

Climatic Changes: An Evolutionary Process Calling for a Change in Human Approach

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Abstract:- Change is the necessary and most static phenomenon of the entire universe so as the Climate Change. Climate Change is also a natural phenomenon that has played a vital role in the evolution of human species. The current Climate is warming up at an unprecedented rapid rate causing massive floods, desertification, droughts, melting of glaciers and polar ice, rising sea level, shifting and shrinking of vegetation belts, altering ocean currents, frequent cyclones, forest fires, heat waves, spreading of diseases, adversely affecting biodiversity and many more disasters. This climatic catastrophe is undoubtedly due to the unregulated exploitation of planet's limited resources to feed the consumerist and energy intensive life pattern of huge human population. The burning of fossil fuels to generate energy along with massive deforestation have accounted for the over accumulation of Greenhouse Gases that are warming up the planet's climate and making the human existence vulnerable. On the other hand, Climate Change is uniting the nations to counter the negative impact of Climate change collectively and harness the untapped huge store of renewable green energy, thus ensuring the way to realise 'Vasudhaiva Kutumbakam' (Entire world is a family). Now, efforts are on across the world for becoming fossil fuel free, deforestation free, to invest in clean technologies like electric vehicles, smart grids, etc. The carbon negative nation Bhutan is living up the Vedic Prophecy of 'ten vyakten bhunjithā' or altruistic consumerism. The climatic crisis demands an instant change in our orientation and wisdom to live harmoniously with Nature rather than making the ridiculous effort to conquer the unconquerable and unimaginably majestic Nature.

REVIEW PAPER

You must take personal responsibility. You cannot change the circumstances, the seasons, or the wind, but you can change yourself. That is something you have charge of. — Jim Rohn

Change is the only unchangeable universal phenomenon that sustains the entire creation from the very microcosmic level to the macrocosmic level. Climatic Changes on Earth is also a natural and a vital phenomenon that is responsible for the life to flourish in immeasurable diversity and beauty. Our planet Earth had already witnessed seven cycles of glacial advance and retreat before reaching the climatic conditions favourable for the advent of present human civilisation. The last Ice Age ended some 7,000 years back, ever then the Climate had changed and synchronised to evolve the climate system comprising atmosphere, hydrosphere, lithosphere, cryosphere and biosphere that is favourable for the emergence of human species.

Climate is a comprehensive phenomenon and interrelation complex that include precipitation, temperature, humidity, sunshine, wind velocity, atmospheric pressure, atmospheric particle count and other meteorological variables like latitude, longitude, proximity to water bodies and mountains, etc. According to Intergovernmental Panel on

Climatic Changes, 2001 glossary definition - "Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system".

Climatic Change is the variation in global or regional climate over a long period of time scaling from few decades to millions of years. Climatic Change is driven by internal processes as well as external forces. The internal processes include Thermohaline circulation, and processes such as albedo, evapotranspiration, cloud formation and weathering. While the external forces can be natural as well as anthropogenic. The natural external processes include the variation in earth's orbit, variation in solar radiations received by Earth, plate tectonics and volcanic activities. The anthropogenic external factors are emission of Greenhouse Gases, deforestation etc. In other words, the amount of sun radiation absorbed by Earth and radiated back determines the temperature and climate, thus climate is the function of global energy content. The net absorbed energy

is circulated and redistributed throughout the planet by air, ocean currents and other mechanisms that bring about climatic variations and define the climates of different regions of the planet.

Harmful impact of Climate Change

Though Climatic Change is a natural process but current warming of Climate across the planet is a critical issue as the change is proceeding with an unprecedented rapid rate. The changes that take thousands of years to occur have been happening within 10 to 20 years causing global warming, melting of glaciers and sea ice, rise in sea level, and more severe and frequent weather events like heat waves, droughts, floods, hurricanes, cyclones, forest fire etc. The reason behind the rapid heating of Climate system is the excessive release of Greenhouse Gases (GHGs) like carbon dioxide and methane gas into the environment that is predominantly by anthropogenic activities. GHGs that trap the solar infra red radiations in Earth's atmosphere and cause heating. The amount of GHGs in the atmosphere has been increasing since Industrial Revolution due to the burning of fossil fuels, i.e., oil, coal, wood and gas, and continues to rise to the level that was never reached in the last 5,00,000 years. On the other hand, massive deforestation across the world is destroying the natural carbon sink to absorb carbon dioxide from the atmosphere and reduces the green house effect. We are burning huge amount of fossil fuels to produce thermal electricity, to run industries and machines, to run transport, to launch satellites, to test missiles and so on. The exceptionally immense burning of fossil fuels coupled with the extensive deforestation to drive the contemporary consumeristic and energy intensive life pattern with huge population is undoubtedly responsible for warming the Earth's Climate and making the survival of humanity vulnerable. Increased warming is resulting in heavy rainfall at some places causing droughts, heat waves and forest fires in other, in this way adversely altering the hydrological cycle thereby causing desertification and damage to the vegetation. Vegetation belts are shrinking as well as shifting which is bringing difficulties in agricultural activities. On the other side, migratory birds and fishes are found to be confused and have to move farther than ever to search for new suitable habitat with favourable temperature. Due to increment in temperatures, diseases are spreading fast in this highly interconnected world. Glaciers and polar ice are melting at a rate faster than ever causing massive floods and increasing sea level that pose a survival threat to more than one billion people.

