

SOCIAL RELEVANCE PROJECT  
ON  
**A REPORT ON CLIMATE CHANGE**

SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGREE OF  
MASTER OF MANAGEMENT STUDIES (2019-2021)  
(UNDER UNIVERSITY OF MUMBAI)



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**CERTIFICATE OF APPROVAL**

This is to certify that the Project titled “**A Report on Climate Change**” is successfully completed by **Pooja Subhash Botalji** during semester IV, in partial fulfilment of Master's degree in Management Studies recognized by the University of Mumbai for the academic year 2019-2021.

This project work is original and has not been submitted earlier for the award of any degree of any other University/Institution.

Name of the Guide: Dr. Betty Sibil

Date:

Signature of the Guide

### **DECLARATION**

I, **Pooja Subhash Botalji**, student of **Pillai Institute of Management Studies and Research**, New Panvel, hereby declare that I have completed the Social Relevance Project on “**A Report on Climate Change**” under the guidance of Dr. Betty Sibil

No part of this report has been submitted for any degree, diploma and title of recognition before, I also confirm that, the report is only prepared for my academic requirement and not for any other purpose.

Name of the Student: Pooja Subhash Botalji

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Date:  
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Signature of

## **ACKNOWLEDGEMENT**

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## Chapter 1: Introduction

### 1.1 Introduction of the Topic

Over the past years impact of global warming, pollution, deforestation, is all that we have learned but one of the major impacts of these issues is now visible as climate change. According to NASA “climate change is a change in the usuals weather conditions found in place” in simple terms it is changed in the weather pattern of a particular region or place. Climate change can be caused by natural incidents too such as the distance of the earth from the sun, eruption of the volcano, etc. but according to some scientist’s earth temperature is rising faster than ever and this is caused by human activity. Scientist believes that human activities such as industrialization, burning of fossil fuels, coal, oil, emissions of carbon dioxide, dependency on vehicles, generation of heat and electricity, agriculture all this are increasing the earth’s temperature and its effects are devastating and its impact can be seen around the globe. Increasing chances of floods, drought conditions, threat on food production, biodiversity depletion, wildfire, more heatwaves, melting of glaciers and thus rising sea level, impact on freshwater bodies, impact on marine life, migration of people due to natural disasters, etc. the list is infinite. India’s Ministry of Earth Science has predicted that India will experience the impact of climate change in this century and that has even started. Over the past years, India has experienced the effect of climate change such as extreme heat, changing rainfall patterns, more droughts, reduced groundwater, sea level rise and hence impacting fishery business, thus we must stop the climate change before its impacts become irreversible.

From years of research, scientist have clime that together we can put a stop to climate change as it is threatening to every living being on the planet it’s crucial that we take steps to control this crisis and for this purpose in the year 2015 United Nations signed legally binding agreement in the Paris which is known as Paris Agreement, 196 parties are part of it and its main aim is to control the rising temperature of the earth below 2 degree Celsius. The objective of this agreement is to control greenhouse gas emissions and to achieve a climate-neutral world by mid-century. Out of 196 countries, India is one of the countries that is complying with the Paris Agreement. Even at the individual level we can do a lot of things that can help us to put a stop the climate change but due to lack of awareness about this issue, its cause and consequences people are reluctant to do something and even talk about it, most of the people think that climate change is a distant problem it is not threatful to us or it is very complicated to understand and hence we end up ignoring this topic it becomes our collective responsibility that we do speak about this issue spread awareness about this topic so that people will engage,

they will take some steps at the individual level to control climate change. As climate change is one of the major problems of our century, we must discuss this problem. The present research study on Climate Change is done with the intent to know the awareness level, factors causing it, how it affects the life of the earth, opinion of the population, and Finally, strategies required to control climate change are discussed.

## **1.2 Research Problem**

The impacts of climate change can be seen around us all. Sudden temperature spikes are one of the examples of it, 2020 year was considered as one of the hottest years ever recorded globally specifically in India and during this year maximum temperature reached 47 degrees Celsius in urban India. According to experts Chennai flood in the year 2015, Uttarakhand flood in the year 2013, Varanasi flood in the year 2019 all these extreme events were caused by climate change even the recent example of the Nisarag Cyclone which hit Mumbai and this was a fresh reminder to us of the threat of the climate change, not only this but the countries biodiversity is also in the danger. India is home to various species of animals but due to the impact of climate change, more species are critically endangered. It is estimated that by 2100 more than 50% of species will lose their normal climate conditions if greenhouse gas emission is not controlled and hence climate change have the potential to cause the sudden loss of biodiversity and one of the examples of this is the loss of Bengal tiger. The list of impact of climate change is long and from the above mention examples we can see that it has started impacting our plant, our nation, our health and our surrounding.

As we can see the impact of climate change is devastating. It is affecting every living being on this planet and hence it is high time that we take measures to control its impact before its effects become irreversible. Thus, present research study is done to understand the cause, consequences of climate change, how much people are aware of it, how it impacts our planet, and what we can do to control it.

