

Episode-7

Is Climate Change a reality or a Statistical Gimmick

By: Dr. Shivani Dhage

Participants:

Narrator /Anchor – **Dr. Shilpa**
An Environmentalist – **Dr. Rakesh, Dr. Ritesh**
Meteorologist from IMD– **Dr. Shailaja,**
Government panellist as Policy maker- **Er. Sourabh,**
Participants/ audience – students from school and Jr. colleges, Nirmiti, Ameya, Sai, Kirti
Parents: **Papa,**

Signature tune and opening announcement.....

In today's episode we will try to find out whether climate change is a reality or it is a gimmick? Scientist do say that it is a reality but one of the presidents of developed country says that it is statistical gimmick. Let us go and find out the truth.

.....Change over Music

Dr. Shilpa: Good morning. Today let us try to analyse rather debate ourselves whether “really there is something like climate change” and “is it so harmful or it is attention grabber or trick of the statisticians/ politicians to put pressures that is intended to make people notice it”? Today we have distinguished environmentalists Dr. Rakesh and Dr. Ritesh, Meteorologist from IMD Dr. Shailaja, Government panellist as Policy maker Er. Sourabh and Papa of Nirmiti. Welcome all. Dr. Rakesh Sir, can you brief the audience please?

Sai and Kirti: Good morning Dr. Rakesh sir. We both are from middle school and our teacher has just started teaching this topic. Our teacher said, it is very complex process. Hope we will understand it better while doing dialog with you.

Dr. Rakesh: Good morning everybody. Thanks Sai and Kirti for briefing us about your school details and I am glad that you are keen to know more. The most common definition of “climate change” is a change or alteration in the statistical properties of the climatic parameters of atmosphere when considered over long periods of time, regardless of cause. **Fluctuations over periods shorter than a few decades, such as El Niño, do not represent climate change.**

Papa: Can you explain to the kids what ‘El Nino’ is?

Dr. Rakesh: El Niño is a climate pattern that describes the unusual warming of surface waters in the eastern tropical Pacific Ocean. In other words, El Nino is the “warm phase” of a larger phenomenon. It is also called the El Nino-Southern Oscillation (ENSO).

Dr. Shailaja: True Dr. Rakeshjee. Students, welcome for this discussion. The Perceptive of Geologists, ecologists, Meteorologist, scientists and environmentalists who are good at understanding the subject on global warming/climate change has been grouped together by Intergovernmental Panel on Climate Change (IPCC). It is an international scientific panel/committee established in 1988 by United Nations organizations (UNO), World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP). Many nations have joined this panel to understand the status of their respective countries. Currently 194 countries are members of the IPCC. India is one of them.

Dr. Shilpa: Dr. Ritesh, will you explain the necessary information required to be collected?

Dr. Ritesh: yes, sure. Thanks Dr. Shilpa for inviting me. “The basic need to estimate the extent of climate change is to have reliable, well calibrated, time series data/information on above parameters, measured through identical methods for the area to be considered. Such Authentic data will minimize the error in extrapolation or interpolation in statistical derivations through modelling and final outcome of the interpretations. This is the first requirement for defining the extent of climate change and future predictions through statistical analysis.

Dr. Shailaja: I will like to add few things. Meteorological departments of respective countries do generate information on climatic conditions but at times uniform methods or instruments are not used. Dr Sourabh Do we have such unbiased comparable data for whole of the world say developing countries and developed countries?

Dr. Sourabh: Probably the answer is “no” Dr. Shailaja. The global warming debate is an on-going dispute about i) the effects of humans on global climate and ii) about what policies should be implemented to avoid possible undesirable effects of climate change. The current scientific consensus on climate change **is that whether recent warming indicates a fairly stable long-term trend and is the trend** largely human-caused?

Dr. Shilpa: There are still some doubts in the minds of people. Is it the serious damage may result at some near future time? If climate change is really happening then what steps are needed by humans to halt the trend? Dear Nirmiti, do you know some details about the world wide institutions involved in this?

