

“Vicious Cycle of Global Warming: Role of Scientific and Technological Development, Challenges and Future Prospects for Sustainability”

***H.R. Dhanetia**

Nature has the enough potential to revive its depleted natural resources up to a bearable limit, beyond that severe consequences can be seen. Since the last decade we have been observing rapid scientific and technological development in all sphere of life, Starting from automobile, air conditioning, anti-biotic in medicine, persistent OPs in agriculture, mining, conventional fossil fuel based industries, synthetic dyes and so on. These developments are seem to facilitate the human comfort and enhanced economic benefits but in actual sense it is not balanced and sustainable development, as they are causing environmental degradation, ecological imbalances, climatic changes and global warming etc. Global warming which is changing the climatic conditions, weather pattern, also decreasing the efficiency of automobiles at higher temperature, resulting in more fuel consumption that leads to higher GHGs emission into the atmosphere. These GHGs further increase the global temperature which further reduces the efficiency of automobiles with more and more fuel consumption and emission of GHGs.

As the global temperature increases more ACs are being used to control the temperature, that further heating up of the globe besides emitting more GHGs like HFCs into the atmosphere. Wireless communication technologies and devices increases the radiation level into the atmosphere which are responsible for the serious health hazard to human health and threat to the extinction of avian population as well. On the other hand increasing concentration of GHGs into the atmosphere creates the extreme climatic conditions like high temperature in summer, very low temperature in winter, uneven rainfall distribution, drought, flood, avalanche, melting of glaciers and landslides etc creating havoc for the human life. Present article is focused on the challenges of this entangled situation that must be overcome by synching with nature to ensure the sustainability.

Key Words: Vicious, persistent OPs, environmental degradation, ecological imbalances, sustainability, GHGs, automobiles, havoc, avalanche, entangled etc.

Introduction

"The Earth provides enough to satisfy every man's need, but not every man's greed."

-Mahatma Gandhi

Now a days we are facing the problem of climate change, for that the most contributing factor is

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global warming. The terms climate change and global warming looks the mutually associated terms and synonyms but actually they are different terms. Negativity is implicit in the climate change word because this change is unfavorable and great challenge for the survival of flora and fauna and alters the composition of atmosphere, weather pattern etc. Climate change is the consequence of the global warming. Emission of large quantities of green house gases like CO₂, CO, NO_x, SO_x, CH₄, VOCs, HFCs etc, from fossil fuel combustion in automobiles, industries, refineries, mining and other anthropogenic activities like deforestation, urbanization, industrialization etc are causing global warming that is responsible for the damage of our ecosystem and environment [1]. Concentration of GHGs in the atmosphere is going on leaps and bound and has reached beyond the tolerable limit, and situation has become uncontrollable due to the auto boosting effect that is called as 'vicious cycle of global warming'. It is a very challenging task to overcome this cyclic situation without thinking out of the box [2].

Different aspects of Scientific and Technological Developments and their Challenges for the Environment, Human Health and Sustainability:

According to the data of GISS (Goddard Institute of Space Studies) the global average temperature in the period 1951-80 was 14°C but in 2017 the global average temperature has increased to 14.9°C [3-4]. The main reasons behind this drastic increase in global average temperature are anthropogenic activities [5]. Different technologies are contributing to the vicious cycle of global warming. Every day many new technologies are being developed and invented by the scientific community to solve the complex problems quickly and economically, along with enhanced productivity and human comfort but simultaneously creating discomfort for the environment, human health and sustainability too [6]. The details of these technologies and scientific developments with their severe consequences are given as follows:

(A) Automobiles: Automobiles have boomed with a great pace in a recent decade which are mainly based on the fossil fuels like petrol, diesel, CNG etc. Combustion of these fossil fuels in the internal combustion engine of automobiles, emit a very large quantity of green house gases (GHGs) into the atmosphere such as CO₂, CO, SO_x, NO_x, VOCs, H₂S and so on. All these GHGs are trapping the solar heat (specially IR radiations) in the earth's atmosphere and causing the phenomenon of global warming [7-8]. Earth's temperature is continuously rising and it has been observed that the average temperature of Earth's surface has raised 1.6°C since pre- industrial era. In comparison to pre-industrial era, the concentration of GHGs has increased manifold in the industrial era [CO₂ (31%), CH₄ (151%), N₂O (17%)].

