CMS VATAVARAN *presents*

WORSHOP ON DEMYSTIFYING CLIMATIC CHANGE

REPORT

- *Priyanka Sridhar*

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BACKGROUND OF THE WORKSHOP

Our climate undergoes a lot of change in the course of time. A lot of factors contribute to this change. It is because of these factors that the severity of the change is affected, and hence affecting us in the process. Science is the basic key to the growth of these factors, and the root of it has to be understood to gain knowledge of the eventuality.

Climate change has become one of the biggest challenges to mankind in the 21st century but to act on it requires a good understanding of the issue. As an issue that affects everybody from the young and the old to the rich and the poor, climate change needs to be understood by all in order to contribute to the solution.

Demystifying Climatic Change is basically breaking down of or demystifying the very concept of climatic change. "Demystifying climate change" is a workshop that focuses on the science behind climate change and allays the doubts that many skeptics raise in order to avoid serious action on climate change. The mystery behind climatic change has to be cleared in order to prevent its further negative induction. For youth leaders, it becomes vital that their understanding is based on science and evidence and not get carried away by baseless skeptical arguments. . The workshop is for young students and professionals who need to gain the basic understanding of the issue through all possible perspectives and at the end choose the area he/she can focus to work on. The Indian Youth climate network offers similar workshops to train young minds and equip them with the necessary tools to take climate action.

PROGRAMME

The workshop held at Bhartiya Vidya Bhawan on August 13, 2010 was on the most prevailing topic of today DEMYSTIFYING CLIMATIC CHANGE, organized by CMS Vatavaran. This workshop was conducted by Mr. Chaitanya Kumar, IYCN.

SESSIONS

Mr. Chaitanya Kumar, initially explained the important terminologies and the nomenclature of Climate. He then gave us an idea about the carbon atom, its cycle and how much more has brought about the climatic changes.

SESSION 1: Science

Science has been at the forefront of discovery in human history. Mathematics or physics or chemistry – Science has defined our development and the way we live!

For example, a person driving a vehicle does not necessarily know the science behind it. But definitely does owe it to science as it is science that makes the driving possible.

SESSION 2: Importance of science

Understanding science helps us understand our problems better. Tackling an issue like climate change which completely depends on science for certainty, makes it vital. Science provides the right arguments to take action across all spheres of rational life – political, economical etc.

We undergo a lot of problems in our lives. Pertaining to climate change, 'pollution' was stated a major problem by a student Monica. Understanding science helps us understand the problem. To this problem, when the science has been understood, the solution cannot be created and implemented accordingly.

A problem like pollution is a vast topic to be covered, as it very complex. The complexity of such any sphere, gives rise to uncertainty, which in turn leads to denial of existence of how we do not care about its impact or which leads to work with caution.

SESSION 3: Climate Science

Science aims at understanding the ways in which our climate behaves and the impact it has on life and on the earth and vice versa.
The need for understanding life created biology.
The need for understanding the way things function created physics.
The need for saving lives created medicine.
And the need for understanding the mind created psychology.
So what need has created the subject 'Climate science'?
As 'climate science' as said earlier is a vast topic to be covered, we will need to educate ourselves with climate, its conditions, its changes etc, to understand what need has developed to create this subject of climate science.

"If necessity is the mother of invention, then doubt is its father" was quoted.
In 1660, John Evelyn quoted "London resembled the 'suburbs of hell'
This was quoted so because, back in 1660, there was tremendous digging for coal and the burning of it. Due to this, there was so much pollution in London, that the entire city was covered in smog. They then realized that something was going wrong.
In 1850, John Tyndall founded 'Infrared Absorptive power of gases'
He found out that there were gases which have the power of absorbing infrared radiation.
In 1950, Charles Keeling drew 'The Keeling Curve'.
The Keeling Curve is the graph showing the variation in concentration of atmospheric carbon dioxide since 1958. Keeling's measurements showed the first significant evidence of rapidly increasing carbon dioxide levels in the atmosphere.
These three are the crucial events as to why we are studying climatic science. A question led to a doubt which led to an invention.
We began to notice changes in the atmosphere and that led us to developing our understanding of climate and its science.

