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CLIMATE CHANGE AND IMPERATIVES FOR SUSTAINABLE DEVELOPMENT UNDER MODI'S GOVERNMENT

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In 2014, India's climate and energy policy was fragmented and had a limited environmental focus. Most initiatives were shaped by the need to ensure energy access and economic growth. Climate policy was not integrated into the development planning, and international negotiations were approached cautiously based on long-standing equity and historical responsibility positions.

Over the last eleven years, however, this approach has undergone a major shift. Institutional reforms, large-scale schemes, and a focus on co-benefits have transformed India into a country where climate mitigation and development objectives reinforce each other. Today, India's climate policy reflects a steady and strategic shift over the last eleven years. It is a transition grounded in institutional reform, driven by large-scale implementation, and guided by the principle that economic development and environmental responsibility must move together. Whether through rooftop solar systems, ethanol plants in rural districts, digital tolling on highways, or LED bulbs in households, the direction has been clear: inclusive, outcome-based, and sustainable.

The most significant feature of this shift has been the remarkable expansion of non-fossil fuel electricity capacity, from 76 GW in 2014 to 223 GW by February 2025, reflecting growth of over 180%, and India's accelerated transition towards cleaner energy sources. India's solar capacity alone increased by 3,450% between 2014 and 2025 reflecting the combined impact of supportive policies and institutional reforms. A series of focused policy initiatives by the government led by Prime Minister Narendra Modi has enabled this growth. Solar Parks were established to aggregate demand and facilitate land acquisition. Interstate transmission charges for renewable power were waived. Dedicated Green Energy Corridors were built for

efficient grid integration. A Production-Linked Incentive (PLI) scheme supported the domestic manufacturing of solar photovoltaic modules.

In parallel, the government made remarkable progress in the biofuel sector. Ethanol blending in petrol increased from 38 crore liters in 2013–14 to 707 crore liters in 2023–24, representing an increase of over 1,186%. The scale-up was facilitated through the National Policy on Biofuels, a reduction in the Goods and Services Tax (GST) on ethanol, and the Ethanol Interest Subvention Scheme. The expansion delivered tangible economic gain. Between the Ethanol Supply Year (ESY) 2014–15 and January 2025, a total of Rs. 1.04 lakh crores were paid to farmers. These payments supported agricultural incomes and created stable demand for agri-residues, enabling the sector to participate directly in energy transition efforts.

At the core of this approach is the recognition by the Modi government of the increasing importance of energy security. With growing demand resulting from India's economic expansion, price volatility in global energy markets, and legacy issues in domestic fuel supply, the imperative to diversify and decarbonize the energy base has become stronger.

An important pillar of India's climate-oriented infrastructure policy has been the digital reform of toll collection. Before 2014, toll plazas were characterized by cash-driven congestion and inefficiency, with average wait times of around 12 minutes per vehicle. The introduction of FASTag has brought significant improvements. With the issue of 10 crore FASTags, the average wait time has nosedived to just 47 seconds. Moreover, the introduction of FASTag has led to fuel savings of Rs 70,000 crores and a reduction of 9.78 lakh tonnes of carbon dioxide emissions. The transformation of tolling mechanisms illustrates how digital tools, with a political intent, can generate both environmental and economic value.

India has also made significant gains in energy efficiency through the Unnat Jyoti by Affordable LEDs for All (UJALA) scheme. Launched in 2015, UJALA has led to the sale of around 408 crore LED bulbs across the country. As a result, the average household electricity bill has been reduced by 15%. The scheme saved 47,883 million kilowatt-hours of energy annually, reduced carbon dioxide emissions by 38.8 million tonnes per year, and resulted in annual financial savings of Rs. 19,153 crores. UJALA has demonstrated the role of demand-side interventions in climate change mitigation by encouraging the widespread adoption of low-energy lighting.

A major push has also come through the PM Surya Ghar Muft Bijli Yojana, launched in February 2024. In its first year, rooftop solar systems have been installed in 8.6 lakh houses.

