Former Vice Chancellor**  
**Navsari Agricultural University, Navsari**  
**& Junagadh Agricultural University,**  
**Junagadh**

**Gujarat-India**



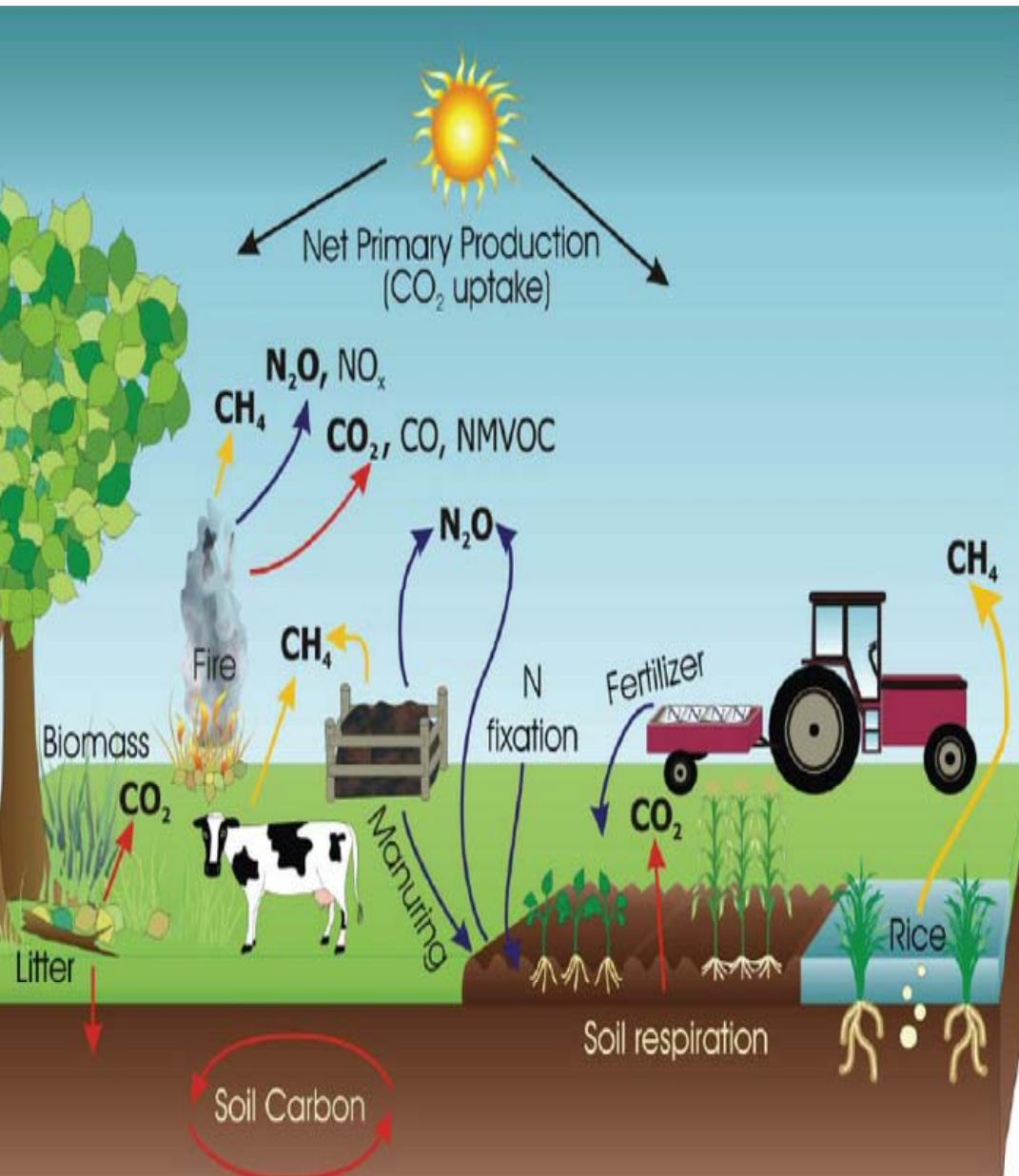
House Gas Emission in India from various sectors

**Greenhouse Gas Emissions:**

India is the third largest emitter of greenhouse gases after China and the US, emitting around 2.6 billion tonnes CO<sub>2</sub> equivalent annually.