SESSION 4: The Carbon Cycle

From the birth of the universe to human life, Carbon is at the center of everything we see around us.
Earth and all the living matter in it, are inexorably dependent on this single atom 'C'.
The carbon cycle lies at the beginning of any study of climate science and it is the simplest yet the most fragile natural cycle on our planet.

Features of a Carbon atom

Number: 6
Tetravalent

1. C12 and C13 isotopes
2. Graphite, Diamond Amorphous carbon
3. 4^{th} in the universe and 2^{nd} in the human body by mass
4. The source of life and death
5. Organic and inorganic compounds over 600,000 known to man
6. Limestones, dolomites, Carbon dioxide + Coal, Peat, Oil, Methane Catharses
7. Controls the climate and the economy

Setting – The Great Aerial Ocean

The Great Aerial Ocean is a complex system in a fragile balance.
Troposphere – Extends 12 kms above the surface and contains 80% of all gases. It is warmest at the bottom and cools by 6.5 degree Celsius every vertical km.
Stratosphere meets the troposphere at the tropopause. Stratosphere heats up as we go up because of the Ozone layer and its UV re-radiation.
Mesosphere lies around -90 degree Celsius while the thermosphere can reach up to 1000 degree Celsius.
Nitrogen – 78%
Oxygen – 20.9%
Argon – 0.9%
Our protagonist, as one notice, is not to be seen! But our lives are still dependent on its miniscule presence. CO2 forms 3-4 parts in 10,000 parts of air.

Scene 1: A pre-historic look at the carbon cycle

Atmosphere, forests, oceans and land => Ancient animals and planktons => Deposits of oil, shale and other sediments => Volcanoes, continent shifts, asteroids => (via CO2) Atmosphere, forests, oceans and land

Facts:

a) A 100 trillion tonnes of Carbon is currently trapped in living things alone.

b) Carbon forms Ch4 and CO2 easily because of the abundance of hydrogen and oxygen.

c) Algae or planktons need sunlight and co2 to produce energy and multiply. Their multiplication leads to overgrowth and eventually their decay can suck all oxygen out of their ecosystem

d) Decomposition of living matter sediments under ocean and on land and under severe pressure and temperature turns into shale and then oil.

e) Over millions of years, this will again be released through natural activities like volcanoes, continental shifts and other cosmic interferences.

f) The entire cycle is possible because of the energy of the sun which we are currently reaping after 4.5 billion years of earth's formation.

g) Plants use co2 for photosynthesis and emit oxygen for the survival of other living species.

h) Prehistoric era, around 65 million years ago, had huge forests and the biggest ocean called the Tethys. Two huge pieces of land were separated by the Tethys. We chose this era for a typical study of climate or the carbon cycle because during this age, the extinction of the dinosaur and many other species took place. What caused it and how is it relevant today is a highly interesting subject.

Scene 2: A modern view of the cycle

Carbon dioxide in the atmosphere is used up by the plants in the process of photosynthesis to produce carbohydrates. These plants are eaten by the animals. Carbon is released by them into the atmosphere through their respiration.

The decaying plants producing carbon dioxide in fossil fuels (coal and oil) are fed into cars. These cars and other vehicles release carbon into the atmosphere, when the fossil fuels are burned.

This is a simpler way of looking at the carbon cycle.

Modern day emissions are not typically from volcanoes or continental shifts or asteroids but from the burning of fossil fuels which contain a lot of carbon which on burning releases carbon dioxide.

The rest of the cycle is similar to the prehistoric era except the fact that the species have evolved a lot, but yet depend on the same processes of photosynthesis from plants and food production from oceans and forests.