Nirmiti: Thanks madam for giving me a chance to tell you about agencies responsible for Global warming deliberations which we learned in college. In addition to WMO, UNO and UNDP, other universal Scientific organizations like Royal Society, American Geophysical Union, Joint Science Academies, American Meteorological Society, and American Association for the Advancement of Science are associated with Intergovernmental Panel on Climate Change (IPCC). They all agree with the opinion that most of the observed warming over the last 50 years is likely due to the increase in greenhouse gas concentrations caused due to human deeds.

Amaya: Very true. But our teacher had also told that there are small but vocal number of scientists in climate and climate-related fields that disagree with the consensus view. Friends, by now, you must have got enough knowledge about what are “Green house gases” and how they are produced through human activity.

Dr. Shilpa: A common person is in a confused state and needs briefing about the realities regarding the reasons for abrupt changes currently occurring in atmospheric parameters. Major Climate change impacts experienced by humans are countless specifically with respect to health related issues. Dr. Ritesh can you elaborate the important factors which need consideration in this issue?

Dr. Ritesh: Five major facts in relation to impact of alteration in climatic parameters are worth emphasizing here: Firstly

- **Rising temperatures:** As temperatures climb up, more heat waves are expected. Extreme heat can cause dehydration, heatstroke, and major organ damage to humans. Specific category of people, including the elderly, children, and the poor with minimum protective facilities is at more risk from the impacts of heat waves. Secondly
- **Water cycle:** Increasing global temperatures can lead to droughts, changes in annual rainfall, sequence of water equilibrium leading to “water scarcity or stress”. Water is life and needed for drinking, Household Needs, Irrigation/Agriculture, Recreation, Industry, Commerce and thermoelectricity/Energy generation. Humans will experience “Climate change poses a huge threat to fresh water availability.

Ameya: Yes sir, in our environmental science chapter, there is an example for water depletion. It is stated that the largest reservoir in the US – Lake Mead – contained less than half the amount of water in 2015 as it did in 2000. Many cities around the world could face a similar fate. **And climate change is making our water supply much less secure.** Behaviour of coastal waves and currents can also change leading to complicated stormy conditions. So what can we do to minimize the adverse impact on maintaining water balance?

Dr. Ritesh: Good Ameya, you will get the answer for your query in subsequent discussions. Let us go ahead. Next point is about air.

- **Air quality:** Air Pollutants like Green House Gases (GHG) are main cause of Global warming. Along with GHGs, emissions from burning fossil fuels, wildfires smoke, industrial emissions, and vehicular exhaust carrying fine particles can penetrate deep into lungs. Intake to air pollutants is linked to short-term & long-term impacts like burning eyes, suffocation/difficulty in breathing, coughing, Bronchitis, asthma, lung cancer, heart diseases, cancers and even death. Others include headaches, nausea & allergic reactions ultimately leading to chronic respiratory disease, lung cancer, heart disease, damage brain, nerves, liver, or kidneys.

.....Change over Music of fear.....

Sai and Kirti : Ohh my God! it is so dangerous! Then we have to take timely precautions to protect ourselves.

Dr. Ritesh: Let us go ahead. Next factor is

- **Vector-borne diseases:** Vector-borne diseases are illnesses spread by insects or arachnids like mosquitoes, fleas, mites, and ticks. As our climate becomes warmer, some insects will grow in tonnes and they are spread to new regions bringing the viral epidemics. Viral diseases like Zika, Ebola, Avian influenza A(H7N9), Middle East respiratory syndrome corona virus (MERS-CoV), Pandemic (H1N1), Influenza at the Human-Animal Interface (HAI), Lyme (caused by *Borrelia burgdorferi* transmitted to through infected blacklegged ticks), and many more outbreaks were recorded in recent years. Incidentally temperature rise is also concurrently recorded which gives scientists a chance/scope to correlate global warming with such epidemics. And last point is
- **Extreme weather:** Climate change has been linked to many types of extreme weather, including hurricanes and floods. These leads to tremendous loss of property, humans and ecosystem. Not only can these extreme weather events have immediate fatal consequences, but they can lead to major injuries and the spread of waterborne illnesses such as wound infections, dermatitis, conjunctivitis, ear, and nose and throat infections.

