
UNIT 12 STATE RESPONSE TO CLIMATE CHANGE

Structure

- 12.1 Introduction
- 12.2 Objectives
- 12.3 India's Need for Urgent Response
- 12.4 India's Response to Climate Change
- 12.5 Response at International Level
- 12.6 Response at National Level
 - 12.6.1 National Action Plan on Climate Change (NAPCC)
 - 12.6.1.1 National Solar Mission
 - 12.6.1.2 National Mission for Enhanced Energy Efficiency
 - 12.6.1.3 National Mission on Sustainable Habitat
 - 12.6.1.4 National Water Mission
 - 12.6.1.5 National Mission for Sustaining the Himalayan Ecosystem
 - 12.6.1.6 National Mission for a Green India
 - 12.6.1.7 National Mission for Sustainable Agriculture
 - 12.6.1.8 National Mission on Strategic Knowledge for Climate Change
 - 12.6.2 Low Carbon Growth
 - 12.6.2.1 Energy Reforms
 - 12.6.2.2 Transport
 - 12.6.2.3 Agriculture and Forests
 - 12.6.2.4 Oil and Gas
 - 12.6.2.5 Disaster Management
- 12.7 Other Adaptation Measures
 - 12.7.1 National Action Programme to Combat Desertification
 - 12.7.2 Watershed Development Programme
 - 12.7.3 Command Area Development Programme
 - 12.7.4 Crop Diversification
 - 12.7.5 NICRA
- 12.8 Let Us Sum Up
- 12.9 Keywords
- 12.10 Suggested Further Reading/References
- 12.11 Answers to Check Your Progress

12.1 INTRODUCTION

Contemporary climate change is a global menace. It is basically an environmental problem which mainly takes place due to greenhouse gases (GHGs) like carbon dioxide, methane, nitrous oxide, etc. Greenhouse gases concentration are increasing in atmospheric environment due to fossil fuel use, land use change and agricultural activities. The increasing greenhouse gases have led to global warming and climate change. As a result, we have witnessed high average

temperature, erratic patterns of rain, uncertainty and increased frequency of natural events like droughts, floods, hot winds, cyclones, etc. This sudden change in climate can have severe impact on development and economy. Due to its over-reach and depth of effects, climate change has become a global governance issue. Various efforts have been done at the International level to tackle this menace. United Nations Framework for Climate Change Convention (UNFCCC), International Panel for Climate Change (IPCC) are the examples of the same. India being a victim of the side effects of climate change and being one of the rising powers of the world cannot go without taking notice of this grave issue. One of the largest democracy of the world and house to the 1/3 population of the world's population, India has taken a balanced yet proactive role at International and National front. On International front, India has always showed concern for the development rights of the developing countries and stressed on common but differentiated responsibilities whereas at National level, it has enacted various environment-friendly legislations, launched various programs to adopt eco-friendly techniques or to mitigate the effects of climate change. In this unit, we will study the role of Indian government in dealing with the problem of climate change.

12.2 OBJECTIVES

After studying this unit, you should be able to:

- explain India's position on climate change;
- explain the National Action Plan on Climate Change; and
- describe the steps taken by India to tackle the climate change.

12.3 INDIA'S NEED FOR URGENT RESPONSE

Given India's present economic, social and geographical diversity, India is more vulnerable to the severe impacts of climate change. The Global Climate Risk Index 2019 released at Katowice summit placed India at 14th most vulnerable nation in the world. Indian government is worried about climate change because of its impact on rainfall, agriculture, coastal life, health, disaster management, economy and eventually all sectors of life. Indian economy is largely based on monsoon. Over the past few years, there is a deficit in the monsoon and uneven distribution of rainfall in some parts of the country like in Rajasthan we have experienced extreme rainfall causing floods. Same way, Western disturbances have caused devastating floods in Uttarakhand in June 2013. India has a vast coastline of 7516 km. Due to climate change, it is expected to have a rise of 25-40cm by 2050. Climate change and rising sea levels has created serious challenges for coastal life. Coastal erosions, increasing wave height have led to the danger of submerging islands, and has forced migration of coastal people. According to Global Climate Risk Index, India suffered an economic loss of about USD 13.8 billion in the year. Climate change can create water resource problems in arid and semi-arid areas. Further, rising sea levels and associated sea water intrusion would affect the freshwater resources. It can affect drinking water supply and hydroelectric power generation also. Climate change, rising temperature will affect India's deltas and mangroves with flooding, erosion and salt intrusions, hence endangering the biodiversity of