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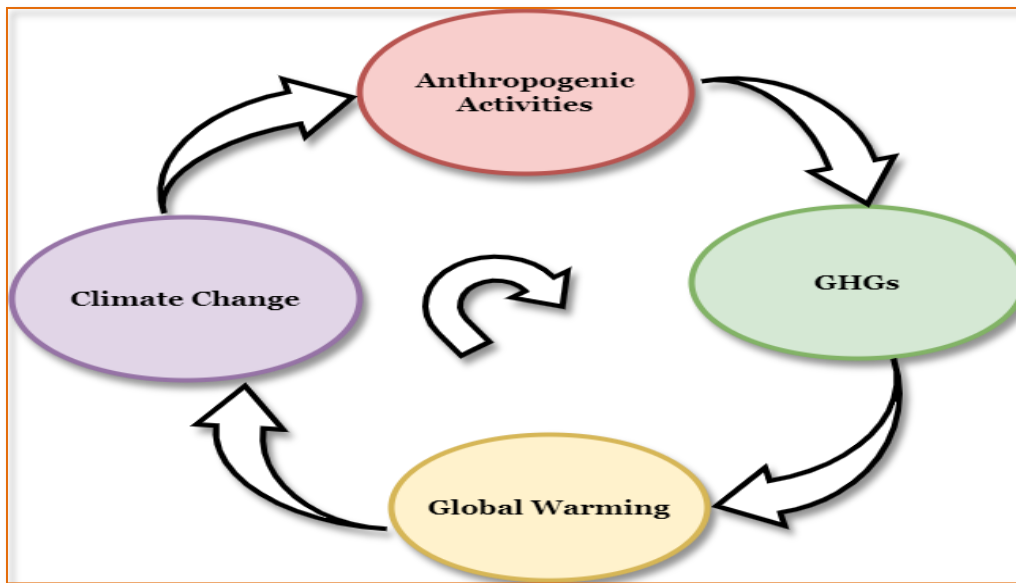


Fig.1: Vicious cycle of Global Warming

At higher temperature the efficiency of internal combustion engines reduces drastically and their performance too reduces accordingly resulting with the more fuel consumption that leads to the liberation of higher GHGs into the atmosphere. These GHGs further increase the global temperature which further reduces the efficiency of automobiles with more and more fuel consumption and emission of GHGs in the cyclic way and our Earth planet is going to become deadly oven. Apart from these facts, there are 21 crore registered vehicles in India (four wheelers and two wheelers) plying on roads. The average consumption of fossil fuel per vehicle per day is 5litres. Thus total consumption of fossil fuel will be 105 crore litre per day in India and there are approximately 205 countries in the world, so we can assume the amount of total emitted GHG gases into the atmosphere globally apart from the air transport which is alone ontributing 2.5% of total GHGs emission. These gases are harmful for the human health and environment [9-11].

