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PREVENTING CLIMATE CHANGE: SINE QUA NON FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Climate change is one of the major challenges facing the world today. It is a global environmental problem which has been receiving intense political attention both at domestic and international levels. The need of the hour is to think about sustainable solutions which are not just temporary but also taking into account the needs of future generations. It must be recognized that natural resources are not unlimited and hence their consumption must be rationed and planned so as to ensure sustainable development. Therefore, preventing climate change is essential condition for sustainable development. Nature friendly alternatives like wind farms, hydro-electricity, solar power, geo-thermal and bio-mass for the generation of power need to be explored and adequately implemented into the system. Other measures through which climate change can be addressed are reducing emissions, improving capacity of the poor to face climate change and increasing sequestration of atmospheric carbon dioxide. Equitable development within and among countries is another component of sustainable development philosophy that has received more recognition in SDG framework in the form of an explicit goal. This paper tries to analyse the various measures which need considerable amount of attention to tackle this issue of climate change. *Gandhiji said, "The Earth has enough for everyone's needs, but not for everyone's greed.' With the entire world coming together to secure the future and pass on the legacy of the earth to our forthcoming generations we can hope to create resources to satisfy everyone's needs.*

Keywords*: sustainable development, climate change, renewable energy, carbon capture.*

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Introduction

Climate change is a global challenge that does not respect national borders. It is defined as the long term change in earth's climate due to natural, mechanical and anthropological processes which result in emission of green house gases like CO2, methane, etc. These gases settle in the stratosphere and trap the heat within the atmosphere leading to global warming and changing climatic patterns. Shifting of seasons, increasing global temperatures, rising sea levels, changing agricultural patterns have resulted in frequent disasters like landslides, tsunamis, drought, famine, population migration and major health hazards not just for us but also for our children and grand children. The need of the hour is to think of sustainable solutions which are not just temporary but also take into account the needs of future generations. It must be recognized that natural resources are not unlimited and hence their consumption must be rationed and planned so as to ensure sustainable development. Nature friendly alternatives like wind farms, hydro-electricity, solar power, geo-thermal and bio-mass for the generation of power need to be explored and adequately implemented into the system.

It is the responsibility of not any one nation but the entire world to work in the direction of saving humanity from the effects of climate change. Formalisation of United Nations Framework Convention (UNFCCC) in 1992 at Rio marked the beginning of serious global efforts in this direction. The 21st session of the United Nations Climate Change conference at Paris in December 2015 will see countries submitting their Intended Nationally Determined Contributions (INDCs). India has already proposed its' INDCs which aim to reduce greenhouse gas emissions intensity by 33-35% by promoting clean and renewable energy, use non-fossil fuel sources, increase forest cover to create an additional carbon sink of 2.5-3 billion tonnes of carbon dioxide equivalent, develop less carbon intensive and resilient urban centres, promote waste to wealth, safe, smart and sustainable green transportation network etc. It has also committed to mobilise new funds from developed countries and to build an international architecture for diffusion of cutting-edge technologies, as well as collaborative research and development in this regard. Through this INDC, India has shown its commitment to combat climate change and "be a part of the solution even though it was not part of problem".

What is sustainable development?

The world commission on environment and development also known as Bruntland commission defines sustainable development as a process that meets the needs of the present generation without compromising over the ability of future generations to meet their own needs. It was formally accepted in the United Nations conference on environment and development held in Rio in 1992 popularly known as the earth summit.

Climate Change Mitigation-Background: United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 1992(Rio Earth Summit) – 172 countries participated, 108 at level of heads of State or Government - Agenda 21, the Rio Declaration on Environment and Development, the Statement of Forest Principles, the United Nations Framework Convention on Climate Change and the United Nations Convention on Biological Diversity

- 1997 Kyoto Protocol- Annex I Parties commit to take binding reduction targets
- 2007 Bali COP: Introduction of Nationally Appropriate Mitigation Actions (NAMA), to engage developing countries in voluntary mitigation effort
- 2009- 2010 (Copenhagen & Cancun COP): comprehensive international system for collective action and major developing countries (including India) announced voluntary mitigation pledges
- 2011 Durban COP: ADP launched for evolving a new agreement for post2020 period
- Warsaw & Lima COP : INDC concept for all countries
- 19th COP in Warsaw (2013): All countries required to prepare INDCs and present them before COP 21 in Paris
- 20th COP in Lima (2014) : Further clarity on form of INDC: not mitigation centric and can include other components as per country priorities
- 21st COP in Paris (2015) all the countries have made a commitment to the common objective of limiting greenhouse gas emissions
- 22nd COP in Marakech (2016) focal issue was the need to reduce greenhouse emissions and utilize low-carbon energy sources.
- 22rd COP in Bonn Germany (2017) the leading role of state-led and state-directed public action on the question of climate change.