the region. Climate change will also have negative impact on Himalayan glaciers and supply of water in various Northern Rivers. It is noted that snow in Himalayas is receding. It will badly affect the Brahmaputra and Ganges river system. A major report released earlier this year found rising temperatures will melt at least a third of the region's glaciers by 2100, even if average global temperature rises are limited to 1.5°C. Climate change can enhance the vulnerability of coastal areas which are already prone to various natural disasters like floods, cyclones, land erosion, etc. India is also vulnerable to increases in vector-borne diseases, such as malaria and dengue, which could both see increases due to climate change.

Check Your Progress 1

- Note:** 1) Use the space given below for your answers.
 2) Check your answers with those given at the end of this unit.

1. Why climate change has become a governance issue?

.....

2. Why India is concerned about climate change?

.....

12.4 INDIA'S RESPONSE TO CLIMATE CHANGE

In India, concern for environment is already deep-rooted in culture. During ancient times, natural forces like our Sun, fire, and water were equated with deities and worshipped. Kings used to take care of Mother Nature and Earth. In Modern India when we got independence, the State's role in environment was fully taken care of as enshrined in article 48A, 51A(g). From time to time, Indian government has framed various legislations which aimed at securing a healthy and pollution free environment. As a follow-up to the United Nation Conference on Human Environment held at Stockholm in 1972, India enacted environment-friendly acts like Water Act, Forest Act and Forest Conservation Act. As a response to Bhopal gas tragedy of 1984, India passed historic Environment Protection Act 1988. All these Acts play a proactive role in the protection, conservation and promotion of environment. As far as biggest environment menace-climate change is concerned, Indian government is playing a proactive and dynamic role at International and domestic level. At International level, India is a signatory to the United Nations Framework Convention on Climate Change and Indian government actively participates in all the international conferences and advocates for common but differentiated responsibility whether it is Kyoto Protocol, Copenhagen or Paris Summit. At present, there is no separate statue on climate change. Indian government's role and actions are based on UNFCCC's common but differentiated responsibilities. Indian government is handling climate change issue at two levels viz. mitigation of climate

change, and adaptation to climate change. Various acts and legislations enacted in this regard include but not limited to Energy Conservation Act 2001 which promotes efficient use of energy; and National Tariff Policy 2006 which mandates compulsory purchase of certain percentage of renewable energy. Another important effort is National Action Plan on Climate Change.

12.5 RESPONSE AT INTERNATIONAL LEVEL

India has become a key player that is actively shaping the International policy for climate change. India represents the voice of poor countries who can't risk their social economic growth for the climate change. Starting from World Earth Summit in 1992 that led to the setup of UNFCCC up to 2019, India has always argued that developed countries should take responsibility for climate change given their historic emissions. India has always demanded that per capita emissions should be the key factor to allocate responsibilities for climate change. It was due to India's efforts along with other developed countries that common but differentiated responsibilities were acknowledged in UNFCCC. India is equally concerned about the gravity of climate change that is why it has always demanded that developing countries especially like the leading one should also take voluntary commitment but only on the receipt of finance and technology transfers from industrial Nations. It was India's continuous efforts that resulted in Kyoto Protocol of 1997 which required Annexure 1 countries (developed countries) of UNFCCC to commit themselves to certain legally binding targets whereas developing countries were kept free from such commitments. In this way, India largely played a role of protector which ensured development and poverty eradication rights of developing countries while pushing developed countries for strong action on climate change. With India's rise and economic power, India was placed in the block of emerging economies in place of developing countries. This enhanced India's role in climate change negotiations. As part of BASIC i.e. China, India, Brazil and South Africa, India started independent negotiations apart from UNFCCC like G 8 + 5 Dialogue on Climate and Energy in 2008 and US led Major Economic Forum on Energy and Climate in 2009.