## **1.3 Need of Study**

Climate change is a change in weather conditions in a particular region. Extreme weather conditions like storms & hurricanes, heatwaves, wildfires, more flooding, and Heavier droughts are consequences of climate change. Over the past decade's several examples can be seen like heavy rainfall in Uttarakhand in 2013, Chennai floods in 2015, drought conditions in India during 2016, and heatwaves during the February and October month all these are an example of climate change despite it poses an immense threat on humanity, many people are

completely unaware about this, due to lack of awareness peoples don't know the cause, effect and consequences of climate change hence this present research study tries to attempt to find the awareness level of the population about climate change and its cause and effects.

#### **1.4 Aim of the Study**

Climate change is an immediate threat that humans are facing still the awareness about it is poor. The aim of this research is to gain an understanding of climate change following its impact on life on earth, how much society is aware of this issue, and what majors we can take to solve this problem. The survey is conducted to get an understanding of the awareness level to ascertain how we can control climate change impact.

#### **1.5 Objectives of the Study**

To study the cause and impact of Climate Change on life on earth.

To study awareness about Climate Change.

To study how Climate Change can be control at individual level.

#### **1.6 Scope of the Study**

Climate change is a rising threat in our life despite all the scientific study and collective efforts of nations the awareness about climate change is very poor and for this reason, the study focuses to understand the climate change issue. This research study makes an attempt to draw the attention of society towards the rising threat of climate change in our life for this purpose constructive research is done. This research covers the basic aspect of climate change which includes studying the awareness about climate change, its impact on life on earth, and also this study strives to find how climate change can be managed or control at the individual and organizational level. The duration of the study was two months. The data collection method for the study is based on primary and secondary data collected from various research papers, surveys, and articles. A survey is conducted on the working population mainly leaving in an urban region.

#### **1.7 Limitations of the Study**

Climate Change is the vast topic to conduct research on, as the time period allotted for this research study was only two months it was not sufficient. Due to time constraints the sample size was kept minimum, the response was collected only from 80 respondents. Another obstacle face during this research was due to pandemic, responses were collected from the working



population irrespective of which industry or company they are working in, as convenience and snowball sampling method was used the respondent's population is diverse and it is kept minimum, also as Climate Change is emerging topic most of the information collected for the fulfilment of this project is collected from the secondary data such as various research papers and articles and hence this study highly depends on the secondary data. As this study covers only the basic aspect of Climate Change Further study is required to find out how exactly Climate Change can have long term impact on humans and what major changes, we have to take to overcome this crisis.

## Chapter 2: Review of Literature

**Mohammed Yahaya Abbas, Ripudaman Singh researched on 'A Survey of Environmental Awareness, Attitude, and Participation amongst University Students: A Case Study' and published a report in May 2014.** Questionnaires and review of the literature and previous research paper was the mode of data collection. The study revealed that students exhibit a high level of awareness level still their participation in environmental activities is low and hence knowing the environmental issue is not sufficient to stimulate participation in environmental activities.

**Charles Vlek and Linda Steg researched the topic 'Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics' and published the report in 2007.** This paper focuses on Behavioural Processes and their impact on Environmental Motivations, and Societal Driving Forces of Environmental Decline. According to the research problem analysis, policy decision making, and behavioural intervention programs are more important for society when it comes to decision making regarding climate change which is causing by increasing pollution and hence study recommends that behavioural and technical changes are required so that peoples can make more informed decisions and escape the dilemma. The study recommends that to stop the deterioration of the environmental policies and procedures need to be made stronger.

**Benjamin K. Sovacool researched the topic Environmental Issues, Climate Changes, and Energy Security in Developing Asia and published the report in June 2014.** He studied the impact of energy technology option on the environment and concluded that not a single energy source of energy is free from the environmental impact though renewable energy source is a very promising option than the conventional sources still are not free of negative consequences to the environment and the electricity, oil, or coal mined produced with the help of clean energy damages the environment. The study recommends that to prevent the environment from damage policymakers need to put a price on the generation of things like sulphur dioxide, nitrogen oxide, a particulate matter which refer to as the carbon taxes.

**Sasmita Mohanty researched on Global Climate Change: A cause of concern and published the report in January 2009.** The author studied the causes of climate change, its impact on the environment, and how we can mitigate climate change. In this research paper, the main focus is on how greenhouse gases and aerosols are causing climate change and their impact on human life. The author believes that if proper steps are not taken to mitigate the

climate change issue then there is a high possibility that climate change will cause issues that will be irreversible. To mitigate the impact of climate change study recommends that collaboration from worldwide countries is required along with the contribution from the common man.

**Muniyandi Balasubramanian research on the topic of Climate Change and its Impact on India and published the report in September 2012.** The author researched how climate change is affecting India and specifically how it is affecting the major resources of the country such as agriculture and food, water bodies, forest, and the health of the people. The study concluded that climate change is the reason for the increased temperature in the central part of India, it is responsible for the deteriorating health of the country's population, sea-level rise is responsible for the flooding and has caused millions to displace, and it is also causing irreversible damage to the unique forest ecosystem. The study recommends improving the situation government needs to form some new policies and procedure which will help to reduce the impact of climate change on above mention resources of the country.