National Oceanic and Atmospheric Administration (NOAA) reported the year 2016 as the warmest regarding the global average of land and sea surface temperatures for the entire year, since record keeping began in 1880. The temperature

in 2016 was 1.2°C warmer than the pre-industrial level. According to NOAA's National Centre for Environmental Information report, USA has experienced about 200 weather and climatic disasters that caused damage exceeding \$1.1 trillion along with the loss of human lives, since 1980. Climatic disasters are causing far reaching and more damages than the benefits we are attaining out of our materialistic and technological advancement. Temperatures spiked to historical highs in 2016 and reported by NOAA as such:

Phalodi, India – 51°C on May 19, India's hottest temperature ever

Dehloran, Iraq – 53°C on July 22

Mitribah, Kuwait – 54°C on July 21

The harm that man has caused to the environment can be interpreted as – 'Earth is 4.6 billions years old, if the time period be scaled to 46 years, then humans have been evolved 4 hours ago, the industrial revolution started just 1 minutes ago, and in this period we have destroyed 50% of the world's forests'. Still, plants and soil absorb and store about ¼ th of the 10 billion tons of carbon emitted by human beings annually. Deforestation accounts for about 15% of global emission.

Worldwide efforts to check the Climatic catastrophe

As the global temperature is rising, enormous efforts are being taken by different nations across the planet to check the disastrous impact of Climate Change by reducing the dependence on fossil fuels, harnessing the renewable sources for energy generation and checking deforestation. Sweden, in its 2016 budget, planned to spend an additional \$546 millions on green technologies and ecological initiatives to give momentum to their efforts to attain the status of first **Fossil Free welfare state** of the world. Currently, Sweden generates 2/3 of its power from fossil fuel alternatives. It is also investing in augmenting the reserve of solar cells and green cars along with climate financing in developing nations. Portugal, on the hand, ran completely on alternative renewable energy for 4 straight days between May 7, 2016 and May 11, 2016. Portugal proved that renewable energy has the capacity and efficiency to run the whole nation. Likewise, Costa Rica met its power demand entirely with renewable energy for 75 straight days. Denmark is another country which set a new record after generating 42% of electricity from merely wind energy. Norway funds Forest Conservation Projects worldwide and has pledged to become **Deforestation free**. It has a policy plan to ban diesel and gas by 2025 and to manufacture emission free new cars. Scotland has banned Fracking permanently while France has become the first

nation to ban all disposable cutlery products. Hawaii Islands and energy intensive city of Los Angeles are speeding up their efforts to produce 100% energy from renewable clean sources. Many stakeholders from various countries have signed the ambitious **New York Declaration of Forests** which aims at reducing up to 50% deforestation by 2020 and to ensure deforestation free world by 2030. The declaration also requires minimum 350 million hectares of land to be reforested. Our neighbouring nation Thailand is working on a pilot project to plant trees by dropping seeds for airplane or flying drone, which is called seed bombing or aerial reforestation. African Nations too have pledged to reforestation 100 million hectares of land. The concept of Fourth Industrial Revolution has been visualised that is to be driven with **Carbon Law**, which demands that the GHGs emission in all sectors and countries to be cut by 50% every decade so as to reach zero by 2050.

Bhutan is an inspiration for the whole world. Being the buffer state between the two huge and highly polluted nations India and China, Bhutan is committed to the environmental protection with such an approach that it has overdone its set goals. Environmental Protection is the core guiding principle of Bhutan's Public Policy, and is even included in its Constitution which requires 60% of total Bhutan's land under permanent dense forestation, but it has currently 72% land under forestation that acts as a 'Carbon Sink' for the world, that is, Bhutan emits 1.5 million tons of carbon dioxide and its forests absorbs over 6 million tonnes of carbon dioxide. Bhutan aimed at making itself carbon neutral but it attained the prestigious status of being a '**Carbon Negative State**'. Bhutan's Gross National Happiness Index is an another innovation for the rest of the world that links the happiness of its citizens to the environment, and displays the beautiful cycle in which good and healthy environment keeps the citizens happy that in turn inspires the citizens to enrich the environment. Bhutan has lived up the Vedic Prophecy '**ten vyaktena bhunjitha**'.