At COP 13 in Bali in 2007, India argued that emerging economies should take voluntary commitment as part of their capabilities to mitigate the climate change. India pledged voluntarily (though non-binding) to reduce emission intensity by 20-25% of the 2005 level by 2020. Further, the announcement of National Action Plan on Climate Change (NAPCC) and Nationally Appropriate Mitigation Action Strategies, demonstrate the resolute stand of India against climate change. It also committed that its per capita emissions will never exceed per capita emissions of developed countries. From COP 15 Summit at Copenhagen in 2009, India started to take larger role and responsibility for climate change. From all these events we can understand that India wants a meaningful agreement on climate change.

Another important role that India plays at International level is through its Clean Development Mechanism (CDM). As per this mechanism, developed countries help sustainable development efforts in developing countries. For their efforts, they get matching certified emissions reduction certificates. It helps them meet their emissions reduction targets. CDM greatly helps developing countries to enhance their sustainable development hence help in the larger cause of climate change adaptation. India is a potential player of global CDM. It has established

National CDM Authority in 2003 in Ministry of Environment and Forests. India has 134 sanctioned Clean Development Mechanism projects and earned 170 million INR worth of Certified Emission reductions till 2017.

Check Your Progress 2

- Note:** 1) Use the space given below for your answers.
 2) Check your answers with those given at the end of this unit.

1. Discuss India’s position on climate change at International level.

.....

2. What is CDM?

.....

12.6 RESPONSE AT NATIONAL LEVEL

12.6.1 National Action Plan on Climate Change (NAPCC)

Along with a proactive role at International level, Indian government is making so many efforts at National level also. Environment sensitivity is shown in various laws passed by government post 1970s. But their main focus was energy or biodiversity conservation. Direct action on climate change was taken in the form of National Action Plan on Climate Change which was launched in 2008 specifically to deal with climate change. It is an umbrella mission which includes eight National Missions which deal with solar energy, energy efficiency, sustainable agriculture and habitats, water and forestry, the Himalayan ecosystem and research.

12.6.1.1 National Solar Mission

Greenhouse gases are one of the main causes behind the global warming and climate change. To curtail GHGs emissions, the National Action Plan on Climate Change aims to encourage use of renewable sources of energy. Given India’s vast solar potential, it launched National Solar Mission for the advancement and utilization of solar energy for power generation and other uses. It aimed at making solar energy competitive so that it can surpass or at least compete with the use of fossil fuels. It focuses on increased utilization of solar thermal technologies in metropolitan areas, industry, transport and business. It aims at the creation of a solar research center, which can help us tapping the optimum solar potential with increased global partnership on technology advancement. It will also help in increasing domestic manufacturing capacity. As a result of National Solar Mission, National Institute of Solar Energy was established under Ministry of New and Renewable Sources in 2013 to assist and supervise the implementation of National Solar Mission. Prime Minister of India Shri. Narendra Modi, and the then President of France, Mr. Francois Hollande launched

International Solar Alliance (ISA) in Paris on the side-lines of CoP 21 in 2015. ISA aims to provide a platform to the countries that lie completely or partial between the Tropics of Capricorn and Cancer and have great solar potential. Thus it aims at increasing solar cooperation amongst the nations, which India can utilize in the country.

12.6.1.2 National Mission for Enhanced Energy Efficiency

Earlier agriculture and related activities were the main emitter of greenhouse gases but these days energy sector particularly emissions from industry and transport have become the main source of greenhouse gases. So, National Action Plan on Climate Change mainly focused on enhanced energy efficiency. It wants to promote energy strategies that can escalate the energy use efficiency and help us in yielding savings of 10,000 MW by 2012 and 23m tonnes of fuel savings per year. Under this mission in 2010, government also amended the Energy Conservation Act 2001 to include energy conservation in buildings. It brings a scheme for companies to trade energy-savings certificates. It also provided for energy incentives, including cheap taxes on energy-efficient gadgets. Indian Government in April 2015 launched Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) with an aim to boost sales of eco-friendly vehicles in the country. Bureau of Energy Efficiency (BEE) labels on vehicles to show their fuel efficiency. In 2017, government launched Energy Conservation Building Code 2017, developed by Ministry of Power and Bureau of Energy Efficiency. It aims at 30-50% energy savings by commercial buildings. It focuses on reducing building energy consumption and promotes low carbon growth. ECBC 2017 gives clear directions to builders, designers and architects to achieve minimum 25% of energy savings to be ECBC compliant. It includes a scheme named Perform, Achieve and Trade (PAT). This allows energy-intensive industries, including thermal power plants, iron and steel, and cement to limit the consumption of energy and sell their energy saving certificates to those that have fallen short. Between 2012 and 2015, it led to savings of 31MtCO₂e which is around 1% of India's current annual emissions.