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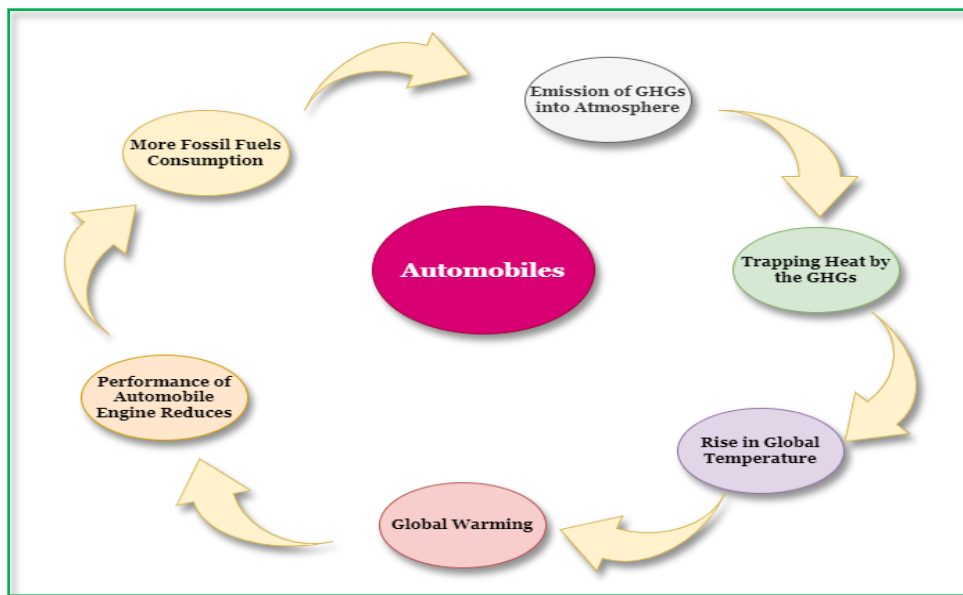


Fig.2: Vicious Cycle of Global Warming caused by Automobiles

(B) Air Conditioning: As the globe warms, more air conditioning units will be sold out and heating up the globe further in a cyclic manner. On the other hand fossil fuels (coal alone accounts for 75% of total energy generated in India) are the main source of power supply for running ACs, which in turn the major cause of global warming and heat waves that further promote the more use of ACs. Outside temperature of a running AC is just in opposite difference of inside room temperature [12-13]. For example, suppose the atmospheric temperature of a particular day is 45°C and inside room temperature under the influence of AC cooling is 20°C. In this case the difference between outside and inside temperature is 25°C, then the outside temperature around running AC will be approximately 70°C (energy conservation law). One can imagine the survival of human and plant cells at so high temperature. The optimum tolerable temperature for the survival of living cells is 50-52°C (vulnerable temperature) above which genetic deformations of DNA and RNA get start [14-15]. This is the one face of the impact of ACs, on the other face ACs release a lot of amount of GHGs i.e. HFCs and CFCs which are capable to trap and absorb a great amount of heat in the form of IR causing global warming [16-18]. Third one is, these gases are also responsible for Ozone layer depletion, as per scientific record one molecule of CFC has the potential to destroy one lakh molecules of Ozone [19].

Presently there are two billion operational AC units in the world which are likely to rise over 5.5

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billion by 2050. According to recent report China and India will have the highest units of ACs by 2050, that will be accounted for more than 45% of the total units of ACs available globally[20-21]. As per the analysis of International Energy Agency an average consumer of the developing countries like India tends to purchase least efficient ACs(three star rating or less) due to cost effectiveness, the high upfront cost of most efficient ACs(five star rating) deters consumers from purchasing them. Cost effectiveness is one of the most important factor that lure the customers to purchase least efficient ACs which consume more electricity. The another factor is the rise in per capita income, so people can afford buying the ACs[22]. The third factor is the water scarcity and depleted ground water table in different parts of the world, in this scenario use of coolers have reduced drastically and customers have moved towards buying ACs [23]. That's why the use of ACs has increased very fast to survive in extreme temperature conditions.

(C) Wireless Communication Devices and Technologies: Wireless communication devices mainly mobile phones, mobile tower and associated technologies like Bluetooth, hot spot, wi-fi, 2G, 3G, 4G, 5G and 6G etc, are successively increasing the radiation level into the environment[24-31]. The exposure of these radiations for a long time period is very lethal for the human and other animals too [32-35]. Avian population is continuously decreasing because when microwave radiations impart over their eggs, chicks developing inside eggs damaged [36]. Our environment has become the open microwave oven due to these radiations and the globe is heating up consequently the Earth's climate is changing [37-40]. Aerosol and water vapour present in the atmosphere interact with the microwave radiations and create a warming effect in our surroundings [41-42]. As the Earth warms, rate of evaporation increases correspondingly and amount of water vapour increases into the atmosphere that further enhances the green house effect in a cyclic way.

Diana Kordas found the profound effect of EMR in her observational study on declining population of birds and trees since the advent of 4G wireless [43].