India accounts for 4.5% of the global GHGs emission. India has pledged that 40% of the country's electricity would come from non-fossil fuel-based sources, such as wind and solar power, by 2030. India has also ratified COP21 Paris Agreement on Earth Day in 2016 and agreed on spending \$6 billion to increase the forest cover from 12% to 29% of country's land by 2030.

In India, Uttar Pradesh has set a world record by planting 50 million trees by 8,00,000 volunteers in 24 hours, this year. These trees will be taken care through aerial monitoring and photography. International Airport at Cochin, Kerala has been designated as the world's first solar powered airport running completely on 46,150 solar panels laid across 45

acres of land and expected to check around 3,00,000 tons of carbon emission in the next 25 years.

Positive impact of Climate change

Besides this, the scientific study published in the Journal 'Nature Climate Change' reveals the positive impact of global warming. According to it, that the warming up of Climate, on account of rising level of carbon dioxide, is making the planet greener as forests are using excess carbon dioxide to grow faster and absorb more carbon dioxide. It supports its finding by the facts that between 25% to 50% of the Earth's vegetated land has experienced significant greening over the past 3 decades and also, the crop yield has been increased by at least 10% to 15%. Further, according to the report of UK based Global Warming Policy Foundation, the global **Carbon dioxide Fertilisation Effect** on worldwide crop yield has been estimated to be around \$140 billion a year. Carbon dioxide Fertilisation Effect increases the rate of photosynthesis and reduces the stomatal conductance due to partial closure of stomata. This checks transpiration and makes plants drought resistant. This Effect also enables plants to grow in low quality soils, since plants tend to transfer more photosynthesis to the roots under higher carbon dioxide concentration and this results in the growth and development of roots along with nitrogen fixation. Despite the increase in crop yield, the quality of certain crops were dropped as the effect is found to cause deficiency of iron and zinc. The elevated level of CO₂ is found to be ineffective for the crops like maize, sugarcane, sorghum, millet and many pasture grasses. Moreover, this fertilisation effect of carbon dioxide is temporary and will be diminished soon, since plants will adapt themselves to higher level of carbon dioxide. Hence, whatever be the short term positives of rising level of carbon dioxide, they are outweighed by its severe negatives.

Climate Warming is also altering the global pattern of 'mild' weather and causing a shift in mild weather from Tropical zones to mid-altitude regions. So, mid-latitude regions are likely to be benefitted as mild weather is highly valuable for range of activities like agriculture, construction, tourism, travel, transportation, outdoor recreations. Climate warming is also likely to evolve new species of flora and fauna. Sun throws more energy to earth in one hour than we could use in one complete year. So Climate Change **offers the timely opportunity** for the capacity building to harness the huge store of renewable energy to counter energy crisis as well as pollution and health problems. The current climatic catastrophe **teaches** that the wisdom of humankind lies not in the **mindless conquest of the invincible Nature** but to explore the treasures of Nature to benefit the whole creation and live harmoniously.

Different nations of the world are dissolving their hostility towards each other and coming together in the battle against rapid climate change. The world humanity is now realising the authenticity and significance of Indian Vedic aphorism “**Vasudhaiva kutumbakam**”. The **Sustainable Development Goals and Paris Climate Agreement** recognises the world’s commitment to take timely actions to avoid climate change catastrophe and to build a sustainable future. Climate Change, global warming and pollution do not know political boundaries and harm the whole humankind alike. All the nations are facing rising temperature, extreme weather events, food insecurity, energy insecurity, diseases and natural disasters, which in turn, making the humankind realise that it needs to respond in a united and holistic way, it needs to rectify the mistakes, it needs to change its approach, it needs to care about environment that envelops it, it needs to establish harmonious relation with the Nature, it needs to check the growing consumerism, it needs to embrace sustainable development.

Decarbonisation and Population Control of world economy are the only solutions that involve the transition of key economic systems such as our energy system, food production system, manufacturing sector, transportation modes and our cities towards fossil fuel free and clean technology. For this, **carbon pricing** will effectively trigger a technological momentum towards low carbon economy by fostering investment in green technology. The need is to direct private sector investment and business entrepreneurship to give innovation required for the transition to low carbon economy. Along with it, the affordability and efficiency of renewable energy, electric vehicles, batteries, smart grids, micro grids should be enhanced. Our life pattern, culture, beliefs, aspirations, technologies must not go against the Nature and should have respect for life.

So far discovered, there is no other planet supporting life, we know no creature beyond Earth, hence we need to value our **Planet and Life**. Changes are obvious, without which we have not experienced the present state of existence. It depends on our intelligence, wisdom, farsightedness and orientation that whether we make the Climate Change to direct our own extinction by our unregulated activities or to make it an opportunity to keep evolving to a more graceful state of existence.