12.6.1.3 National Mission on Sustainable Habitat

Sustainable development is the key to climate change mitigation and adaptation. That is why Indian Government launched National Mission on Sustainable Habitat in urban areas to help in increasing measures of sustainable development. It aims at extending the Energy Conservation Building Code, treatment and recycling of urban waste management. It also aims to promote procurement of efficient vehicles. Supreme Court has directed the government that no Bharat Stage 4 vehicle will be sold in India with effect from 1st April, 2020. Bharat Stage 6 norms will come into force from same date. Delhi has become the first state to adopt BS6 norms for vehicles.

12.6.1.4 National Water Mission

Climate change will have severe impact on water supply either through receding glaciers or salt water intrusions near coastal areas. So, there is a dire need for National Water Mission. It sets a target of a 20% enhancement in water utilization efficiency by means of pricing and other relevant and pragmatic measures. National Water Mission adopts an integrated water resource management. It urges to conserve water. It stresses

on minimizing wastage and ensure more equitable distribution both across and within states.

12.6.1.5 National Mission for Sustaining the Himalayan Ecosystem

Himalayan Ecosystem is the backbone of India's agriculture, monsoon, water supply and bio diversity. Taking care of its vulnerability to climate change, a special mission National Mission for Sustaining the Himalayan Ecosystem has been launched by government. It aims to understand the process that affects Himalayan glacier. After its understanding the mission will develop policy measures for sustaining and safeguarding it. It focuses on forest cover, biodiversity and other environmental assets in the Himalayan area

12.6.1.6 National Mission for a Green India

The mission for Green India aims at enhancing green and forest cover in India to lessen the impact of greenhouse gases. It aims to increase the forest/tree cover of 5 million hectare. It focuses not only on quantity but quality also. It also aims at increasing forest cover from 23% to 33% of the country. It has the target of annual CO₂ sequestration increase by 50-60Mt by the year 2020. To involve people and securing their participation in enhancing green India, this mission aims to increase forest-based livelihood income for about 3 million households living in and around the forests. It also focuses on promotion of alternative fuels like methanol, ethanol, hydrogen, CNG, LPG and Hybrid Electric Vehicles.

12.6.1.7 National Mission for Sustainable Agriculture

Since India's half of the population depends on agriculture or its supporting activities and it is going to be severely hit by climate change, National Mission on Climate Change has specifically launched a separate mission - National Mission for Sustainable Agriculture. It aims at supporting adaptation to climate change. It will focus more on climate-resilient crops, extension of climate insurance mechanisms, expansion of weather insurance mechanisms and adapted agricultural practices.

12.6.1.8 National Mission on Strategic Knowledge for Climate Change

Indian government wants to continuously work hard till the problem of climate change is solved. The National Mission on Strategic Knowledge for Climate Change promote research to enhance the knowledge on the impacts and threats of climate change so that we can deal with it better. It also seeks higher private sector participation to build up adaptation and mitigation technologies via venture capital funds. It also focuses on increased international collaboration and improved climate modeling capacities.

12.6.2 Low Carbon Growth

In order to combat climate change, India has focused on low carbon growth in all sectors of economy. It has tried to minimize conventional sources, promote renewable sources and reduction in carbon emissions. For this purpose, government has taken several initiatives in several fields of the economy which are as following.

12.6.2.1 Energy Reforms

Since India is the world's second largest coal consumer after China and Energy sector being the one of the prime contributor to greenhouse gases has faced many reforms in India. Indian government has tried to change the face of energy sector in India by focusing on low carbon growth and maximum utilization of renewable energy sources. India is one of the countries with the largest production of energy from renewable sources. According to Paris Agreement by 2030, India will achieve 40% of its total electricity generation from non-fossil fuel sources. In 2015, India set a goal that by 2022 it will install 175GW of renewable energy capacity. It will include 100GW solar, 60GW onshore wind, 10GW bioenergy and 5GW small hydro.