SESSION 5: Global Warming: New face to an old trick

Global warming is the increase in the average temperature of Earth's near-surface air and oceans since the mid-20th century and its projected continuation.
Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) between the start and the end of the 20th century.
'Why is the warming of any concern', is the most frequent question put forth.
Such small changes in temperature are quite usual. And the planet is definitely not burning.

A changing climate

The following are the recent headlines been taken portraying how there has about a climatic change:
'The Arctic ice has melted by over 40 % in the last 40 years'
'The Golden Toad (*Bufo periglenes*) of Costa Rica suddenly vanished in 1991'
'The 'Sahelian' drought of the 1960's in Africa continues without respite'
'The last decade has been the warmest in the last 1000 years'
'In Feb 2002, Larsen B ice-shelf at 3250 Square kms broke up over a matter of weeks'
'Increased effects of El-Ninos and its impact on ocean currents and other ecosystems. The 1998 forest fire destroyed 5 million hectares of forest land in Borneo – a stunning ecosystem'

Why are all these changes taking place only now? They have not happened earlier! Has global warming got anything to do with this? What is causing the rise in the temperature? Is this a new phenomenon? Is it good or bad? Will it affect me?
The above questions hold the key to unraveling the climate science and what lies ahead for the future of mankind. We will now see how the change of climate was in the beginning.

Climatic change in the beginning

Climate can be altered dramatically by three ways:

1. The shifting of contents: Natural movement of tectonic plates => Wipes out life on earth.
2. Cosmic collisions: Asteroids or alien objects impacting earth => Wiped out the dinosaurs and many others
3. Greenhouse gases: Natural and human leads to what?

The above 3 prove that climate has been changing over millennia and drastic change has been brought about by external factors. In all the above cases, an interesting observation is that the greenhouse gas effect has been proved to be a positive feedback providing mechanism. Each of the above has the potential to shift the planet and its inhabitants from one geological era to another. Like from the Jurassic to the Pleistocene, changing climate has controlled everything on this planet.

SESSION 6: The greenhouse gas effect

The greenhouse effect is caused by an atmosphere containing gases that absorb and emit infrared radiation. Greenhouse gases trap heat within the surface-troposphere system, causing heating at the surface of the planet. Solar radiation passes through the clear atmosphere and reaches the earth. Most radiation is absorbed the earth's surface and warms it. Some solar radiation is reflected by the earth and the atmosphere.
Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the earth's atmosphere and the lower atmosphere.
An anti hero is vital for the planet's existence, without which the earth would be a cold dead place.

Greenhouse gases and what they do

Water vapor (36-70%) - Carries heat and provides feedback for other ghg's.
Methane (4– 4-9%) - Traps infrared radiation.
Carbon dioxide (9-26%) - Traps infrared radiation and increases water vapor's heat absorption.

Ozone (3 – 3-7%) – UV Rays let in.
All greenhouse gases trap infrared radiation. Other gases in miniscule quantities include nitrous oxide and cfc's. Greenhouse gases keep the earth's average temperature constant at around 14-15 degrees C and any variation in the quantity of gases can play a major role in altering the earth's temperature and hence its climate.

Sources of Greenhouse gases

Carbon dioxide - CO2

Animal and plant respiration, by which oxygen and nutrients are converted into CO2 and energy, and plant photosynthesis by which CO2 is removed from the atmosphere and stored as carbon in plant biomass.
Ocean-atmosphere exchange, in which the oceans absorb and release CO2 at the sea surface.
Volcanic eruptions, which release carbon from rocks deep in the Earth's crust (this source is very small)

Methane - CH4

Human-related activities include fossil fuel production, animal husbandry (enteric fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management.
Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires.

Carbon Di-oxide - CO2

The largest source of CO2 emissions globally is the combustion of fossil fuels such as coal, oil and gas in power plants, automobiles, industrial facilities and other sources.
A number of specialized industrial production processes and product uses such as mineral production, metal production and the use of petroleum-based products can also lead to CO2emissions.