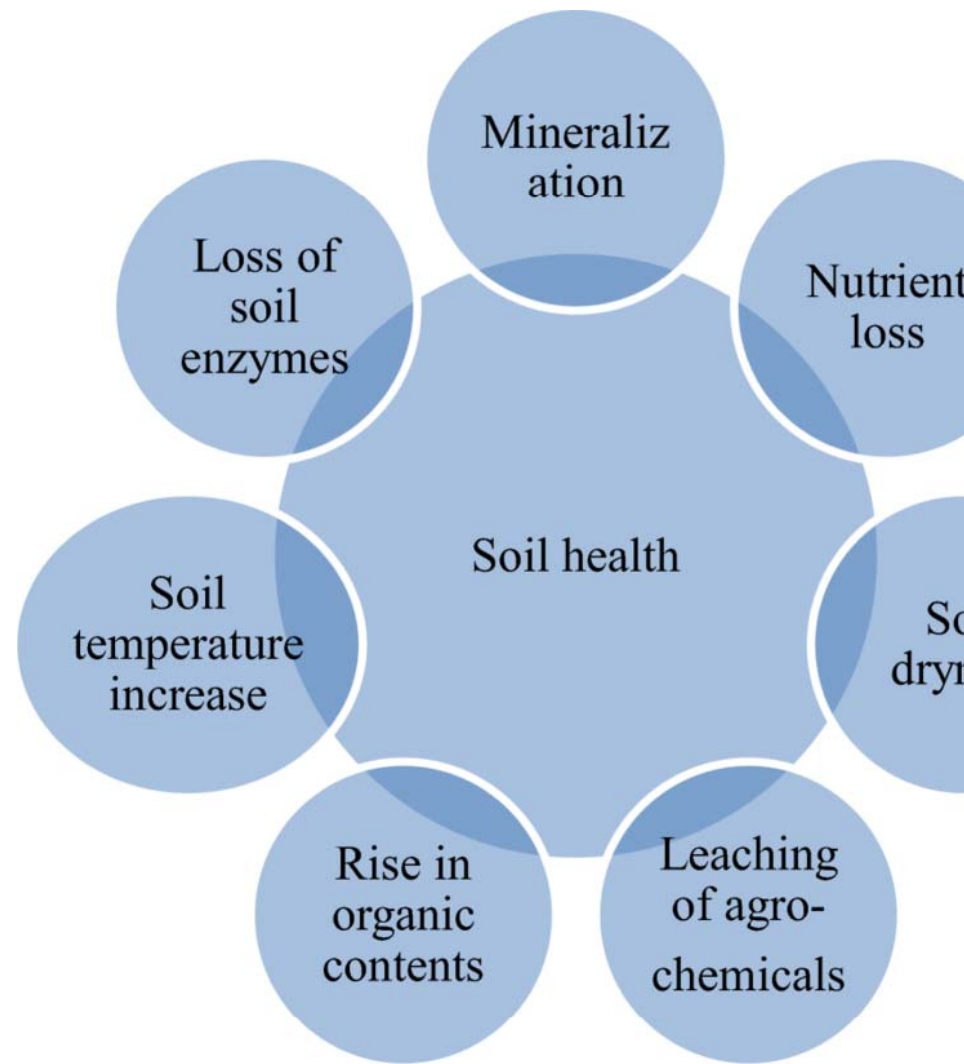
However, India's per capita emissions are just 1.8 tonnes, significantly lower than the world average of 4.4 tonnes per capita.

India, in its Nationally Determined Contributions (NDCs), committed to "reduce the carbon intensity of its GDP by 33 to 35% by 2030 from 2005 level."



**On-farm agricultural greenhouse gas emission sources, removals and processes in managed ecosystems**

## Impacts of climate change on soil



## Importance of Soil

Soil can nourish plants and maximize carbon fixation while minimizing the release of CO<sub>2</sub>, reversing the effects of climate change

After oceans, Soil is the second largest carbon sink

Agricultural Soils contribute 19% of Agriculture Sector Emissions in India

All life depends upon Soil- There can be no life without Soil and No Soil without life, They have evolved together

## MAXIMIZE CONTINUOUS LIVING ROOTS

- Crop Rotation
- Relay Crops
- Forage and Biomass Planting
- Perennial Crops
- Cover Crops