**Preethi Lolaksha Nagaveni and Amit Anand researched the topic of Climate Change and Its Impact on India: A Comment.** The research papers study some of the weather events such as heavy rainfall in Uttarakhand in 2013, Chennai floods in 2015, and drought conditions in India during 2016 which were a direct impact on climate changes. The author has also studied the Climate Change litigation of India and concluded that India needs to from some specific acts which can address the climate change issue as the existing legal framework lacks heavily when it comes to the implementation of the laws and also there should be strict penal sanctions to those who do not abide by the laws.

## **Chapter 3: Research Methodology**

### **3.1 Research Design**

#### **3.1.1 Type of Research**

Quantitative research was done for the fulfilment of the objectives. This type of method helps to investigate data and to carry out the data analysis.

#### **3.1.2 Research Method**

Primary and Secondary type of research is done for the fulfilment of the objectives.

#### **3.1.3 Population of the Study**

A diverse group of people have participated in the study.

#### **3.1.4 Data Collection Method**

For the primary data collection quantitative method was used this involves the use of a wide variety of basic and applied research questions on to the population to reach the result and conclusion. An online survey was conducted, a total of 17 questions were asked to understand the awareness about Climate Change and various research papers were studied for the collection of data related to the cause and consequences of Climate Change, its impact on life on earth, and what major we can take to control it.

### **3.2 Sampling Design**

The sampling design was a combination of two techniques carefully chosen keeping in mind the pandemic situation.

#### **3.2.1 Sample of the Study**

A total of 80 respondents were involved in the survey and the target group of the study was the general population. specifically living in Mumbai region.

#### **3.2.2 Sampling Technique**

It's a combination of Convenience sampling and Snowball sampling technique.

## Chapter 4: Data Representation and Data Analysis

For the primary data collection survey was conducted. Convenience and Snowball sampling methods were used. A total of 80 respondents gave their response to the 18 questions which were related to the Climate Change. The information is collected with the help of a structured questionnaire and then responses were statistically analysed. Simple statistical tools and techniques were used such as pie charts, bar charts, and Chi-Square analysis for the easy understanding of the result.

### Cause of Climate Change

#### Greenhouse Gases

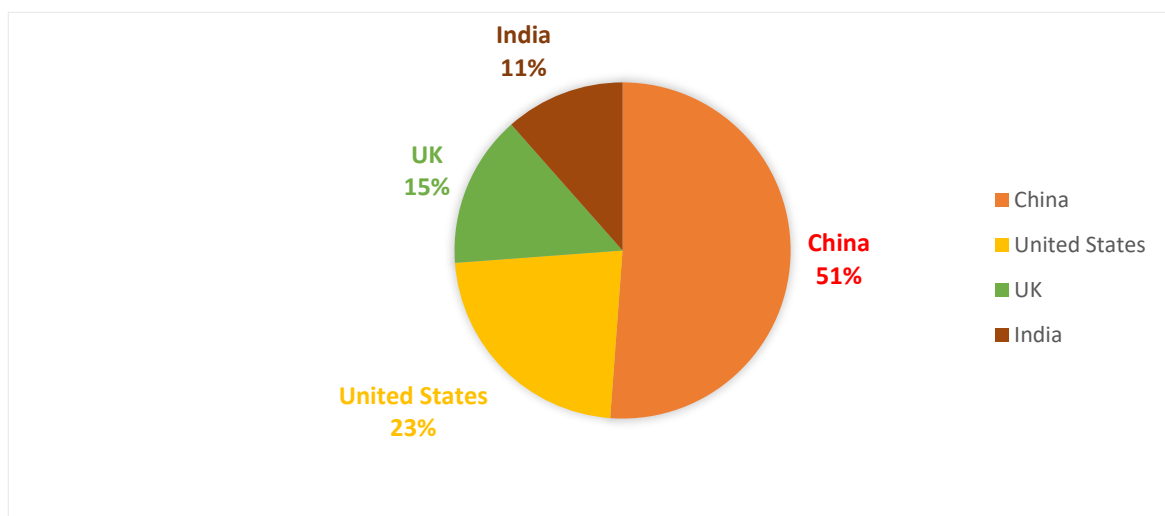


Chart – I Total CO2 Contribution of Top Four Countries

Data taken from Joint Research Centre (EDGAR) Emission Database for Global Atmospheric Research