Nitrous Oxide - N2O

Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, acid production, and nitric acid production.
Natural emissions of N_2O primarily result from bacterial breakdown of nitrogen in soils and in the earth's oceans.

Global Warming Potential (GWP) gases

High GWP gases are emitted from a variety of industrial processes including aluminum production, semiconductor manufacturing, electric power transmission, magnesium production and processing, and the production of HCFC-22.

The Keeling Curve and the Villain

Climatologist Charles Keeling climbed Mt. Mauna Loa in Hawaii to record CO2 concentrations in the atmosphere. It shows our planet's breathing every year. The northern spring and the northern autumn which indicate the rise and fall of CO2 was shown by the ups and downs drawn in a graph.
Observation: After each year, the graph went up higher and higher to show the rise in CO2 levels.
Result: Carbon dioxide has increased (The Keeling Curve).
The temperature has increased (Hockey stick).
Now we see that the rise in CO2 has a direct impact on the temperature.

Anthropogenic impact on climate

The common question put forth would be whether the impact on our climate is natural or human.
The facts are very obvious in front of us
Human intervention with the carbon cycle by rapidly increasing the carbon emissions in the atmosphere through burning fossil fuels is leading to a slow but steady increase in global temperatures.
Our modern life depends on fossil fuels. Right from the food we eat to the cars we drive, everything in the 21st century is addicted to hydrocarbons and that is only leading to increasing temperatures.
Our water, our air, our land and all other natural resources are either getting depleted or being polluted everyday.
Our carbon emissions are leading to an unprecedented change in our climate and we are facing a great peril.

SESSION 7: Positive Feedbacks

Feedback is an outcome of any process that can accelerate or decelerate the process itself.
A positive feedback accelerates and a negative feedback does the opposite. And in case of climate change, a positive feedback is not always positive!
There are 3 grave concerns staring at the world

a) Destruction of the Amazon rainforests
b) Methane emissions from clathrates
c) Collapse of the gulf stream
d) El-Nino La-Nina Cycles

The Gulf Stream – keeps it warm

The Gulf Stream transports heat from the warm tropics to the northern Atlantic and keeps most of Europe warm.

The stream averages 100 Sverdrup's, that is, 100*1 million cubic meters per second.
Melting ice from arctic and Greenland can make the water lose its salt and thereby its heat.
The water fails to sink and the great oceanic conveyor belt is broken.
Scientists predict such drastic changes can happen by the end of this century or even earlier if business as usual continues.

Amazon Forests – a remnant of the ancient past

Amazon is a huge reserve of carbon in the soil. As soil warms, bacterial decomposition accelerates and CO2 is released faster.
More CO2 in the atmosphere means the pores of the leaves will be smaller and therefore transpiration rates will drop dramatically and so will rainfall.
Half of the deforested land could turn to shrubs and small weeds and the other half could turn into a desert.
These changes are happening as we speak with species disappearing slowly.

Methane from Clathrates – A sight we should never hope to see

Methane is trapped in iced clathrates and are present in massive amounts at the sea bed – twice as much energy as all fossil fuels combined.
255 million years ago, Clathrate emissions led to the wipe out of all species in the permo-triassic era.
Rise in atmospheric temperatures will slowly lead to rising sea surface temperature and later sea bed temperatures.
Release of 10-42,000 trillion cubic meters of clathrates on the ocean bed if triggered can spontaneously change the face of the planet within months.

El Nino + La Nina – sinister sisters

Simply put, El Niño and La Niña are different stages in a cyclical pattern of climate turbulence otherwise known by meteorologists as the Southern Oscillation. Usually in 3-7 year cycles.
The El Niño part of the cycle involves warmer-than-usual sea temperatures, great amounts of rainfall (in the northern hemisphere) and low atmospheric pressure.
The most extreme results of an El Niño event have included flooding from Ecuador to the Gulf of Mexico, massive marine life die-offs in the Pacific, hurricanes in Tahiti and Hawaii, and concurrent droughts in many other parts of the world from Southern India to Australia to Central America.