Recently in December 2017 at **World Economic Forum in Davos our Prime Minister** in his speech highlight the importance of prevention of climate change, his words include—'*The second global challenge is the problem of climate change. In our culture, we treat the Nature as* mother. *We also believe that man only has the right to milk it; not to destroy it. That is why, through Paris Agreement, we have assured the global community that our development process would be entirely in line with our cultural ethos towards environmental safeguards. In fact, we are not only aware of our responsibilities towards climate change; we are willing to take lead in mitigating its effects. To demonstrate sustainability of our development process, we have made major commitments and achievements in renewable energy. We have planned to draw 175 GW of energy from renewable by 2022. This includes 100 GW from Solar Energy and another 75 GW from Wind and other sources. Not only this, we are also the sixth largest producer of renewable energy. The International Solar Alliance has been conceived as a coalition of countries which are rich in solar radiation. The effort is to make them engage with each other to mitigate the hurdles and promote the enablers in solar energy'.*

Indian Scenario These are the impacts of climate change on the biodiversity of India.

- ❖ Adverse effect on agriculture, health, forestry and infrastructure.
- ❖ Temperature rise by 3 o C to 4 o C towards the end of 21st century.
- ❖ Reduction in wheat and rice yields. Rainfall patterns and quantities in periods of drought in some regions, more rainfall in central India and reduced rain in the north-east, leading to changes in forestry and vegetation. Rain spells in the Ganga, Krishna and Godavari more intense.
- ❖ Number of rainy days may be reduced in the western parts of the Gangetic basin.
- ❖ 70 per cent of vegetation vulnerable to change.
- ❖ Adverse impact on wildlife and other biological species.

Sustainability: The earth system is such that sensitivity to and impacts of climate change vary in space as also the potential of mitigating and adapting to this change. While highlands and islands are the region's most sensitive to climate change, the areas rich in forests or having potential for development of forests and organic agro forestry systems have a high potential of mitigating climate change. Areas rich in biodiversity become significant for offering a genetic base for developing new crop varieties and livestock breeds resilient to climate change and thus for food

security in the changing climate. A region like Himalayan mountain system attracts more global attention than other mountain regions. Responding to the global importance of the Himalayas, India has drawn a National Mission "Sustaining the Himalayan Ecosystem" as part of the National Action Plan on Climate Change.

National Action Plan On Climate Change India has also committed to increase its share in renewable energy to 40 per cent in installed capacity by 2030. Its current share of renewable energy is around 13 per cent (36 GW) making it a very ambitious goal. India says that the ambitious goal will be attained by the following. Solar and Wind energy will increased to 100 GW and 60 GW by 2022 respectively and an increase even after that. It is envisaged to increase biomass installed capacity to 10 GW by 2022 from current capacity of 4.4 GW. Special programmes will be launched to promote small and mini hydel projects; new and efficient designs of water mills have been introduced for electrification of remote villages and will continue to be promoted. India has also agreed to enhance its forest cover from 24 per cent of the geographical area in 2013 to 33 per cent of its geographical area in long term. And it also mentions that its forest cover will absorb 2.5 to 3 billion tonnes of carbon dioxide by 2030 making it a major sink for absorbing Carbon Dioxide. We have also decided to build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

National Green Highways Mission: The Ministry of Road Transport and Highways (MoRTH), has promulgated Green Highways (Plantations, Transplantations, Beautification and Maintenance) Policy – 2015 to develop green corridors along National Highways for sustainable environment and inclusive growth.

Non Fossil Fuel Energy Technology

Non fossil fuel energy technologies produce no GHG emissions during operation and if they can be harnessed on large-scale and become cost competitive, they are possible climate change solutions. Currently, renewable energy, hydro power and nuclear power add to 83 GW. The current share of renewable electricity capacity is 13 per cent in total generations in India. The revised National Solar Mission target is 100 GW installed capacity by 2022. At present, solar

energy capacity has reached 3.5 GW which is almost eight times compared to 47 MW in 2010. The goal is to have a total of 175 GW by 2022 from all renewable energy sources. Application of solar photovoltaic technologies viz. solar rooftop and solar parks is being significantly enlarged. Research has shown that new materials like gallium arsenide, carbon nanotubes have potential to increase the efficiency to as high as 50 per cent.