A subsidy amounting to Rs. 4,966 crores has been disbursed by January 2025. The scheme has enabled households to reduce their electricity expenses while contributing to national energy sustainability by promoting Jan Bhagidari. The widespread adoption also highlights the increasing importance of decentralized solar power in meeting future energy needs.

The impact of the schemes and initiatives rolled out over the past decade is clearly visible as the Modi government's climate strategy is now delivering quantifiable outcomes. Between 2005 and 2020, the carbon emission intensity of GDP declined by 36%, reflecting the growing alignment between economic growth and environmental responsibility. In 2020 alone, greenhouse gas emissions fell by 7.9% compared to the previous year.

To be sure, clean energy, biofuels, and energy efficiency were not pursued as standalone environmental goals, but rather as integral elements of national development strategy, whose defining feature is the co-benefits approach. Energy security, rural income support, transport efficiency, and consumer savings became vehicles for achieving climate goals. As a result, development and climate policy were no longer treated as competing priorities. The alignment helped build consensus across ministries and sectors, allowing policy momentum to be sustained over multiple years.

India on the Forefront of Mitigating Climate Change

We all have a bleak picture in our minds of what would happen if climate change remained a challenge for India. But do we really know the outcome? Climate change is a massive threat to mankind; therefore, many countries, including India, are trying to combat its detrimental effects. Here is what you need to know why the subject is a “now or never” situation for India and what can be done to tackle the effects of climate change.

Broadly speaking, the geographical surface of the Indian subcontinent is divided into six physiographic regions, which are namely the Himalayas, Peninsular Deccan Plateau, the Indo-Gangetic Plains, Coastal Plains, the Thar Desert, and the Islands. Each physiographical region has a unique climatic profile and vulnerability profile. According to a study by World Bank, the temperature in India is warmer than that of other countries due to the Himalayas acting as barriers to winds coming from Central Asia and China. The temperature might only rise further in the future, which can lead to extreme weather conditions such as heatwaves, prolonged droughts, heavy rainfall, etc.

To combat the situation, the Government of India, startups, and many NGOs are working together to control the pace of climate change in India. Almost a decade ago, climate change was hardly a matter of concern. But today, given the drastic implications of climate change,

the situation demands urgent action. The Indian government has been instrumental in controlling and managing climate change, and the solutions have benefited the people of India.

Some of the key initiatives taken by the Central Government are as follows:

International Solar Alliance (ISA)

It's not unusual for temperatures to hit 48 degrees celsius in India's hottest regions, such as Rajasthan. The place becomes nearly uninhabitable for humans. But the region is undoubtedly ideal for one of the biggest solar farms in India. Launched in 2015, the International Solar Alliance is a solar power development project in collaboration with France. ISA is an alliance of the "sunshine countries" to utilise solar energy efficiently. The alliance was formed with solar energy-rich countries to reduce the dependency on non-renewable sources of energy like fossil fuels.

One Sun, One World, One Grid Project

The idea of the One Sun, One World, One Grid (OSOWOG) project was first proposed by honourable Prime Minister Mr. Narendra Modi during the first assembly of the International Solar Alliance in 2018. Through OSOWOG, the programme aims to provide energy to about 140 countries by a common grid that transfers solar power. The project acts as one of the solutions to many of our global problems in the energy sector. The United Kingdom jointly launched the OSOWOG initiative in partnership with ISA and the World Bank Group.

Swachh Bharat Mission

The Swachh Bharat Mission is another landmark initiative by the Honourable Prime Minister, Mr. Narendra Modi. The initiative covered 4,041 statutory towns to clean the streets, roads, and infrastructure of India and provide sanitation facilities for every household. Under the initiative, all villages, districts, and gram panchayats in India declared themselves "open defecation free" by 2nd October 2019, on the 150th birth anniversary of Father of the Nation, Mahatma Gandhi. The initiative helped build over
100 million toilets in rural India.