Dr. Shilpa: Thank you Dr. Ritesh for elaborate information. Let us presume that “climate crisis and its impact on people around the world are real”. Dr. Sourabh, can you tell the history of climate change subject?

Dr. Sourabh: The basic science behind climate change is actually quite simple. 150 years ago, many well known scientists like Irish physicist John Tyndall, Swedish scientist Svante Arrhenius, Jagdish Bhagavati, Susan George discovered that increasing the amount of carbon dioxide, the then called ‘carbonic acid’ in the atmosphere along with some colourless and invisible gases and vapours would cause rise in global temperature due to absorption of radiant heat from Sun. But the idea remained mostly an academic question until, the mercury really started rising with noticeable increase in temperature.

Nirmiti: Yes I remember this was taught to us in high school days. We know that Sun is the only source of external heat for earth. Sunlight passing through atmosphere heats the surface of the earth and releasing heat in the form of “long wave infra red radiation”. Presence of green house gases in lower atmosphere result in trapping and absorbing these radiations and heat earth surface more.

Dr. Sourabh: Hi guys, to continue the topic, here is more information. The IPCC panel also concluded there's a better than 95 percent probability that human-produced greenhouse gases such as carbon dioxide, methane and nitrous oxide have caused much of the observed increase in Earth's temperatures over the past 50 years. The main reason for the increase in green house gases causing

warming is uncontrolled unbalanced activities by huge population, industrial activity, combustion of fossil fuel and improper management for minimizing such generation.

Nirmti and Sai: No one disputes above statement Sir! Scientifically correlation between warming of earth and quantitative increase of green house gases is a reality with authentic reasoning. It is technically proved beyond doubt that increased levels of greenhouse gases are causing global warming.

Ameya: The evidence was first supplied by Tyndall. It is possible to prove without conducting a “planet-scale experiment” which a group of scientists were insisting to conduct, to prove the shift in “planet's energy balance” towards the higher side. Can we get some details of energy balance and green house gases generation?

Dr. Rakesh: Yes my dear friends, absolutely correct. I am happy to note that you all are aware about today’s topic. It is simple to explain increase in green house gases in atmosphere. Say for example, the design capacity of people in a train coach is fixed but is seldom exceeded during travel. Limited resources available in a coach like space and fresh air circulating are utilized by large number of passengers bringing shortage and limitations. This results in creating stress. Similarly the earth has fixed assimilative capacity /natural ability to handle the changes in the environmental factors. If humans exceed this ability, obviously the impact will be exerted creating pressure on natural systems.

Dr. Shilpa: But Dr. Rakesh, I came to know that on Thursday 4 May 2017, Ian Johnston*, Environment correspondent has raised certain issues about authenticity or reality of climate change phenomena. He has reservations about climate change and warming of earth. He expressed his concern about what will happen next and what can we do about it? Is climate change so bad for humans? What if there's a little climate change?

Dr. Rakesh: Opinions differ with variety of persons. Some commentators, including the Global warming Policy foundation (GWPF), adopt a so-called ‘lukewarmist position’ (meaning agrees that the climate is changing but is not certain that's a bad thing, and reserves judgment on controlling). This group is arguing that climate change will not be too bad. There is no need to stop using fossil fuels which may be taken up as long term phase out policy. Alternative safe fuel source has to be explored. They saw positive point that global warming can lead to beneficial effects such as 'global greening' in which plant growth is boosted by the extra carbon in the air. However, it can happen only if we preserve the forest and not destroy for human’s greed under the banner of “Development”.