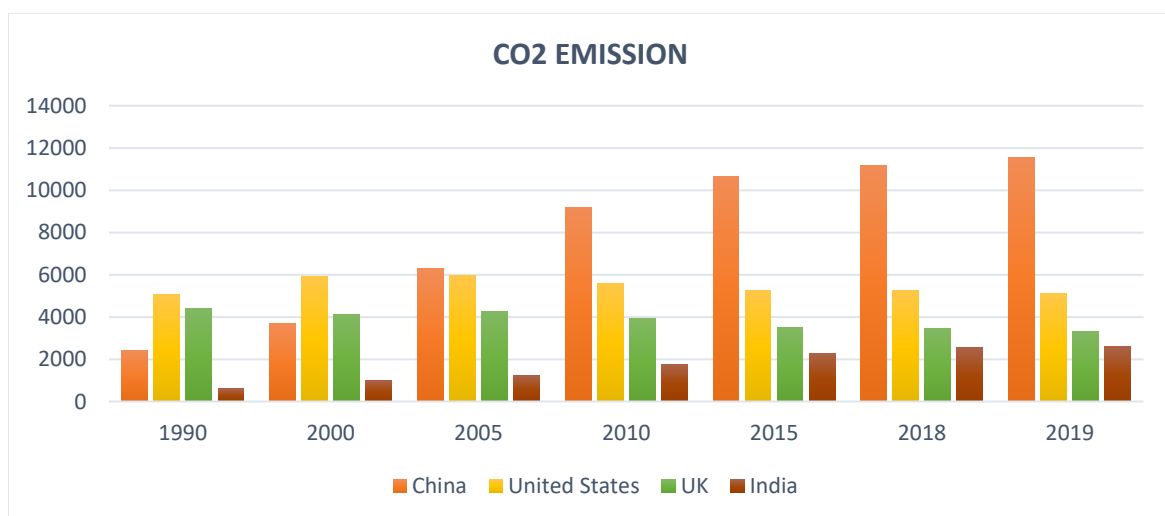


Chart – II Total CO2 Contribution of Top Four Countries from year 1990 to 2019

Data taken from Joint Research Centre (EDGAR) Emission Database for Global Atmospheric Research

One of the major reasons behind climate change is the emission of carbon dioxide and other greenhouse gases into the atmosphere. Carbon is one of the essential and fundamental elements of life on earth. Everything in our day-to-day life is built on carbon. Start from the food that we consume to the fuel that we use. The environment has its mechanism to control the amount of carbon present in the atmosphere which is referred to as the Carbon Cycle. The carbon cycle is a biochemical process that interchanges carbon compounds around the various spheres of the earth and thus maintains the carbon level in the atmosphere and is important because it helps to maintain the stable earth temperature, hence the carbon level of the atmosphere is not supposed to change. In brief, when animals die, they end up in the ground, and decomposition of their corpse begin, this decomposition process for some of the dead animals slows down and they turn into coal, natural gas, and oil and this carbon remain stuck in the ground for decades this carbon is referred to as the Fossil Fuels but as humans evolved, there needs increased we wanted a more reliable source for energy and hence we started digging up the fossil fuels and end up releasing trapped carbon into the atmosphere which disrupted the earth's carbon cycle. Since industrialization begin humans are burning fossil fuels at an alarming speed. **According to the Our World Data carbon emission in the year, 1800 was 28.09 million tonnes and in the year 2019, it was 36.44 billion tonnes. India contributes 7% to global carbon emissions. India's carbon emission in the year 2019 was around 2.62 billion tonnes and in the year 2018 it was 2.59 billion tonnes**, so only within a year, there was an increase of 3 billion tonnes. The sources of greenhouse gases are infinite start from the fuel that we required to drive our car to the electricity we use every day. The greenhouse gas generated by:

**Transportation** is first in the list of sources as this sector heavily depends on the use of fossil fuels. Most of the cars today that we use depend on the use of petroleum and diesel. According to the report of the **International Energy Agency (IEA) released in May 2020 transportation sector is responsible for 24% of CO2 emissions** and out of all the various vehicles road vehicles account for three-quarters of transport emissions.

**Electricity generation** is another major cause of greenhouse gas emission as the generation of electricity is dependent on the burning of fossil fuels. **According to the International Energy Agency (IEA) emission of CO2 in 2018 grew 1.7 % than the previous years and major contributors were the US, India, and China and these three countries contributed 85% of the net increased.** IEA found that a 0.3% increase in global temperature is caused because of coal-burning which is mostly used for electricity generation.

**Commercial and Residential** food waste is one of the major problems that arise from a commercial and residential source. **Every year 1.3 billion tons of food around the world go to waste** and this waste food ends up in dump yards and in open areas where it decomposes in the open environment releasing methane gas which is more harmful than the carbon dioxide in the atmosphere and according to the **Our World Data 6% of the greenhouse gas emission is due to the food waste. In India every year 67 million tonnes of food are waste that costs 92,000 crores.** Among the other sources of greenhouse gases, this one is relatively easy to avoid but it is becoming one of the major issues.

**Industrial Greenhouse Gas Emission** The emission from this sector is generated directly from burning fossil fuels such as natural gases, petroleum, and diesel. Though over the years the government has put a lot of restrictions on the industries still it is leading us to know where and this remains a problem.

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### **Deforestation and Intensive Farming**

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**Deforestation** is one of the major causes of climate change. As plants absorb atmospheric carbon for food production and release oxygen in the air. This destruction of forests is happening around the world. Forest is essential for humans if we want to sustain and if destruction continues then humans cannot survive as its fundamental block for life. The classic example of deforestation is the destruction of the Amazon Rainforest, Brazil. This rainforest is considered the lungs of the world as it produces more oxygen and it is also home to many diverse species. In August 2019, thousands of fires were recorded in the Amazon forest and the National Institute of Space Research (INPE) found that it was a 75% increase in the fire than in 2018. This intense destruction of the Amazon began during 1970. To boost the economy and take advantage of natural resources stored deep in the forest government gave free land to people around the forest. This led to the rapid destruction of the land. Intensive farming began in the area and people started illegally burning the near forest to get more land for their farming. And within 10 years 20,000 square kilometres of land was cleared due to intensive farming. Indigenous people face a problem as they were thrown out of their homes. In the early 2000 government successfully decreased the rate of deforestation in the Amazon but in the year 2018 new government weakened the environmental laws which were protecting Amazon leading to the occurrence of record-breaking fires in the Amazon. If the destruction of Amazon continues it will be led to the release of more carbon dioxide into the atmosphere leading to the further warming of the planet. Amazon is not the only rainforest that is being destroyed by humans for personal needs. According to the Global Forest Watch from the year, from 2002 to 2019 328

