



UNIT V - CLIMATE CHANGE AND MITIGATION MEASURES

Mitigation Efforts in India and Adaptation funding Key Mitigation Technologies and Practices

India is advancing in mitigation and adaptation efforts to combat climate change, focusing on key technologies, policies, and financial mechanisms that aim to reduce greenhouse gas emissions and support communities in adapting to climate impacts.

1. Renewable Energy Expansion

- *Solar Power: India has set ambitious targets to increase solar power capacity, with initiatives like the International Solar Alliance (ISA) and rooftop solar programs to expand solar access. Innovative technologies like solar photovoltaic (PV) cells, concentrated solar power (CSP), and bifacial solar panels are being promoted to maximize efficiency.*
- *Wind Energy: India is one of the largest markets for wind energy and aims to increase onshore and offshore wind power capacities. Technological improvements, such as larger and more efficient wind turbines, have lowered costs, making wind a competitive clean energy source.*
- *Green Hydrogen: India is exploring green hydrogen, produced using renewable energy, as a clean fuel source. The National Hydrogen Energy Mission aims to reduce emissions from hard-to-abate sectors like steel and cement.*

2. Electrification of Transport

- *Electric Vehicles (EVs): India's Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme aims to increase EV adoption. Battery technology advancements and EV infrastructure expansion (charging stations, etc.) are key focuses.*
- *Biofuels: The government supports biodiesel and ethanol blending in fuels, which helps lower carbon emissions from the transportation sector. Feedstock innovation (e.g., using non-edible oils, crop residue) and waste-to-biodiesel technologies are being developed to make biofuels more sustainable.*

3. Sustainable Agriculture and Climate-Smart Farming

- *Precision Agriculture: Technologies like AI, drones, and IoT are helping farmers optimize water use, nutrient application, and pest control, making agriculture more resource-efficient and resilient to climate change.*
- *Agroforestry and Organic Farming: Encouraging agroforestry and organic practices promotes carbon sequestration, improves soil health, and enhances biodiversity. Initiatives like the National Mission for Sustainable Agriculture (NMSA) support these practices.*
- *Climate-Resilient Crop Varieties: India is developing and promoting drought-resistant, flood-tolerant, and salt-tolerant crop varieties to help farmers adapt to changing climate patterns.*

4. Building and Industrial Efficiency

- *Energy-Efficient Buildings: The Energy Conservation Building Code (ECBC) sets standards for energy efficiency in commercial buildings. Technologies like green roofs, solar panels, and smart appliances are promoted to reduce energy consumption.*
- *Waste-to-Energy: India is investing in waste-to-energy plants that convert municipal and agricultural waste into biogas and other energy forms, which mitigates emissions and provides energy.*
- *Carbon Capture and Storage (CCS): Emerging CCS technologies capture carbon from industrial emissions and store it underground or use it in products, which can help reduce emissions from sectors like cement and steel.*

5. Forest Conservation and Afforestation

- *The National Afforestation Program and the Green India Mission focus on restoring degraded forests and increasing forest cover. These programs provide ecosystem services, carbon sequestration, and livelihood opportunities for local communities.*
- *India's implementation of the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) mechanism aligns with global forest conservation efforts, enabling carbon financing from developed countries.*

Adaptation Funding Mechanisms

India is securing funds from both domestic sources and international climate finance mechanisms to support adaptation:

1. Domestic Funding Initiatives

- **National Adaptation Fund for Climate Change (NAFCC):** The NAFCC supports state-level adaptation projects focusing on sectors vulnerable to climate impacts, such as water resources, agriculture, and forestry.
- **State Climate Action Plans:** Each Indian state has developed a climate action plan with funding from central government resources to enhance local resilience.

2. International Climate Finance

- **Green Climate Fund (GCF):** India collaborates with GCF for adaptation and mitigation projects. The GCF has funded projects related to water resource management, agriculture resilience, and disaster risk reduction in vulnerable communities.
- **Global Environment Facility (GEF):** The GEF supports India in biodiversity conservation, sustainable land management, and coastal resilience projects.
- **Adaptation Fund:** Under the United Nations Framework Convention on Climate Change (UNFCCC), the Adaptation Fund has funded projects in India for infrastructure improvements, flood control, and food security.

3. Public-Private Partnerships (PPPs) and Corporate Social Responsibility (CSR)

- PPPs and CSR initiatives fund climate resilience projects, such as water management, renewable energy installations, and sustainable agriculture. For example, private companies support reforestation and solar power installations in rural areas.

India's combined focus on renewable energy, efficient technology adoption, resilient agriculture, and international funding allows for a balanced approach to both climate mitigation and adaptation efforts. These strategies are crucial as the country works toward ambitious climate targets, such as its net-zero goal by 2070.