Dr. Sourabh: Others have claimed humanity is plunging headlong towards catastrophe/disaster and possibly in future a tiny band of survivors cluster may be shifted around the last remaining habitable territory near the poles.

Dr. Shilpa: Both groups are at odds with the science. Professor Tim Palmer, an Oxford University physicist who has worked on reports for the Intergovernmental Panel on Climate Change (IPCC) explained in a recent talk at the Royal Society, the ‘scientific consensus on climate change. He said that impacts could be anything between minimum and extreme. Dr. Ritesh, can you throw some light on the application of computer models?

Dr. Ritesh: Hi everybody, I am involved in modelling job and hence will share my thoughts. It is stated that computer models are developed using mathematics, the laws of physics and the best available knowledge. According to output of these models which are based on mathematical equations, the world's temperature could be may rise between about 1.5oC and more than 5oC of warming as a result of the doubling of atmospheric carbon dioxide. So far it has raised from about 280 parts per million– a level that had remained fairly constant from the end of the last Ice Age to the 1800s in pre industrial era – to more than 400 ppm today (to be precise, it was 384 ppm in 2007). Kyoto protocol has identified three main GHG viz. Carbon dioxide, methane and nitrous oxide which are produced mainly due to industrial activity and fossil fuel burning. So if the adaptive measures are not taken, we may reach soon the double the level of carbon di oxide that is 560 ppm.

Dr. Shilpa: Ritesh, can you give some more information about how the models are run?

Dr. Ritesh: Models are often the source of mockery from climate ‘sceptics’ or ‘deniers’. Their output is based on the authenticity of data files of observations which is the main input. However, they have actually proved remarkably successful when measured against actual observations. Even Arrhenius’ prediction that the Arctic would warm more quickly has proved to be true.

Dr. Shilpa: Thanks Dr. Rakesh, Shailaje, Sourabh and Ritesh. Dear participants, it is a reality that production of GHGs has increased and most of the world has come to the conclusion that fossil fuel use should be phased out rapidly and try to minimise the chances that devastating storms, deadly heat waves, floods, droughts and other extreme weather events will wreak havoc to an unprecedented extent. Some of the hottest and most humid parts of the world are already getting close to the point where humans are no longer be able to lose enough heat to stay alive outdoors. Dr. Sourabh, will you like to add anything more?

Dr. Sourabh: A “global warming conspiracy theory” invokes claims that the scientific consensus on global warming is based on conspiracies to produce manipulated data or suppress dissent. It is one of a number of tactics used in climate change denial to legitimize political and public controversy disputing this consensus. Global warming conspiracy theorists typically allege that, through worldwide acts of professional and criminal misconduct, the science behind global warming has been invented or distorted for ideological or financial reasons, or both. Dr. Rakeshjee, please give us more information about IPCC.

Dr. Rakesh: As stated by the Intergovernmental Panel on Climate Change (IPCC), the largest contributor to global warming is the increase in atmospheric carbon dioxide (CO₂) since 1750, particularly from fossil fuel combustion, cement production, and land use changes such as deforestation. The IPCC's Fifth Assessment Report (AR5) states:

“Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. This evidence for human influence has grown since AR4. It is extremely likely (95–100%) that human influence has been the dominant cause of the observed warming since the mid-20th century. — IPCC AR5 WG1 Summary for Policymakers”.

Dr. Shilpa: Let us study the recent example of havoc due to floods in Kerala. Recent natural disaster of Kerala floods has impacted the whole nation directly or indirectly. One of the main reasons is excessive human activities like too much construction, excessive stone mining there by disturbing the geological strata near to the coastal region which already is vulnerable due to the impacts of waves and disturbing natural drainage system. Indirect impact is we are spending huge amount of money and other resources for the settlement of the affected people which is the priority.

Kirti: Mam, I did not understand the meaning of vulnerability. Can you explain it?