It revised Tariff Policy in 2016. It makes it compulsory for power distributors and some large electricity users to buy a proportion of their energy from renewable sources. It also waives inter-state transmission charges for solar and wind energy. India is the 4th largest wind power producer in the world after China, the US and Germany. The success of government's efforts for renewable energy is visible through the fact that target of installing 20 GW of solar power by 2022 was achieved four years ahead of schedule in 2018. So, India has set a new target of generating 100 GW of solar power by 2022. India has the second largest solar park in the world at Kurnool, Andhra Pradesh, with a capacity of 1000 MW. To promote low carbon growth, India strives hard for energy efficiency. India in 2001 established the Bureau of Energy Efficiency. Its main responsibility is to reduce the energy intensity of the economy. Ministry of Power has established a national smart grid mission which tries to build energy efficient grid system in India to minimize the wastage in electricity. A new action plan to cut cooling energy requirements has been launched. Government also aims to replace India's 14m conventional street lights with LEDs by 2019 with the help of subsidies.

12.6.2.2 Transport

Greenhouse gases from vehicles are main source of global warming. Hence India promotes low carbon transport initiatives. In 2011, India launched National Mission for Electric Mobility. It aims to promote electric vehicle (EV) and hybrid manufacturing. It has a target of 30% share of sales for EVs by 2030. It also aims for all new urban buses to be fully electric by 2030. In 2015, India launched its FAME scheme to subsidise electric and hybrid cars, mopeds, rickshaws and buses. India has amended its biofuels policy in 2018. It proposed 20% blend of bioethanol and 5% of biodiesel by 2030. Aviation only represented 1% of India's emissions in 2014, but given its increasing demand India has become a signatory to Corsia, the UN aviation emission offset scheme. India also promotes coastal shipping and inland water transport, due to their fuel efficiency and cost effectiveness.

12.6.2.3 Agriculture and Forests

Agriculture is responsible for around 16% of India's GHG emissions through methane produced from livestock, rice cultivation and nitrous oxide emitted from fertilisers. Already facing a challenge to feed the second largest population of the world with increased and frequent droughts and floods, agriculture is most vulnerable sector to climate change. Under India's National Mission for Sustainable Agriculture (NMSA), it has taken several steps to tackle

agricultural emissions like promotion of lower methane emission rice production, crop diversification away from rice, chemical-free farming and soil health pilot projects. In order to cut down nitrous oxide emissions, neem coating of urea was made compulsory in 2015. India has installed 200,000 solar water pumps to cut down energy consumption. India is also increasing its forest to become a net CO₂ sink. It aims at promoting the forest cover area from 24% to 33% of its area.

12.6.2.4 Oil and Gas

29% of India’s total energy consumption comes from oil and it is estimated to be more than double by 2040. Given the large amount of greenhouse gases they emit, India has tried to minimize its consumption and increase its prudent utilization. India has made subsidy cuts and petrol and diesel tax rises to address climate concerns. Gas makes up only 6% of energy consumption in 2017. The government aims to more than double the share of gas in the energy mix to 15% by 2022, so that we can lessen the GHGs emission and use a clean fuel.

12.6.2.5 Disaster Management

As a measure of adaptation, India has taken several disaster management steps. It enacted its Disaster Management Act in 2005. It aims at mitigation and preparedness. In 2016, India launched a disaster management plan, which integrates global disaster risk reduction frameworks. India also made an assessment of vulnerability and adaptation under NATCOM which was presented to UNFCCC in 2012. Government has launched various problem specific plans to deal with different disasters like it launched “Flood Management Programme (FMP)” a State sector Scheme in XI Plan which was continued during XII Plan as well.

Check Your Progress 3

- Note:** 1) Use the space given below for your answers.
2) Check your answers with those given at the end of this unit.

1. What is National Action Plan on Climate Change (NAPCC)?

.....
.....
.....

2. What do you mean by low carbon growth strategies?

.....
.....
.....

3. What are the 8 missions under National Action Plan on Climate Change (NAPCC)?

.....
.....
.....

12.7 OTHER ADAPTATION MEASURES

12.7.1 National Action Programme to Combat Desertification

India is a party to the UN Convention to Combat Desertification (UNCCD) and the Ministry of Environment, Forest and Climate Change is the National Coordinating Agency for the implementation of the UNCCD in the country. A 20 year comprehensive National Action Programme (NAP) to combat desertification in the country has been prepared. The objectives of the programme are community based approach to development; activities to improve the quality of life of the local communities; awareness raising; drought management preparedness and mitigation; Research and Development initiatives and interventions which are locally suited; and strengthening self-governance leading to empowerment of local communities. It is proposed to initiate activities that include, among others, assessment and mapping of land degradation, drought monitoring and early warning system groups, drought preparedness contingency plans, and on-farm research activities for development of indigenous technology.