lakh land of forest was destroyed. The top 5 regions which are more vulnerable to deforestation in India are Assam, Mizoram, Nagaland, Arunachal Pradesh, and Meghalaya and these 5 lands contributed to the 60% of tree loss between the year 2001-2019.

## **Impact of Climate Change**

### **Disappearing cities**

Sundarbans is declared by UNESCO as a World Heritage Site which is shared by India (40%) and Bangladesh (60%), it is located on the lower end of Gangetic West Bengal. It is home to various critically endangered species and spread almost 3,860 square miles but as our globe is warming way faster than the estimation of scientists it is leading to the melting of glaciers and the water from these glaciers is directly going into the sea causing the rise in the sea level. The sea level of the Bay of Bengal is increasing twice as the global average making Sundarbans at the risk of disappearing. For the last 50 years, this area has lost around 260 square kilometres of area which is more than the square kilometres of the city of Kolkata. This area was the natural barrier for the tides and cyclones but due to the rising sea level, the incidence of flooding increased, and most of the land got submerged under the water.

The area which is now submerged under the water was once fertile land. Locals used to do farming of chilies, watermelon, rice, etc. and all the houses, schools, mosques got destroyed in the flood. According to the site of the West Bengal Disaster Management and Civil Defence Department, Kolkata has experience 16 large floods from the year 1978 to 2013. Apart from the Sundarbans, the other cluster of small islands is also at the risk of disappearance. These islands are minimizing in the size, the Ghoramara island of Kolkata has reduced to one-third of its size, and the island name Lohachara got completely disappeared from the face of the map it is estimated by scientist that in the coming 30 years more habitable island will also be loss which is home to the various endangered species specifically the Bengal Tigers which are one of the critically endangered species. If major steps are not taken at this stage then there is a great threat that we will lose the Sundarbans in coming years which is one of the great reservoirs of carbon. Kolkata is not the only city at the risk. It is estimated that by the 2050 cities like Mumbai, Chennai and some other small islands liked Andaman Nicobar are at the risk of submerged.

According to one of the studies conducted by the **World Economic Forum (WEF) in 2019** estimated that **around 11 cities** around the globe are **Jakarta (Indonesia), Lagos (Nigeria), Houston (Texas), Virginia Beach (Virginia), Bangkok (Thailand), New Orleans**



(Louisiana), Rotterdam (Netherland), Alexandria (Egypt) and Miami (Florida) are at the risk of sinking due to rising sea level and could disappear completely by 2100. Not only cities but countries are also facing the risk of climate change. Countries like **Kiribati, Maldives, Vanuatu, Tuvalu, Solomon, Samoa, Nauru, Fiji Islands, Marshall** all are at risk of submerging. All the above mention countries are referred to as Small Island Developing States (SIDS). SIDS are threatened by increasing tides, cyclones, flooding, damage to the crops, increase diseases, and loss of freshwater bodies so even though these countries have contributed less towards global warming still they are first to get impacted by climate change. Since these counties are developing hence, they lack the technologies required to protect against climate change.

Flooding forces people living in that area to live in their home and this has created the issue of **Climate Refugees** which is also known as the **Environmental Migrants**. Climate Refugees are the people who are forced to leave their region due to sudden changes in their local environment. **According to the data of Migration Data Portal in the year 2019** and some years previous to that around 5.1 million people from 95 countries and territories were leaving their homes due to the natural disasters and around 9.8 million people moved from their homes in the first half of 2020. From India, 2.7 million people were displaced in the year 2020 and caused the internal displacement the major reasons behind this displacement were the tropical storms, monsoons, drought conditions, etc. Not only it impacts people's mental and financial situation but also it puts more stress on the resources of the nation.

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### **Melting of Glaciers**

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It takes millennia to form massive glaciers and they are responsible for global stability but now these massive glaciers are at risk of climate change and can melt in few years. The emission of greenhouse gases is causing the increased temperature of the globe and this is the primary cause of the melting of glaciers at an alarming rate and if that continues to happen then our planet one day will be left iceless. **According to National Snow & Ice Data Centre (NSIDC), 10% of the land area on earth is covered by ice** which is around 15 million square kilometres, and this massive glacier stores 69% of the freshwater of the world. Over the year's climate change has melted more than 9.6 billion tonnes of glacial ice since 1961 and according to the research conducted in the year by the University of Zurich (Switzerland) over one-third of Antarctic glaciers can melt by 2100. The Antarctic holds 90% of the planet's ice and if that ice melts then there will be 200 feet increase in the sea level.