COP26 Glasgow Summit

While addressing the world leaders at the annual conference of United Nations COP26 in Glasgow, the Hon'ble Prime Minister of India listed five commitments of India to combat climate change. The announcements were:

- India will achieve a target of net zero emissions by the year 2070.
- By 2030, India will meet 50 percent of its energy requirements from renewable sources.

- India will decrease the total projected carbon emissions by one billion tonnes by 2030.
- India will take its non-fossil energy capacity to 500 GW by the end of 2030.
- The nation will reduce carbon intensity by more than 45% by 2030.

Climate Tech & Indian startups

Climate tech is a solution that involves providing new and feasible solutions to combat climate change. Climate tech includes finding ways to minimise greenhouse gas emissions and offering environment-friendly alternatives to existing technologies. According to the Economic Survey 2021-22, India is the third-largest startup ecosystem in the world, In terms of how holistic the overall growth has been, startups in India have spread over 56 industries, with the top 5 being IT services, Healthcare & Lifesciences, Professional & Commercial Services, Education, and Agriculture.[source] Climate tech is one of the latest additions to this list, as several startups have emerged that are focusing on India's climate crisis.

The Current Scenario

With people becoming increasingly aware of climate change, the Indian government has also shifted its focus to the climate crisis. At the 26th session of the Conference of the Parties (COP26), India presented five nectar elements (Panchamrit) as its climate action:

- Reach 500 GW of Non-fossil energy capacity by 2030.
- Generate fifty percent of India's energy requirements from renewable energy by 2030.
- Reduce total projected carbon emissions by one billion tonnes from now to 2030.
- Reduce the carbon intensity of the economy by 45 percent by 2030, over 2005 levels.
- Achieve the target of net zero emissions by 2070.

The government has already started taking the necessary steps in the right direction to combat climate change. As a result, the climate-tech sector is experiencing a huge boom.

The Impact

Today, several investors (both angel investors and venture capitalists) prefer to do business with companies that value the planet and offer solutions to ease the ongoing climate crisis. Although it takes a lot of effort to generate sufficient traction and attract investors, climate tech startups have an obvious advantage with them. This is the reason why they appear as a better option to investors, as compared to others.

Typically, investors prefer to put their money into ideas that promise potential and can effectively address a few of the most common real-world problems. The climate-tech domain

is just the right fit, with plenty of opportunities. And the focus of these startups is on the environment, which is a plus!

India's Climate Change Policy: Towards a Better Future By Shyam Saran

As a populous, tropical developing country, India faces a bigger challenge in coping with the consequences of Climate Change than most other countries. Climate Change is a global phenomenon but with local consequences. There are both external and domestic dimensions to India's Climate Change policy which has been articulated through two key documents. One is the National Action Plan on Climate Change(NAPCC) adopted on June 30, 2008. The other is India's Intended Nationally Determined Commitments(INDC) submitted to the UN Framework Convention on Climate Change(UNFCCC) in October 2, 2015. The NAPCC has an essentially domestic focus. The INDC is a statement of intent on Climate Change action announced in the run up to the Paris Climate Change summit held in December the same year. The NAPCC incorporates India's vision of ecologically sustainable development and steps to be taken to implement it. It is based on the awareness that Climate Change action must proceed simultaneously on several intimately inter-related domains, such as energy, industry, agriculture, water, forests, urban spaces and the fragile mountain environment. This was the backdrop to the 8 National Missions spelt out in the NAPCC. This need for inter-related policy and coordinated action has been recognized, only several years later, in the adoption by the UN of the 17 Sustainable Development Goal (SDG). The National Missions are on Solar Energy, Enhancing Energy Efficiency, creating a Sustainable Urban Habitat, Conserving Water, Sustaining the fragile Himalayan Eco-system, creating a Green India through expanded forests, making Agriculture Sustainable and creating a Strategic Knowledge Platform for serving all the National Missions. The NAPCC acknowledged that Climate Change and Energy Security were two sides of the same coin; that India had to make a strategic shift from its current reliance on fossil fuels to a pattern of economic activity based progressively on renewable sources of energy such as solar energy and cleaner sources such as nuclear energy. Such a shift would enhance India's energy security and contribute to dealing with the threat of Climate Change. Thus a co-benefit approach underlies India's Climate Change strategy. The NAPCC constitutes India's response to Climate Change based on its own resources but recognizes that it is intimately linked to the parallel multilateral effort, based on the principles and provisions of the UNFCCC, to establish a global Climate Change regime. It was India's hope that the ongoing multilateral negotiations under the UNFCCC would yield an agreed outcome, based on the principle of Common but