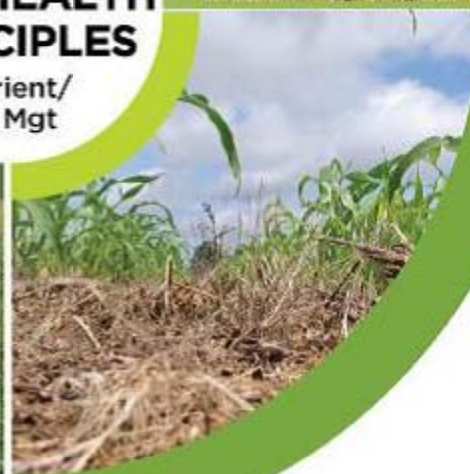
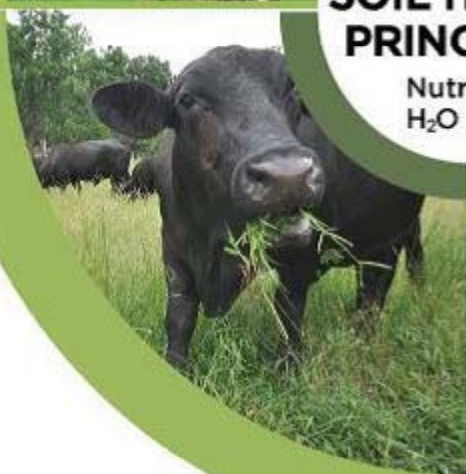


## MINIMIZE DISTURBANCE

- No-till
- Reduced Tillage
- Controlled Traffic
- Avoid Tillage When Wet
- IPM

## MAXIMIZE BIODIVERSITY

- Crop Rotation
- Rotational Grazing
- IPM
- Pollinator Plantings
- Organic Fertilizers
- Legumes in Mix
- Agroforestry
- Cover Crops
- Crop/ Livestock Integration



# 4 SOIL HEALTH PRINCIPLES

Nutrient/  
H<sub>2</sub>O Mgt

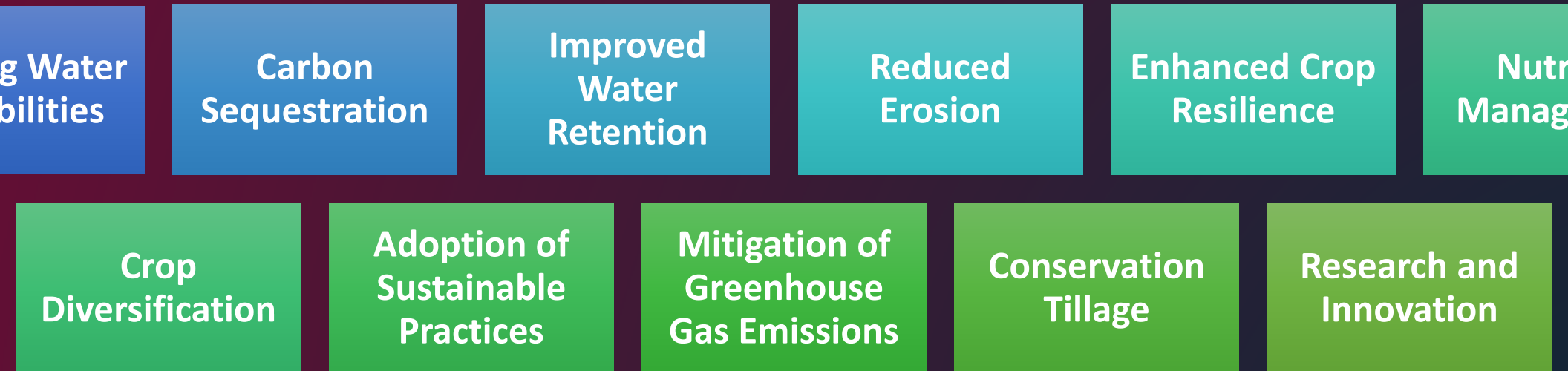
## MAXIMIZE SOIL COVER

- Mulching
- Reduced Tillage
- Forage and Biomass Planting
- Residue Retention
- Cover Crops
- Green Manures

# Soil Health Management

Soil health management is a critical component of climate change mitigation strategies, playing a pivotal role in enhancing agricultural sustainability and reducing the overall environmental impact.

How soil health management contributes to mitigating climate change



Anything that needs to be **managed well** is to be **measured well**  
Therefore **Soil Health Testing** is a core of soil health management

# Soil Health Card (SHC) Scheme

Collection of Soil Samples from farmers field.

Chemical analysis in Soil Testing Laboratory.