Warming in the arctic region is way faster than in the other parts of the world. **According to the global climate change NASA it was observed that Greenland and Antarctica are losing ice six times faster than the rate in 1990** and if this situation continues then by 2100 more than 6.7 inches rise in the sea level will occur due to the melting of glaciers. Between West Antarctica and East Antarctica, West Antarctica is more vulnerable to climate change and one of the glaciers named Thwaiter is most important, as the satellite data showed that this glacier is melting very rapidly which makes it more dangerous. It's one of the riskiest glaciers which every year accounts for the 4% rise of the world sea level. Climate change has so badly impacted Antarctica that even the coldest spot-on earth- East Antarctica is now showing the signs of melting.

Increasing sea level is not the only repercussion of the melting of glaciers. As the ice melts more sunlight gets observed leading to the evaporation of water and thus increasing the greenhouse gases. This gas goes up in the atmosphere and increases the temperature of the planet. As the earth's air moves from the central warm region of the planet to the colder poles the shape of the movement of this air influences the weather pattern in other parts of the world. **On February 6, 2020, NASA recorded the hottest temperature in Antarctica which reached around 18.3 degrees Celsius, which was the same temperature as the city of Los Angeles**, and this sudden drop in the temperature causes the melting of nearby glaciers. This temperature in the arctic continues from 5th Feb 2020 till 11th Feb 2020 and during this time the Island's name Eagle melted 106 millimetres which are approximately 4 meters.

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### **Impact on Agriculture**

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Over the years extreme weather conditions had very serious repercussions on food production. It has threatened the quality, quantity of our food supplies. **According to the UN Population Division world population by end of 2020 was at 8 billion and it is estimated that it will reach 10 billion by end of 2050.** As the population of the world is increasing at an alarming rate, demand for good quality food supplies has also increased. This means the agriculture industry now has to ramp up its food production to fulfil the needs of the growing population, but as climate change has impacted every aspect of our lives, agriculture is also one of them. Farmers all around the world are struggling to face the impact of climate change. According to the Climate Government, the global average atmospheric CO<sub>2</sub> in 2019 was 409.8 ppm and in February 2021 it was 415.44 ppm if the emission of greenhouse gas continues at this rate then according to the study conducted by Arizona State University the yield of vegetables will fall by 35% all this is happening because of the increased temperature, droughts, increased level of

carbon in the air, rise in sea level thus frequent flooding, increased salinity, and reduced fertility of the soil.

Coffee production has seen a serious impact on climate change. Coffee is the drink without which most people around the world cannot start their day. Every year around the world 10 million tons of coffee is consumed, but this most loved drink in the world is now in crisis. For the farming of the coffee plant, specific weather conditions are needed which are found only in the specific region of Latin America, Asia, and Africa. The coffee plant is very sensitive to the slightest change in the weather conditions but under suitable conditions like 18-to-21-degree Celsius, a specific amount of rain and 1000-2000 meters above sea level plant take 2-3 years to grow before its berries are picked to supply to the consumers, but due to climate change, the land which is suitable for growing coffee is shrinking in size. **Zona Cafeteria, Colombia** is the most suitable place for the production of coffee plants and here the world's best quality of coffee is produced due to its geographic position, but from the past 15 years, the production of the coffee has dropped significantly. Over the years greenhouse gas emission has warmed plant by 1.2 degree Celsius since 1980. Overheating of the plant is leading to the production of a very lower quality of beans. As the warmer climate is suitable for fungi and pesticides, most of the plant is getting infected by the fungi called Coffee Rust which is turning plant yellow causing the death of the plant. The changing weather conditions also made it difficult for farmers to predict the plant's lifecycle they do not have absolute certainty about weather patterns as the generation before they had. Since the year 2013, the amount of land used to grow coffee has reduced by 7% and it is estimated by farmers that Zona Cafeteria will warm by 0.3 degrees Celsius per decade. Climate change will cause the reduction of 50% of land which is suitable for coffee production by 2050. It will also cause the extinction of 60% of wild coffee species. This news is devastating for the farmers, who have been cultivating coffee plants for generations for them its tradition and heritage. 80% of the world's coffee is grown by 25 million small farm holders throughout the world but many of them are living in poverty. Though there are various ways available by which farmers can protect the plants but not all farmers have access to the new resources and hence many farmers have lost their only livelihood and this led to the farmers outraged in 2013 in Colombia. Their demand was simple, farmers wanted more financial support but still, coffee plantations now have become a very expensive business and thus farmers are now shifting and had started farming more economically suitable plants.

Vanilla is another loved plant around the world. South America, Central America, and Africa are two regions where the cultivation of vanilla beans is done. Madagascar, Africa supplies 85% of the world's natural vanilla but again due to climate change vanilla production has dropped very drastically. Madagascar is considered as one of the countries that are most heavily got impacted by climate change. Flood in 2017 destroyed about 30% of Vanilla plants causing the shortage at the global level and this is the year when the prices of the vanilla were at the peak. Coffee and Vanilla is not the only plant that is experiencing the crisis of climate change but other plants like Black Pepper, Kesar, Rice, Grains, Fruits, Vegetables, etc. all now in the trap of climate change.