Differentiated Responsibility and Respective Capabilities(CBDR), which would enable developing countries like India, through international financial support and technology transfer, to accelerate its shift towards a future of renewable and clean energy. While India has made significant progress in implementing several of the National Missions, its expectations of a supportive international Climate Change regime based on equitable burden sharing among nations, has been mostly belied. It is in this context that one should evaluate India's subsequent NDCsubmitted on the eve of the crucial Paris Summit on Climate Change of December 2015. Prime Minister Modi has been one of the world leaders who has taken a keen interest in Climate Change issues. Under his leadership India decided to adopt a more pro-active, ambitious and forward looking approach in the run-up to the Paris Climate summit. This is reflected in the country's INDC. It links India's commitment to ecologically sustainable economic development with its age old civilizational values of respecting Nature, incorporating a sense of inter-generational equity and common humanity. The targets India has voluntarily committed itself to are unprecedented for a developing country. The energy intensity of India's growth will decline by 33-35% by 2030 compared to 2005 base year, which means that for every additional dollar of GDP India will be using progressively and significantly lesser amount of energy. There is confidence that based on the achievements of the National Mission on Enhancing Energy Efficiency, this target will be met.India being one of the world's largest emerging economy, which already has a large energy footprint globally, this constitutes a major contribution to tackling global Climate Change. The INDC has set a target of 175 GW of renewable energy by the year 2030 on the strength of the outstanding success of the National Solar Mission. It is reported that this capacity may well be achieved 10 years in advance. The government may raise India's target to 227 GW for 2030. The target of achieving 40% of power from renewable sources by 2030 is likely to be achieved several years in advance. The figure is already 21% as of date. India is actively reducing the component of coal based thermal power in its energy mix. It is not widely known that the country has a very high cess on coal, of the order of Rs.400 per tonne, proceeds from which go into a Clean Energy Fund. India is also committed to not building any new thermal plants which are not of the most efficient ultra-supercritical category. India played a major role in assuring the success of the Paris Climate summit and Prime Minister Modi's personal intervention in the adoption of the landmark Paris Agreement was acknowledged by several world leaders. His initiative on the setting up an International Solar Alliance for promoting solar power worldwide was welcomed. India is advancing on a broad

front to ensure a clean energy future for its people, drawing upon its ingrained civilizational attributes and putting in place a wide range of policy interventions under the legal framework of the Energy Conservation Act, covering 15 energy intensive industries and the Energy Conservation Building Code, covering all new urban infrastructure. 32 states of the Indian Union have formulated and begun implementing their own State Action Plans on Climate Change(SAPCC). There is also an active and vibrant civic society which is promoting citizens' awareness of the threat of Climate Change and what each of us can do as individuals to meet this threat. It is hoped that India's leadership in dealing with its own challenges of Climate Change and Energy Security will act as a spur to other countries to raise their own contributions to meeting this global and existential challenge. Failure to do so condemns humanity to an uncertain and possibly catastrophic denouement.

The Climate Agenda For Modi 3.0: Mitigation And Adaptation Needs To Be A Balancing Act

With the temperature soaring close to 50 degree Celsius during the Lok Sabha election this year, issues related to climate change and its impact have come to the fore and will likely be part of the government's immediate concern.