12.7.2 Watershed Development Programme

In India, watershed development has been running under Ministry of Environment and Forest since 1990s. It is now placed under Ministry of Rural Development and Department of Land Resources. Now, it has been integrated with climate change adaptation measures. It aims at mitigating the adverse effects of drought on crops and livestock and to control desertification. Climate change results in reduction in water availability, land productivity, and rural livelihoods. In such times, watershed development areas provide a sense of relief. Watershed management ensures village communities to participate in mitigation and adaptation strategies. They can be trained for carbon free economy in watershed villages.

12.7.3 Command Area Development

This program was launched by government of India in 1974-75 with the vision to bridge the gap between irrigation potential and actual utilization. It has been integrated with National Water Mission. It is suggested that modernization of command area will result in increase of about 20% in irrigation efficiency. This is very necessary to save the agriculture from climate vulnerability. Earlier, it was implemented as a State Sector Scheme. Later on, it was merged with Accelerated Irrigation Benefits Programme (AIBP). Now it is being implemented under Pradhan Mantri Krishi Sinchai Yojna (PMKSY) from 2015-16. Now Command area Development works are restricted to 99 prioritized AIBP projects.

12.7.4 Crop Diversification

Due to climate change, flood and drought, cyclone and other natural disasters became severe threat and its frequency is likely to increase in future. Under such situations, crop diversification is an effective adaptation option. Along with maintaining biodiversity, it protects farmer from complete crop failure. It provides better food security and alternative income generation option to farmers. It also reduce chances of crop failure due to insects, diseases and weed. Due to variety

of products, it enables farmers to grow surplus products for sale and thus obtain increased income to meet other needs related to household well-being. It can be implemented in a variety of forms and at a variety of scales, allowing farmers to choose a strategy that both increases resilience and provides economic benefits. It requires knowledge and skills in affected areas about crop-production techniques, integrated farming systems (including crop rotation and intercropping), and climate resilient production techniques.

12.7.5 NICRA- National Innovations in Climate Resilient Agriculture

National Innovations on Climate Resilient Agriculture (NICRA) is “a network project of the Indian Council of Agricultural Research (ICAR) launched in February, 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. Further, the project aims to demonstrate site-specific technology packages on farmers’ fields for adapting to current climate risks; and to enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project consists of four components such as Strategic Research, Technology Demonstration, Capacity Building and Sponsored/Competitive Grants”. As of now, the project has shown remarkable results in the development and transfer of technologies such as on-farm water harvesting and management; improved crop varieties (abiotic stress tolerant); conservation agricultural practices; site-specific nutrient management; agro-advisory services, etc (<http://www.nicra-icar.in/nicrarevised/index.php/home1>).

12.8 LET US SUM UP

It is clear that India being the second largest populous country and with massive poverty is extremely vulnerable to climate change. Indian Government has sincerely taken a notice of the issue and is trying to give best responsible response to it. It holds the position that some urgent steps must be taken to deal with climate change but not at the cost of development and poverty eradication rights of developing countries. Developed countries should understand their historic responsibility for the past emissions with certain binding cuts on carbon emissions and also by giving assistance in technology and funds to the developing countries. Only with this a vast, in depth and meaningful action can be taken on climate change. On the other hand, India is also taking noteworthy measures at national level. It focuses on sustainable development, clean development, low carbon growth so as to minimize the impact and growth of the climate change. India has also taken steps to minimize its vulnerability by launching focused flagship programmes to deal with different types of disasters. India has taken massive initiatives to promote green growth. It is also contributing in cutting down the emissions worldwide by various measures like Clean Development Mechanism. Thus we can say that India’s response to climate change is pro-active, balanced and just.