Sustainable Production and Consumption: High per capita GHG emissions in developed countries are the inevitable outcome of unsustainable lifestyles comprising unsustainable patterns of production and consumption. These need to be addressed in the future climate change arrangements and it must be recognized that human well-being is not conditional on unsustainable lifestyles , and on other hand the argument that the present lifestyles of certain countries are sacrosanct is untenable.

Carbon Capture, Storage and Utilization Technologies The CO2 sequestration involves capture of excess CO2 from its point sources and its permanent fixation through storage or utilization away from the atmosphere. Captured CO2 is sequestered by means of surface processes or by sub-surface storage and/ or by utilization in recovery of energy fuels and minerals. If the source and the underground fixation sites are not near to each other, transport of liquid CO2 over long distances is required. The CO2 sequestration technology is a multi-disciplinary scientific and engineering topic.

CO2 Sequestration and Industrial Energy The industry sector contribution to GHG emissions is 37 per cent of total emissions. Industry consumes about 40 per cent of the total energy generated worldwide. The application of CO2 capture and utilization processes for industry is similar to those of power plants.

Underground CO2 Trapping Research on both active and passive underground trapping of CO2 is being attempted. CO2 can be buried in deep saline aquifers as well as in rocks and minerals. CO2 storage is in demonstration stage and several large-scale experiments have been undertaken worldwide. Norway has proved to be the first successful project in CO2 storage in the underground deep aquifers under the sea bed.

Clean Coal Technology All technologies for reduction of pollution from coal combustion can be termed as clean coal technology.

Renewable energy: Pillar of Climate Change Mitigation It is very obvious that for the climate change to be stabilized at a level that does not endanger the humankind, globally low-carbon pathways have to be pursued. Over the past decade, several renewable energy technologies have attained maturity and are on the way to be cost competitive in their own right. The successful penetration of renewable energy depends on several factors: cost-competitiveness, and the structure and operation of markets for energy and energy based services. Each of these factors is driven by the policy environment. The current policy environment in India has been successful in creating one of the largest and most diverse renewable energy programmes in the world, with a broad technological base and large human capacity. In any future energy scenario, energy efficiency on the demand side and renewable energy on the supply side become intrinsic parts of the overall strategy. And more and more attention is paid to them not only from the climate change perspective, but more importantly, from energy security point of view. Moreover, with a huge section of our population without having access to modern energy, renewable energy could very well help in bridging that gap in a more equitable and sustainable fashion.

Carbon Sequestration Carbon sequestration is a process by which, the carbon dioxide is captured from atmosphere or anthropogenic sources of Co2 (like large stationary industrial sources) and stored for a long term to be utilized for later use. These sources include large sites created by humans such as power plants , refineries, coal and gas plants , large industrial sources like that of ethanol , cement production and natural gas processing plants. This process involves mainly three steps. The first step includes the capturing of the CO2. The second step involves transporting it through pipelines, trains, trucks, or ships after compressing this captured CO2. The third step includes storing this CO2 in deep underground rock layers in the earth's surface for long term storage.

CONCLUSION

Climate change is one of the several dimensions of sustainable development. While averting climate change and achieving sustainable development are desired by all, there are conflicts of

opinions about the solutions to achieve the goals as well as limitations of knowledge in designing perfect and universally acceptable solutions and resources to implement them. Global partnerships aim for capitalizing on the opportunities of cooperation for ground actions to the benefit of all. UN-REDD programme is one such programme providing a new opportunity of income to people in developing countries by conserving their forests and switching over to land uses with high carbon stocks; developed countries paying for carbon conserved and sequestered by people in developing countries. As climate change will affect both developed and developing countries, it has become the crucial agenda of international relations and a point of action driving convergence of social, economic and environmental development goals and synergy or the best trade off between short term and long term and local and global development goals. The goal of sustainable development is so vast and a problem like climate change is so complex that we need to adopt the best available solutions without delay, monitor the outcomes and further improve the tried solution with new knowledge and experiences: a flexible and adaptive problem solving strategy.

I bow my head in reverence to our ancestors for their sense of the beautiful in Nature and for their foresight in investing beautiful manifestations of Nature with a religious significance –

Mahatma Gandhi

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