Many voters themselves addressed the urgency to focus on climate change. On May 25, East Delhi resident Ronika Sawhney stepped out to cast her vote. Queuing up to cast her vote with the temperature above 45 degrees, Sawhney said, "It was a test between my health and the duty to the nation...Regardless of who comes to power, climate change needs more attention." In fact, a majority of the 2,178 people surveyed by the Yale Program on Climate Change Communication and CVoter said they were worried about various environmental issues harming their locality, including agricultural pests and diseases, extinction of plant and animal species, climate extremes and severe air pollution.

So what should be the government's climate agenda? Some experts advocate a balancing act between mitigation and adaptation. This would mean that while India works to curb carbon emissions, it should also empower citizens with facilities, infrastructure and policies to adapt to climate change-triggered crises.

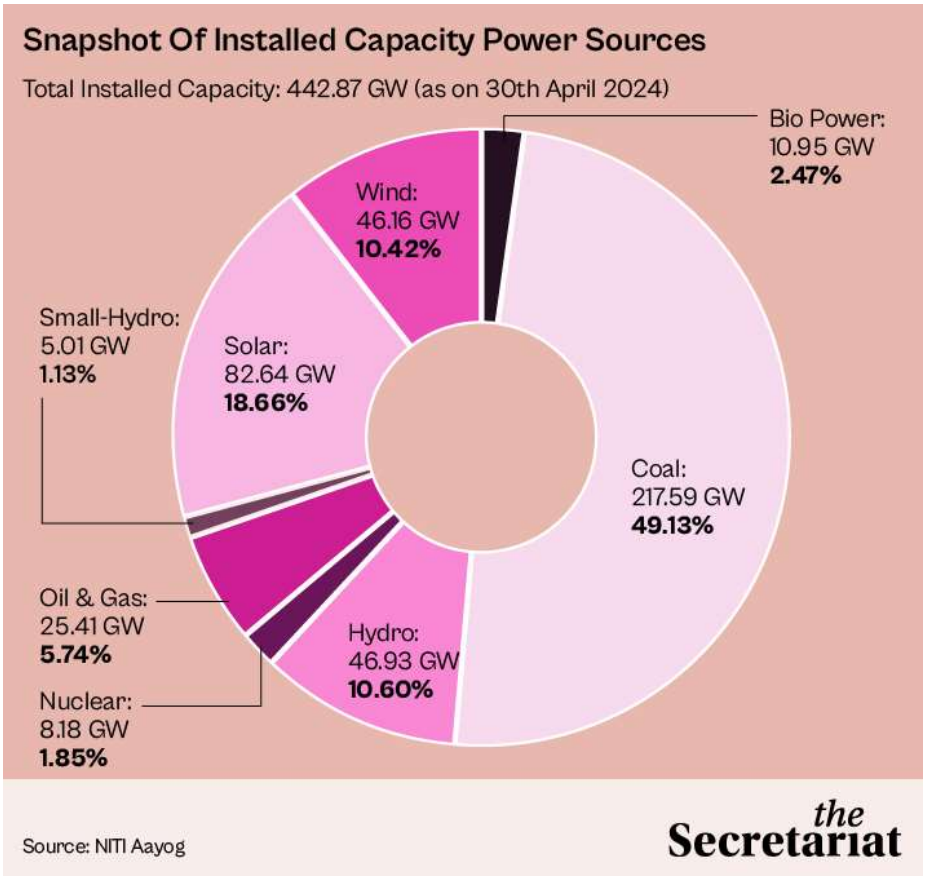
Anushree Joshi, Climate and Sustainability Researcher at Boston Consulting Group (BCG) India, told *The Secretariat*, "Although, India is lacking in both adaptation and mitigation, all big-ticket steps taken here (in India) are mitigation measures. There should be a balance of mitigation and adaptation, which global forums like COP are moving towards. India should

be at the forefront of these efforts given how agriculture, which suffers due to lack of adaptation, is a big part of our economy."