In contrast, cooler sea temperatures, high atmospheric pressure and drier air characterize the La Niña phase of the Southern Oscillation.

During La Niña, currents bring nutrients up from the deep water, providing feast, rather than famine, for marine organisms. And accompanying strong winds blow moisture away, making for cloudless skies and dry conditions in equatorial countries from the International Date Line east to South America.

Increased intensity and frequency—now every two to three years—of El Niño and La Niña events in recent decades is due to warmer ocean temperatures resulting from global warming.

SESSION 8: Negative Feedbacks and Global Dimming

The primary negative feedback is the effect of temperature on emission of infrared radiation: as the temperature of a body increases, the emitted radiation increases with the fourth power of its absolute temperature.

Global Dimming

After the last ice age, a 100ppm rise in CO2 caused a 5 degree rise in temp but a 100ppm rise today has only caused .63 degree rise

Many believe the effects of substances like aerosols and jet trails have a cooling effect as they reduce the amount of incoming radiation on the earth's surface.

In fact, amount of sunlight reaching the surface has reduce by almost 22% in a few places.

It's a danger – bottom to top

"Is there a general trend evident in all of the regions, habitats and organisms documented? And is so, is that trend in the general direction one world expect, given what we know of climate change? "

Many species have been found on higher plains and latitudes than their normal living conditions

- ⇨ Copepods – small organisms have been detected up to 1000kms away from their natural habitats.
- ⇨ Butterflies – 35 non-migratory species of butterflies have moved 240kms northwards in the northern hemisphere while many southern species died.
- ⇨ In Europe, numerous plant species have been budding and flowering 1.4 to 3.1 days earlier per decade while their relatives in North America have been doing so 1.2 to 2 days earlier.

"All these changes could easily disrupt the connectedness amongst species and possibly lead to numerous extirpations and extinctions"

Peril at the poles

Let us take an example of a shrimp. It is the most important species in the southern ocean. 60-70% of shrimps live in the Southwest Atlantic sector of the Southern ocean. Species like seals, baleen whales, whale sharks and many other mammals depend on the shrimp. They feed on phytoplankton, microscopic, single-celled plants that drift near the ocean's surface.

Sea ice helps the growth of sea planktons. Sea ice has declined by 20% and shrimps are declining by 40% every decade, contributing to the climatic change.

- ⇨ The scientific community was first astonished when they saw hair-grass in Antarctica. In 2004, great swards of green were seen in a place which was devoid of any life thus far.
- ⇨ The emperor penguin population is half of what it was 30 years ago while the number of Adeline penguins has declined by 70%.
- ⇨ The number of Peary caribou dropped from 26,000 in 1961 to 1000 in 1997. The inuits depend on it for food and a ban on caribou hunting has made matters worse.
- ⇨ Polar bears that find enough food survive while the rest perish travelling long distances for food.
- ⇨ Less sea ice has a grave impact on many animals like seals that will be unable to raise their offspring's with less or no sea ice.
- ⇨ As forests recede northwards, the temperature is only set to increase and along with the Albedo affect, positive feedback loop sets in.

Now, let us take the example of ourselves, human beings.

Every human being is different and we depend on our nature for everything. We are of 6.5 billion and our population keeps increasing, yet we take more and more from nature everyday. Even after understanding the impacts of our actions on nature, we do not do anything about it. Our waters are dying, our seas rising, our food

vanishing and our trees disappearing. Moreover, our actions have an impact on all other species on earth. Our future is not so bright, but still we live in denial, thus again contributing to climatic change.