12.9 KEYWORDS

- Clean Development Mechanism (CDM)** : A mechanism defined under Article 12 of the Kyoto Protocol through which investors (governments or companies) from developed (Annex B) countries may finance greenhouse gas emission reduction or removal projects in developing (Non-Annex B) countries, and receive Certified Emission Reduction Units for doing so, which can be credited towards the commitments of the respective developed countries.
- Desertification** : Land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Land degradation in arid, semi-arid, and dry sub-humid areas is reduction or loss of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest, and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities.
- Sustainable Agriculture** : Sustainable agriculture involves successful management of agricultural resources to satisfy human needs while maintaining the environmental quality and conserving the natural resources.
- Crop Diversification** : Crop diversification is growing of different crops suited to different sowing and harvesting times, assists in achieving sustainable productivity, conserve natural resource, and minimise the environmental impacts of crop cultivation.

12.10 SUGGESTED FURTHER READING/ REFERENCES

Dubash, Navroz K. (2012). The Politics of Climate Change in India: Narratives of Equity and Co-Benefits. Working Paper No. 2012/1. Delhi: Centre for Policy Research Climate Initiative.

https://www.undp.org/content/dam/india/docs/climate_change_adaptation_activities_in_india_part_i.pdf

IPCC, 2012: Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special

Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564.

Ministry of Environment, Forests and Climate Change (2014) Statement by Hon'ble Minister at the High Level Segment of UNFCCC COP-20. New Delhi: GOI. Retrieved on 15 May, 2019 from <http://www.envfor.nic.in>

Prime Minister's Council on Climate Change (2008) National Action Plan on Climate Change. Retrieved on 5 May, 2019 from http://pmindia.nic.in/climate_change.htm

Raghunandan. D. (2013), Rethinking India's Climate Policy and the Global Negotiations, Oxfam: India

Web Links

<http://www.nicra-icar.in/nicarevised/index.php/home1>

https://www.ipcc.ch/site/assets/uploads/2018/02/WGIAR5-AnnexII_FINAL.pdf

IPCC (2001) Third Assessment Report. Retrieved on 9 May, 2019 from https://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

12.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. The answer should include following points:
 - Pervasive impacts of climate change on all the ecosystems and human existence;
 - Mitigation of and adaptation to climate change involve technologies, finance, and global action.
 - Climate change policy development and action demand proactive measures by both developed and developing countries.

Check Your Progress 2

1. The answer should include following points:
 - India has become a key player that is actively shaping the International policy for climate change. India represents the voice of poor countries who can't risk their social economic growth for the climate change.
 - India has always argued that developed countries should take responsibility for climate change given their historic emissions. India has always demanded that per capita emissions should be the key factor to allocate responsibilities for climate change. It was due to India's efforts along with other developed countries that common but differentiated responsibilities were acknowledged in UNFCCC.
 - India is equally concerned about the gravity of climate change that is why it has always demanded that developing countries especially

like the leading one should also take voluntary commitment but only on the receipt of finance and technology transfers from industrial Nations.

- India plays a role of protector which ensured development and poverty eradication rights of developing countries while pushing developed countries for strong action on climate change.
2. Clean Development Mechanism (CDM) is a mechanism defined under Article 12 of the Kyoto Protocol through which governments or companies from developed (Annex B) countries may finance greenhouse gas emission reduction or removal projects in developing (Non-Annex B) countries, and in turn receive Certified Emission Reduction Units for doing so, which can be credited towards the commitments of the respective developed countries. In other words, as per this mechanism, developed countries help sustainable development efforts in developing countries. CDM greatly helps developing countries to enhance their sustainable development hence help in the larger cause of climate change adaptation.

Check Your Progress 3

1. Government of India launched National Action Plan on Climate Change way back in 2008 specifically to deal with climate change. It is an umbrella mission which includes eight National Missions which deal with solar energy, energy efficiency, sustainable agriculture and habitats, water and forestry, the Himalayan ecosystem and research.
2. Low carbon growth strategies aim to combat climate change. The strategies aim to minimize the use of conventional sources, promote renewable sources and reduce the carbon emissions. The sectors mainly focussed for low carbon growth strategies are energy sector, transport, oil and gas sector, agriculture and forest sector.
3. The eight missions under National Action Plan on Climate Change (NAPCC) are National Solar Mission; National Mission for Enhanced Energy Efficiency; National Mission on Sustainable Habitat; National Water Mission; National Mission for Sustaining the Himalayan Ecosystem; National Mission for a Green India; National Mission for Sustainable Agriculture; and National Mission on Strategic Knowledge for Climate Change.