Distributing Soil Health Card to farmer- Online data managing through e-krushi kiran (AAU)

Recommendation of the fertilizers needed for crops, based on soil fertility status.

information on 12 parameters, including macronutrients, micronutrients, and physical parameters like pH, EC, and OC.

Alternative crops with a broad ranking of crops in terms of profitability.

- The Soil Health Card (SHC) Scheme launched by Govt of India in February 2015
- Was First Original in Gujarat

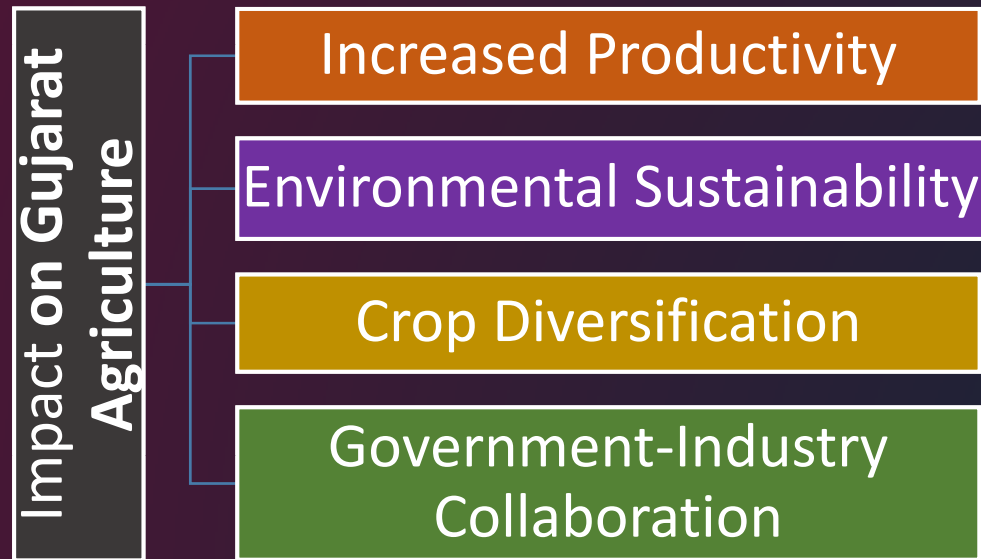


## Soil Health Card (SHC) Scheme

Adoption of Soil Health Card recommendations has led to a decline of 8-10% in use of chemical fertilizers and also raised productivity by 5-6% (National Productivity Council).

Under Phase-I (Years 2015 to 2017) 10.74 crore cards were distributed, while under the Phase-II 11.14 crore cards have been given away during the period.

**Soil Health Laboratories Infrastructure Created in India:-** 429 static labs, 102 new mobile labs, 1,562 village-level laboratories and strengthening of 800 existing labs.





# Pramparagat Krishi Vikas Yojana (PKVY)

ificantly contributed to soil health management, playing a vital role in mitigating climate change. The scheme has been instrumental in promoting organic/natural farming practices, focused on sustainable agricultural techniques that enhance soil health.

Through the adoption of organic inputs, reduced chemical usage, and increased reliance on natural processes, the scheme aims to improve soil fertility and structure. This leads to healthier soils, contributing to carbon sequestration, reducing greenhouse gas emissions.

By encouraging farmers to embrace climate-resilient and eco-friendly agricultural practices, the scheme plays a crucial role in fostering soil health management practices that have tangible benefits for both farmers and the environment in the context of climate change mitigation.