SESSION 9: Other impacts

1. Agriculture: Agricultural production is projected to drop by at least 30% this century. Most of this will be in tropical countries like India. Monsoon dependent crops will be hardest hit.
2. Freshwater resources: Over a billion people, particularly in sub Saharan Africa and South Asia, will suffer from drought and famine conditions. In India, gross per capita water availability will decline from 1820 m3/yr in 2001 to 1140 m3/yr in 2050.
3. Coastal systems: Coastal populations will be displaced and coastal ecosystems will suffer. Sea levels have already risen 20 cm, and are projected to rise by 88 cm this century.
4. Industry and society: Indigenous cultures will be worst affected by loss of livelihood. Small island states, coastal communities and high altitude settlements will be severely affected.
5. Human health: 1,50,000 deaths per year are already attributed to climate change. There will be increased incidence of vector and water borne diseases, cardio respiratory and malnutrition related diseases.
6. Disasters: Countries across the globe will be prone to more natural disasters at frequent intervals owing to rapid changes in ocean temperatures and air current patterns.

SESSION 10: The Skeptics Eye

Water vapor is not being considered even when it causes 98% of the greenhouse gas effect.
Southern Sea Ice is increasing.
Increasing temperatures cause a CO2 rise and not the other way round.
Humans are too insignificant to alter the climate.
Recent decades(especially 2007) have seen a sudden dip in temperatures rather than warming.
Unusual activity in the sun is causing global warming.
IPCC miscalculated, predictions are exaggerated and science is uncertain.
We have seen medieval cooling even when the CO2 in the atmosphere was below industrial level.

Effect of water vapor

While water vapor is indeed the most important greenhouse gas, the issue that makes it a feedback (Increase in temp causes more evaporation which leads to more heat absorption) is the relatively short residence time for water in the atmosphere (around 10 days).
At Day 0 there is zero water, but after only 14 days, the water is back to 90% of its normal value, and after 50 days it's back to within 1%. That's less than 3 months.
Compared to the residence time for perturbations to CO_2 (decades to centuries) or CH_4 (a decade), this is a really short time.

Southern Sea ice is increasing

Antarctic sea ice has growing over the last few decades but it certainly is not due to cooling - the Southern Ocean has shown warming over same period.
Increasing southern sea ice is due to a combination of complex phenomena including cyclonic winds around Antarctica and changes in ocean circulation.

Recent years have seen a sudden dip in temperatures rather than warming

- ⇨ 2007's dramatic cooling is driven by strong La Nina conditions which historically has caused similar drops in global temperature. It is also exacerbated by unusually low solar activity.
- ⇨ One has also seen a dip in temperatures during the 1940'2 to the 1970's. This dip coincided with the discovery of aerosols and their excessive use by humans. Aerosols and dust have the property of causing what is known as global dimming.
- ⇨ A medieval warm period was also noticed. Solar radiation warms the stratosphere through the UN rays absorbed by ozone while GHGs heat the troposphere.

Earth on an average was slightly cooler by .3 degrees Celsius than now.

Carbon dioxide lags temperature & the legend of the ice age

When the Earth comes out of an ice age, the warming is not initiated by CO2 but by changes in the Earth's orbit. The warming causes the oceans to give up CO2. The CO2 amplifies the warming and mixes through the atmosphere, spreading warming throughout the planet. So CO2 causes warming *AND* rising temperature causes CO2 rise.

Ice Age

Milankovich cycles have been widely accepted to explain the ice age phenomenon and their cyclic nature
The three causes are:

a) Earth's wobbling on its axis every 22,000 years
b) Earth's rotation on its axis from 21.9 to 24.4

c) 1,30,000 year cycles of earth eccentricity

Blame the Sun or the humans?

- ⇨ In the last 35 years of global warming, the sun has shown a slight cooling trend. Sun and climate have been going in opposite directions.

Various independent measurements of solar activity all confirm the sun has shown a slight cooling trend since 1978.

- ⇨ Atmospheric CO2 levels are rising by 15 gigatonnes per year. Humans are emitting 26 gigatonnes of CO2 into the atmosphere. Humans are dramatically altering the composition of our climate.