The Push For Renewables

India has been eagerly pursuing the path of sustainability as it broadens sustainable development. For instance, the country has been leading on the front of energy transition, shifting towards greener forms of energy like solar, wind, hydropower, etc.

According to India Climate and Energy Dashboard, the total installed power generation capacity is 442.87 GW with coal contributing 49 per cent. Renewable energy capacity has also increased rapidly over the years.



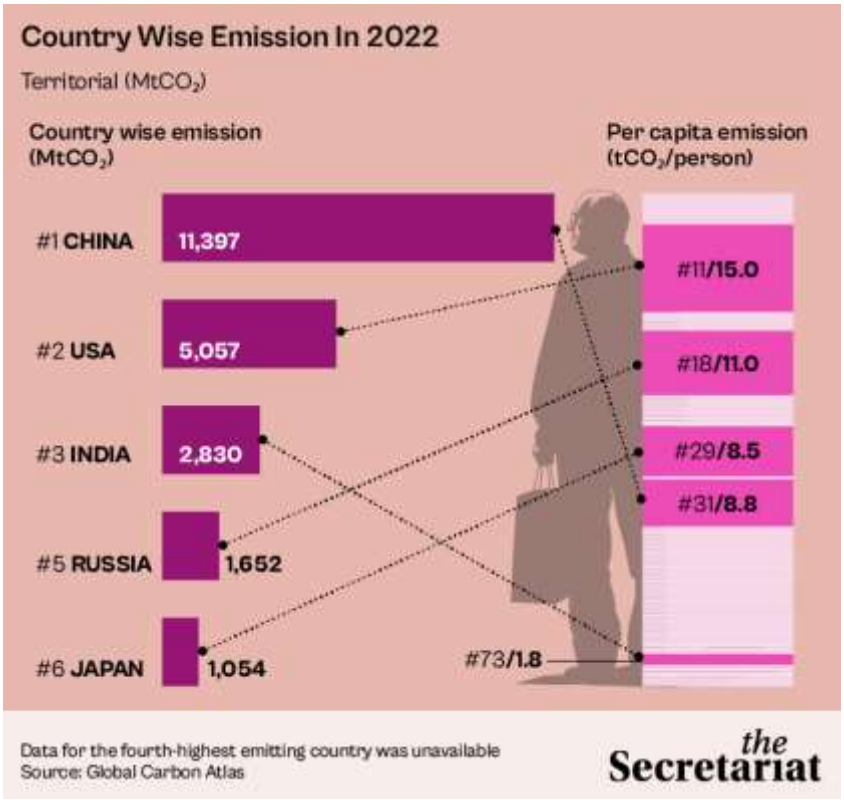
Solar holds the highest share among renewables at 18.6 per cent with wind and hydro at 10.42 per cent and 10.60 per cent respectively. With the governmental target of achieving 50 per cent of its total power capacity from renewable energy, the bid has worked out.

In addition, the country has adopted electric vehicles and hybrid vehicles in a big way. It still needs booster shots to help in better manufacturing and infrastructure evolution. Not just private vehicles, public transport is also switching to the electric mode.

But again all the government's aforementioned efforts fall under mitigation, allowing India to emit less and be accountable for carbon emissions. This close watch on emissions has increased after India committed to Net Zero by 2070 at COP28.

India was still the third top emitter globally in 2022, emitting 2,830 metric tonnes of carbon dioxide (CO2), after China and the USA. China tops the chart with 11,397 metric tonnes of CO2, While the USA emits 5057 metric tonnes of CO2, as per the Global Carbon Atlas.

The picture, however, is quite different when it comes to ranking countries by per capita emission. Under this head, India ranks 73rd with the average Indian emitting 1.8 metric tonnes of CO2, which is starkly less when compared globally.