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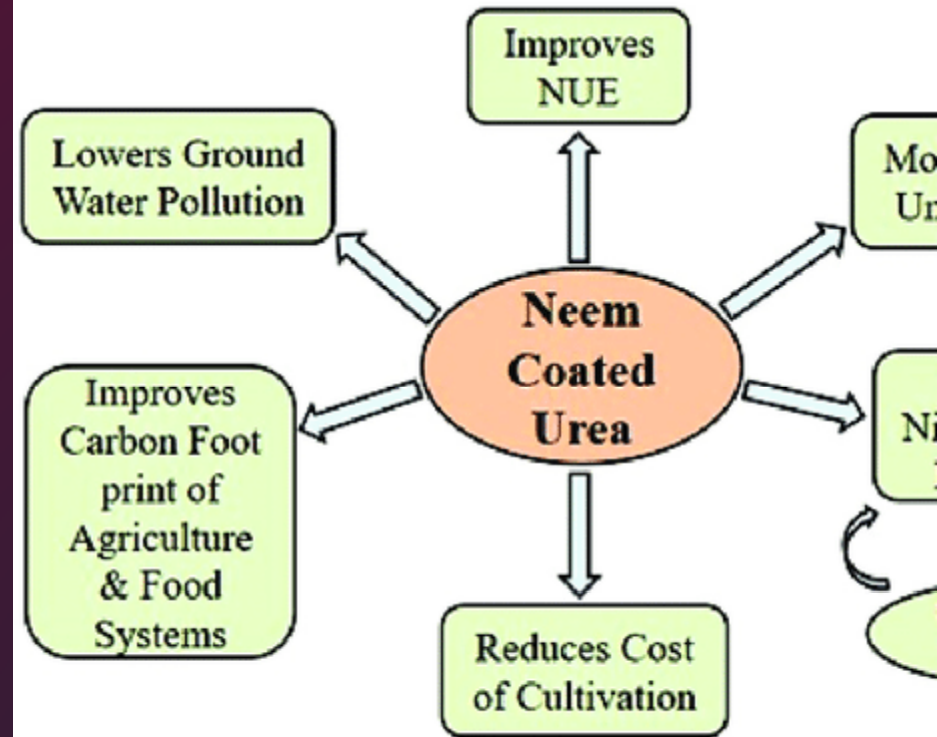
# Neem-coated urea

Nitrogen efficiency of normal urea is 40-50% and remaining nitrogen, around 50-60% is lost due to evaporation, leaching and denitrification. This loss can be reduced by use of neem coated urea.

This innovation involves coating urea with neem, a natural biopesticide, offering multiple advantages.

The slow release of nitrogen from neem-coated urea enhances nutrient absorption, reducing runoff and reducing greenhouse gas emissions linked to nitrogen fertilizers.

The neem coating's pesticidal properties contribute to pest and disease control.



# National Biogas and Manure Management Program

National Biogas and Manure Management Program by the Ministry of New and Renewable Energy in India has played a pivotal role in advancing soil health management and mitigating climate change.

The program promotes the installation of biogas plants, utilizing organic waste for methane production. The resultant bio-slurry, a by-product rich in nutrients, serves as an excellent organic fertilizer.

Over 50 lakh biogas plants have been installed

across the country. The application of bio-slurry in farms enhances soil fertility and water retention, leading to improved soil health, increased crop yields, and resilience to climate change.

The anaerobic digestion process in biogas plants reduces methane emissions from organic waste, acting as a potent greenhouse gas, thereby supporting climate change mitigation efforts.

The program thus represents an integrated approach, fostering sustainable agriculture, waste management, and environmental conservation.

# Ministry of Agriculture & Farmers Welfare

Government of India



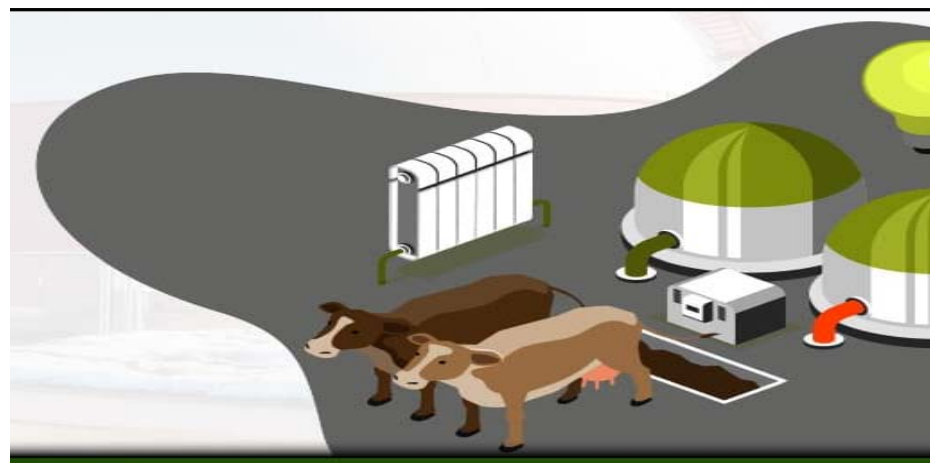
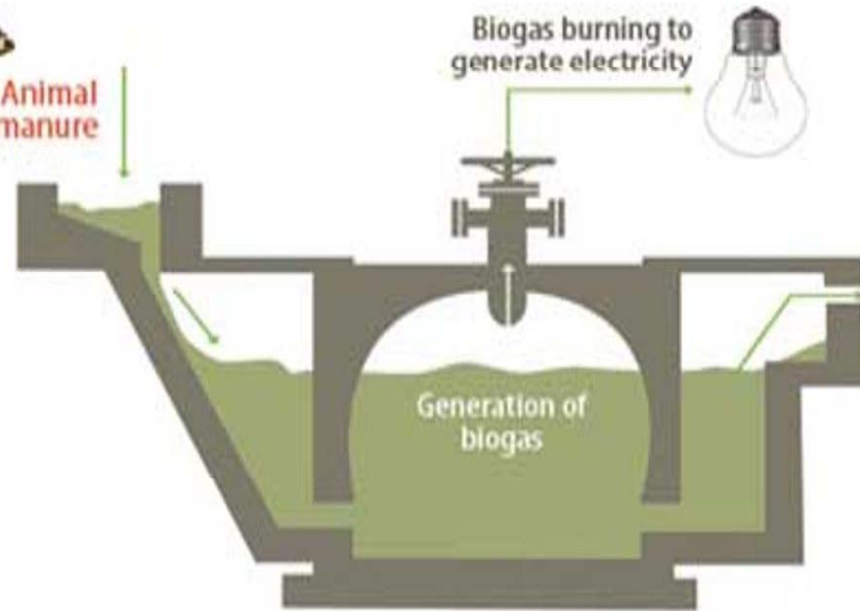
## Sub-Mission on Agroforestry