IPCC miscalculated, predictions are exaggerated and science is uncertain

Science is unpredictable but when straight facts stare at us, they cannot be ignored.

There are 4 steps that a scientific model needs to make sure it passes:

- Physical basis is consistent with the laws of physics
- Can it accurately simulate the present climate
- Can it simulate day to day weather changes
- Can the model simulate past climates

Hadley center for climate prediction and research is currently the number one institution that has been able to generate accurate climate models.

The IPCC formed in 1988 under UNEP has over 426 experts and over 440 reviewers. Opinions of businesses and other stakeholders are constantly taken into consideration.

It is often said that most of IPCC's predictions are in fact indicative of a less severe atmosphere than what could actually happen and this has been due to the considerations of other stakeholders.

OPEN FORUM AND RECOMMENDATIONS

Mr. Chaitanya Kumar looked forward for the audience participation for giving out solutions to prevent the drastic changes affecting our climate.

The students at the workshop gave their following suggestions:

Siddharth

We must act sustainable and accordingly. We must take the initiative of preventive measure and be a positive follower for all the people.

And also, a single car can be used to take 4 people to a same place, rather than using 4 different cars for 4 people!

Monica

I feel we should spread awareness of solar science technology. As it generates electricity from sunlight, it would be a better tool to enable cooking, for electric cars etc.

Shravya

Solar panels must be installed, which helps in saving electricity. When we start using it, automatically our neighbors will and hence the awareness will spread.

Karthik

I drive my car to my friend's place, which is just a kilometre away. I feel I should go walking instead of taking my car.

Dinesh

I would like to find sustainable development techniques, which are practical. Because I don't feel people will be ready to start using solar panels and the like.

Mansa

I would want the politicians to act accordingly, as they do have a major role to play in improving our climate.

Revanth

What I feel about this is that we should start from ourselves rather than blaming the government and waiting for them to take an initiative.

Ujwan

Instead of solar panels, which are very expensive, I think we need to look out for another source, which is economical and beneficial.

CONCLUDING REMARKS

Mr. Chaitanya Kumar brought out the 4 structures or elements of a society, without which a society will collapse, namely:

1. The Government
2. The Corporate Society
3. The Civil Society
4. The Youth

So basically, these elements need to come together for the betterment of our society and for bringing about solutions to fight the climatic change and make it a better place to live. It is we the people who have reformed the basic structure of our climate, which has resulted in the drastic negative change. We are only slowly beginning to understand and unravel all the positive feedbacks that are at play in nature. Change happens differently in different places. When we trace out the problems and find out from where the problems rise from, we need to act upon it.

FEEDBACK

Kavyashree, VJIT college

I liked the workshop. I was able to recognize all the problems, but couldn't find solutions for all questions raised. I can pass on the information to my family. As I always feel, I will try to contribute more from my side to help the condition of our climate.

Mansa, VJIT college

I knew the concept of the programme. I found some of the practical solutions good. The session was good, but a few questions remained unanswered. I felt bad that the government is not taking any measures to improve the present climatic change. My personal approach to this would be to spread the facts in my college. I feel a politician should have been a witness to this workshop.

Monica, VJIT college

During the workshop, we discussed the problems but not the solutions. All of us have ideas about this, but there has not been many solutions given. The sessions were good in discussing problems but not solutions. In my future, I will be an RTI researcher and bring up solutions. I'll bring about awareness camps and also spread it amongst my friends. It is the youth who should be particularly aware of this.

IMPACT OF THE WORKSHOP

The workshop on demystifying climatic change dedicated to amateurs was informative and educative. The impact it created on the students were positive. The only drawback was the lack of solutions being drawn out of the problems. It is a growing subject and a lot more data needs to be accumulated to fill in the unfilled solutions. But the students were able to connect to the problem and understand the depth of it. On the whole, it was a very productive workshop for the beginners of this subject.