Bearing The Burden Of Climate Change's Effects

Yet, India bears the burden of the critical impacts of climate change. Climate expert Sankalp Suman told *The Secretariat*, "Although it shouldn't be an either-or situation when it comes to mitigation or adaptation in the context of climate change but if we are forced to make an either-or decision, then I believe adaptation needs to be our utmost priority."

He said mitigation should be a priority for countries that are causing or historically contributing to climate change, where the per capita carbon emissions are much higher than the global average, which is not the case for India.

"Even though we are the third largest emitter, our per capita carbon emission is half the global average. That said, it is not proportional to how people in India continue to suffer due to climate change," Suman added.

He noted that India's climate change crisis is not comparable to others due to the impact on agriculture, food and erratic weather. "Hence, the urgent need for India to focus more on adaptation," he said.

The country has been lurching from energy crisis to water scarcity to food insecurity to agriculture crisis, all of which can be traced back to climate change. Moreover, according to a report by the Council on Energy Environment and Water, over 80 per cent of India's population lives in districts highly vulnerable to extreme hydro-met disasters.

With all of this at stake, this is where the balancing act of adaptation comes in. While we can't unilaterally put an end to climate change since it needs global collaboration, the government and policymakers can help vulnerable citizens adapt and build resilience to the impacts of climate change by empowering them with policies, safeguards, infrastructure, knowledge and monetary support.

Experts note that climate change hasn't found much space in India. "Things that can make you money or save money have been incorporated into the idea of climate change. For example, India is doing very well in solar panels but not because it is good for the environment but because it will save us money," he said.

"I believe policymakers and industry are ill-informed about the segregation between adaptation and mitigation. They may not know what is the difference between the two at the ground level," he added.

The Need Of The Hour

It is high time the country focused on adaptation measures to build resilience capacity for the citizens to survive the catastrophes triggered by climate change and global warming.

Experts note there is a pressing need for a climate change body to identify issues on a state-by-state basis. A one-size-fits-all approach won't work because the complexities and environmental conditions of each state are different. Addressing climate change effectively requires context-specific solutions tailored to challenges and opportunities in each region.

"Climate action will only be able to come from the ground up. Panchayats and municipalities should be the first line in climate strategy and deployment of solutions as many climate change-triggered issues need to be addressed at a micro level," Suman said.

Experts believe an inter-governmental body can help bolster the National Action Plan on Climate Change, which was introduced in 2008. The plan is a national strategy to enable the country to adapt to climate change and enhance the ecological sustainability of India‘s development path.

Areas That Need Support

Experts say it is high time for the country to focus on the agriculture sector. Joshi said climate-resilient agriculture should be big on the agenda. “When it comes to climate-resilient agriculture, it is not just about conducting activities to suit the needs of corporations and what sells, but also about what the region's particular climate requires.”

She said the new government can push for the cultivation of climate-resilient crop varieties instead of water-intensive crops such as rice, cotton and more. “We need to move towards traditional crops the terrain can understand and for that government intervention is needed at this stage,” Joshi added.

She said the country needs to focus on resource building such as improvements in irrigation and training in agronomic management techniques. “We, as a country, are not doing enough on that front. A lot is happening in regenerative agriculture globally, as well as agrometeorology installations, fortification and diversification of crops, and needs to be looked into by the new government as these are the things that can better our resilience to climate change and answer food insecurity questions,” Joshi noted.

Experts also noted that given India is a disaster-prone country, there is a need for disaster-resilient infrastructure. “The infrastructure of even Tier-1 cities is not adequate given India’s vulnerability. We need to climate-proof roads, bridges and buildings in flood-prone and coastal areas, as well as implement early warning systems,” she told *The Secretariat*.

In all, Modi 3.0 has its task cut out vis-a-vis climate change that has left its mark with disruptions in the lives of people. The government needs to prioritise how to safeguard the people first. If the opportunity is lost, there won’t be even a tightrope left to balance mitigation and adaptation.

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