Under this Scheme, an area of 52,003 hectare has been brought under plantation, 580 nos. of nurseries have been established and 1.3 Crore trees have been planted during last three years (2016-17 to 2018-19) across 20 states & one union territory (Jammu & Kashmir) which are implementing SMAF Scheme.

The major species being planted include (Santalum album (Santal/Chandan), Aegle marmelos (Bael), Azadirachta indica (Neem), Litsea glutinosa (Bollygum), Poplar, Eucalyptus, Dalbergia sissoo (Indian rosewood/Shisham), Terminalia arjuna (Arjuna) etc.



Animal manure



# Mission on Agroforestry

Mission on Agroforestry in India has emerged as a key strategy to promote sustainability in agriculture. By encouraging the integration of trees and shrubs into farming systems, the mission aims to enhance environmental resilience and socioeconomic well-being.

Agroforestry practices contribute to sustainable land use by **preventing soil erosion, improving water retention, and enhancing biodiversity**. The presence of trees provides multiple benefits, including **carbon sequestration**, improved soil fertility, and diverse income sources for farmers. Additionally, agroforestry systems help mitigate climate change by acting as carbon sinks.

The mission facilitates knowledge dissemination. Ultimately, the integration of trees into rural landscapes fosters a more sustainable and resilient farming ecosystem, addressing both environmental and economic challenges.

# The Green India Mission

Green India Mission, launched in 2014, aims at protecting, restoring and enhancing forest cover and responding to climate change. The target under the Mission is to plant 6 billion trees in 600 million hectares (mha) of forest and non-forest lands for increasing the forest and tree cover and improving the quality of existing forests.

Significantly contributed to soil health management and climate change mitigation in India. Focused on afforestation, reforestation, and biodiversity conservation, the mission has introduced practices that positively impact soil health.

Increased green cover helps prevent soil erosion, improves water retention, and promotes nutrient cycling, thereby enhancing overall soil health.

# The National Mission on Sustainable Agriculture (NMSA)

The National Mission on Sustainable Agriculture (NMSA) launched in 2015, plays a crucial role in promoting soil health management and mitigating climate change in agriculture. It focuses on sustainable agricultural practices that enhance productivity while minimizing environmental impact.

By promoting organic farming/natural farming practices and efficient water management, NMSA contributes to improved soil health and resilience.

NMSA reduces greenhouse gas emissions, enhances carbon sequestration and promotes climate-resilient farming systems. Through capacity building, research, and technology adoption, it aims to create a more sustainable and climate-smart agricultural sector in India.

These integrated initiative schemes collectively spearhead sustainable agriculture, nurture soil health, and play a vital role in climate change mitigation, addressing environmental challenges in the agricultural sector.

# Healthy Soil: Cornerstone of Life

Biological  
Diversity

Food  
Production

Water  
Benefits

Carbon  
Storage

# Thank You