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### **Biodiversity Depletion**

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Biodiversity term refers to the rich variety of life which is found on earth. It is the functioning ecosystem and it acts as the crucial backbone for humankind to survive. This system provides materials for consumption, oxygen generation, and provides clean air and water. We, humans, depend heavily on this system. Over the years many researchers and scientists had claimed that protecting the ecosystem is important as **40% of the world's economy is dependent on natural resources**, healthy ecosystem directly translates into good opportunities for economic development if not paid attention then it can become one of the reasons for the destruction of humankind. The impact of climate change on our biodiversity has been very significant. As life is complex every living being on the planet is dependent on other species for its survival, destruction of one species can cause the destruction of other species and thus disrupting the whole pyramid of life, and can disturb the stability of the planet for the long term.

The polar bear is the classic example of how climate change can impact animals' habitat and thus reducing their population. The polar bear is found in the Arctic Circle and the North Pole. They need cold conditions to survive but due to increasing greenhouse gas emission the earth's temperature is rising at an alarming rate which is causing the melting of ice and thus destroying the Polar Bear's natural habitat. Ice in the Arctic is warming way faster than in the other parts of the world. The rising temperature also has adverse effects on the main preys of Polar Bear which are Seals, seals require ice to raise their young once. But due to the melting of ice population of seals is decreasing leading to increasing food stressed for Polar Bears.

In the coming future, Polar bears can become more food stressed as they are struggling to find prey. **According to the research conducted by National Geography in the year 2018, Polar Bears are losing mass at a faster rate due to the non-availability of prey.** Seals make 95%

of the Polar Bear diet but as the temperature is increasing, they are moving deep in the sea which causes Polar Bear to burn more energy on walking and swimming long distances to catch them. This study found that bears have to burn 60% more calories than usual.

Mammals are not the only ones that have been impacted by climate change. Butterflies are usually very sensitive to changing weather conditions. Environment plays a crucial role in the butterfly's life cycle as it triggers their reproduction, migration, and hibernation. Climate change has affected the migration of the butterflies even it has also impacted their only food source Milkweed. Monarch butterflies heavily depend on the milkweed but farmers are now choosing to produce insect-resistant milkweed making it too toxic for butterflies hence farming a new crop variety of milkweed means the death of butterflies. Drought conditions are other reasons for the death of the milkweed plant and thus impacting its production.

Oceans cover the two-thirds surface of the earth and over the years the temperature of the sea has also increased drastically. According to the US National Oceanic Atmospheric Administration (NOAA), the global sea level temperature has increased 0.13 degrees Celsius. Oceans absorbed excess heat from greenhouse gas and as the ocean warms it leads to deoxygenation which is nothing but the reduction in the amount of dissolved oxygen which leads to the death of marine life. Climate change has also impacted the Phytoplankton. These are the microscopic marine algae, and these are bases for the food web. In the stable marine situation, they provide food to the various range of sea creatures, they are also considered as earth lungs or rainforest of the sea, but over the years bleaching of the coral reef had caused the death of many coral reefs. ARC Centre of Excellence for coral reef studied that coral reefs had started bleaching and cooking due to the increasing temperature of the sea.

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### **Increased Health Risk**

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In 2016, in Siberia, Russia a remote community, Salekhara experienced an outbreak of bacteria called Anthrax. This bacterium is found in soil and affects grazing animals. These bacteria can also affect humans if they come in contact with infected animals or contaminated animal products. But this outbreak was very mysterious as for the past 70 years there was not a single case of Anthrax were recorded. During this outbreak, 90 people got infected with the bacteria and one 12 years boy died. To content, the spread of virus authorities burned the carcasses of the reindeer. Scientists started looking for answers for this sudden outbreak and found that climate change is behind this.

In Northern Hemisphere around the Arctic, the layer of the earth **Permafrost** is found which stays frozen throughout the years even in the winter season, the surface above the permafrost thaws but a deep underground layer of the earth remains frozen. So, when plants and animals die, they don't get decompose but get frozen deep in the underground surface of the earth and it has been that way for thousand years but due to overheating of the earth this permafrost layer is thawing and shrinking in size. And once they thaw out, the corpse of animal start decomposing leading to the release of harmful gases like CO<sub>2</sub>, methane along with the bacteria's and viruses in the atmosphere.

Most scientists believe that if permafrost continues to melt then it can unleash some of the deadly viruses and bacteria's that we humans had successfully controlled. **Scientists have even found a microbe that was 400,000 years old in thawed permafrost.** Another major impact of thawing permafrost is land sliding. Over the past years, many incidents of land sliding are reported in the arctic region. 35 million people live around the permafrost but due to its melting, there is one more problem that gets added to the list which mankind has to face due to climate change.

Other health issues arising due to climate change are malnutrition, malaria, diarrhoea, and heat stress. According to the World Health Organization between 2030 to 2050, 250,000 deaths can happen due to the above mention diseases. People living in the poverty in developing countries will be the first to get impacted. Every year heatwaves caused the death of 373 across India in 2019. The number of deaths due to natural disasters has also increased. In 2019 two thousand peoples lost their lives due to floods and extreme weather conditions and the states that got impacted most were Bihar, Maharashtra, and Kerala.