Fig. 3: Impact of mobile tower radiations on Environment

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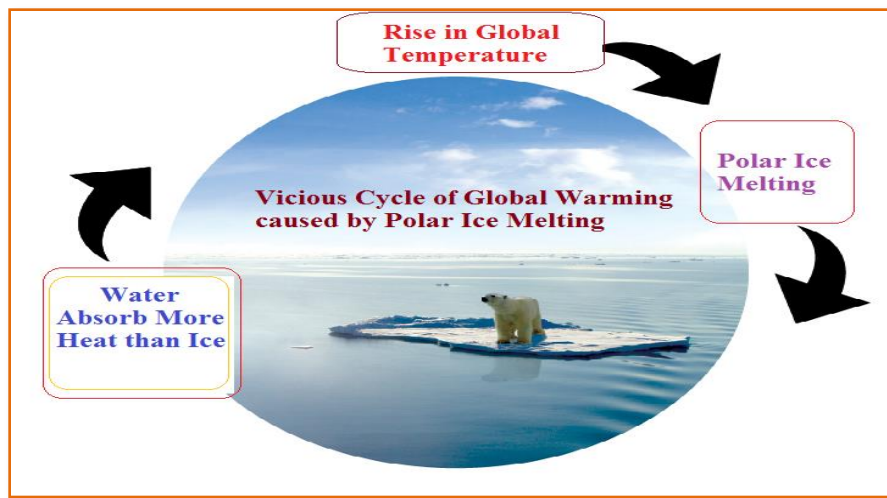


Fig.4:Vicious cycle of Global warming caused by Polar Ice Melting

(D) Agricultural Technologies: Agriculture is the prominent source of global emission of GHGs[44-45]. Rampant use of Agricultural pesticides, chemical fertilizers and livestock manure are the main cause behind the degradation and contamination of the environment. These contaminants run-off with the rain water to the water bodies like rivers, lakes, small ponds, sea etc where they create the phenomenon of eutrophication which is responsible for the death of aquatic animals. On the other hand agricultural pesticides are non-biodegradable and persistent in nature, so their concentration in the soil successively increases and progressively move in the food chain through bio-magnification and bio-accumulation [46]. Livestock manure is the main source of very potent green house gas i.e. methane (CH₄) [47]. Genetically modified seeds are also a cause of concern for the biodiversity. Spraying of pesticides using modern tool and techniques like drone technology are making the aerosol in the atmosphere which is a serious threat for human and animals health as well.

Future Prospects for Sustainability: The challenges of global warming and climate change are multifaceted and universal. So, to deal with them, global and collective efforts are to be needed with multipronged strategies. We have to use our natural resources in such a way that beside fulfilling our needs we will have to keep in mind the needs of future generation too. We have take certain measures individually along with the formulation of environmental policy at government level to deal with the present situations. Some of them are mentioned below:

1. To reduce the GHGs from the automobiles electric vehicles, along with the public transportation should be promoted.

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2. Use of ACs must be strictly banned in all government offices and institutions except emergency and health related services.
3. Global warming compensatory taxes should be levied upon the households and commercial outlets using ACs.
4. Just like the Telecom Regulatory Authority of India-Regulatory body in telecom sector, Electricity Regulatory Authority of India- Regulatory body in the sector of electricity, a permanent Environmental Regulatory Authority of India must be constituted to regulate the environmental affairs.
5. Intense plantation drive in rural as well as in urban area should be initiated.
6. In metropolitan cities just like water harvesting system, plantation should be made compulsory in the construction related bylaws.
7. In agriculture sector use of bio-fertilizers, bio-pesticides should be ensured instead of chemical fertilizers, and hazardous pesticides.
8. ACs should be designed in such a way that Minimum be fixed at 25°C and maximum at 35°C, so that misuse of ACs can be checked.
9. As far as possible wired communication devices should be promoted instead of wireless communication devices.

Conclusion: The climatic stability is must for the sustainability of nature and natural resources and for climatic stability sustainable practices are must in the every sphere of life.

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