Dr. Shilpa: “Vulnerability to climate change is the degree to which geophysical, biological and socio-economic systems are susceptible to and unable to cope with adverse impacts of climate change (Füssel and Klein, 2006). The term ‘vulnerability’ may therefore refer to the vulnerable system itself, e.g., low-lying islands or coastal cities; the impact to this system, e.g., flooding of coastal cities and agricultural lands or forced migration; or the mechanism causing these impacts.

Dr. Rakesh: Yes. Suggestions and recommendations of Western Ghats report were not followed and implemented to this ecologically and geologically Sensitive Area (ESA) for some reason or the other. The Kasturirangan committee report has sought to balance the two concerns of development and environment protection, by watering down the environmental regulation regime proposed by the Western Ghats Ecology Experts Panel's Gadgil report in 2012. The panel, in its report, has classified the 142 taluks in the Western Ghats boundary into Ecologically Sensitive Zones (ESZ) 1, 2 and 3. ESZ-1 which covers Kerala state, being of high priority, almost all developmental activities (mining, thermal power plants etc) were restricted in it.

Dr. Sourabh: The Central Government told the National Green Tribunal that it would not follow the recommendations of the Madhav Gadgil report on Western Ghats. The Ministry of Environment & Forests and Climate change (MoEFCC) said that examining and processing the report of the high-level working group (HLWG) headed by Dr K Kasturirangan will be done. This report was also opposed by many. The Gadgil Committee report adversely affects the various mafia. When the Gadgil Committee report was first made public, there were a lot of protests against it from the sand mining and quarrying lobbies in Goa. Many mafias created fear among farmers in Kerala that the Gadgil report is against them, and that they will lose livelihood if its recommendations are implemented.

Kirti and Ameya: Is there a simple example to understand the improper management?

Dr. Shilpa: Another simple example is for Mumbai where you live. The water consumption is much higher than other cities. Moreover the domestic waste water generated is wasted after partial treatment into the coastal region and not recycled or reused thus making natural water resources scarce. The ocean water which forms about 97% of the global water is not utilized for daily needs either by humans or plants and getting polluted. We should try to conserve water by changing our habits and minimize water use to save our

mother earth from manmade calamities and depletion of natural resources. The human's greed for lavish living needs to be curbed.

Dr. Ritesh: Very true Dr. Shilpa. Similar example is over use of vehicles to travel a shorter distance and no walking or cycling which enhances release of GHGs. One should try to avail optimum basic facilities and conserve the environment. "Simple living and high thinking" will help us to balance and preserve the ecosystem".

Nirmiti and Sai: All of us should also minimize use of electricity and try to use non-conventional energy sources like solar power. This will indirectly reduce generation of GHG through burning fossil fuel. The consumption of fuel products petrol and diesel needs to be restricted because these energy sources are non renewable and are principle sources of GHGs.

Dr. Shilpa: Well said my friends. To conclude, Science had made enormous efforts in understanding climate change and its causes on global level. Today's discussions are helpful to develop strong understanding of most probable current and future potential impacts that will make our life difficult. It will also help people to acquire knowledge of necessary actions to be followed now and in coming decades. This understanding is crucial for the decision makers and policy makers to minimize climate change impacts in the context of other large challenges the nation and world is facing. There are still some uncertainties about the predictions as the climate of the world is a very complex subject.

Dr, Ritesh: Moreover, the data base used in the statistical analysis and modelling has to be strengthened to make it unbiased and accurate. Never the less, the evidence is based on multiple lines of research, documenting and statistical models to state that the climate is changing and these changes are largely due to human activities. While much remains to be learnt, the core phenomenon, research, scientific questions and hypothesis have been examined carefully and have stood firmly.

Dr. Shilpa: Thanks everybody and in particular to experts who had elaborated the complexity in simple way. To sum up, I feel active participation of all the people with elaborate scientific debate for this complex topic and careful examination of alternative evaluation will be helpful to save our mother earth to have our future life comfortable. Parents should encourage the kids to conserve and preserve our environment.

Thank you all for the wonderful contribution on the recent topic of concern to all.

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