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### **Extreme Weather Condition**

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Impacts of Climate Change can be seen around the world. As the global temperature is increasing moisture in the air, water bodies, and soil water evaporated leading to drought conditions. Drought severely impacts the drinking water supplies and ecosystem. Due to the non-availability of water prices of food supplies increased. Drought conditions in India and also around the world have increased significantly over the years but nowadays this condition is having more severe and long-lasting effects. **According to one of the reports of World Bank Andrapradesh, Mahabharashtra and Orissa are more prone to the drought conditions in India.** NITI said that India is facing the worst water crisis in history and around 600 million Indians are facing a water crisis. 2,00,000 people die every year due to drought

conditions and no access to fresh water, if this continues then by 2050 the situation will become more dangerous leading to the affecting GDP of the country.

Another impact of Climate Change is the birth of more hurricanes and cyclones. As oceans are warming at an alarming rate the scientists and researchers have claimed that this can cause more intense tropical cyclones and hurricanes and this incident will be frequent if global warming continues. Though scientists have found enough evidence that climate change is causing these intense cyclones and hurricanes still they are not able to accurately predict regional intensity but it is estimated that the intense cyclones will cause more heavy rains and thus flooding in the coastal cities and villages. Maharashtra's coastline was heated by the cyclone named Nisarag in the year 2020. Some part of Mumbai and the village area around the Alibag was the one which got more affected. Before cyclone Nisarag, another cyclone Amphan heat eastern coast. It heated West Bengal, Odisha, and Bangladesh in May 2020 a total of 118 people dies.

Though the formation of cyclones in the Bay of Bengal is normal due to the geography of the region number of cyclone formations in the Bay of Bengal has increased due to the rising sea temperature climate change the intensity has increased over the years. But in the case of Nisarag as the temperature of the Arabian sea is increasing rapidly it is now becoming one more ideal sea for the formation of cyclones. Before Nisarag, the temperature of the Arabian sea was 30-32 degrees Celsius. Arabian sea is more turbulent than the Bay of Bengal and the geography of the sea is different and thus cyclone formation does not occur more frequently in the Arabian sea but the rising temperature of the sea is making it a new cradle for cyclone formation.

### **Awareness about Climate Change**

The awareness level about Climate Change is studied by asking various questions to the population. It was found that out of that **80 respondents 73.8%** of respondents was able to accurately define the Climate Change definition, **whereas 17%** said that climate change is nothing but the transition from one season to another, and **5% of respondents** said that it's just the normal weather condition of a particular region. From the above percentages, we can say that respondents know the difference between climate change and weather patterns and are aware of the overall concept of climate change.

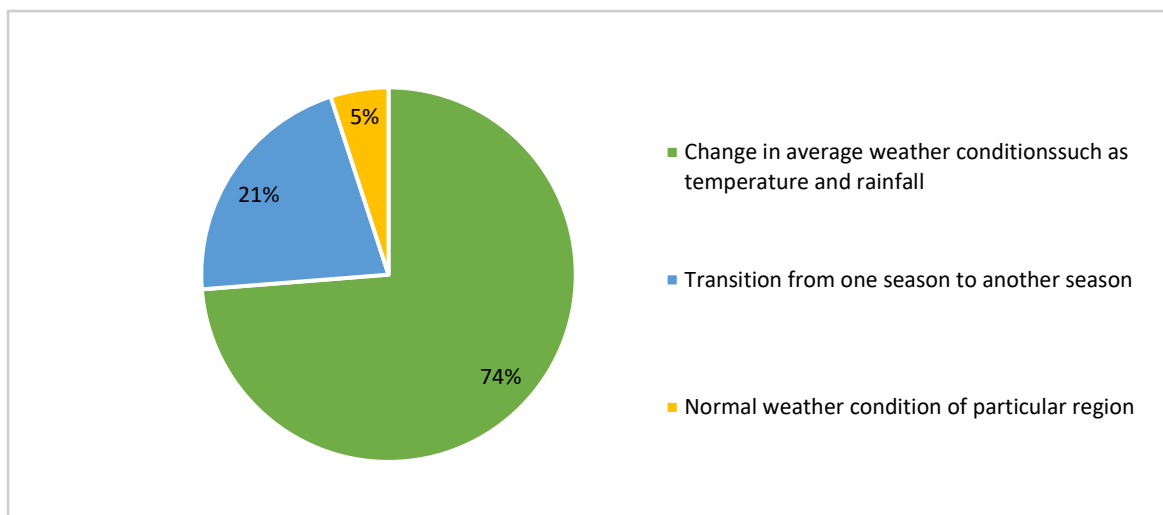


Chart – III Awareness about term Climate Change

Out of **80 respondents**, **88.8%** of respondents believe that climate change is a global crisis, **76.3%** believe that it is threatening to our lives and **63.8% of respondents** believe that it's the human activity behind climate change when asked whether respondents know what are the cause and consequences of climate change and method to control it **56.3%** and **52.5% respondents** said yes respectively. To check the level of awareness specific questions relating to the cause of climate change were asked and **61.3% of respondents** know that water vapor is one of the greenhouse gases, **83.8%** agree with the statement which states that extreme weather conditions are caused by climate change and **70% respondents** know that food waste generates the greenhouse gases. From the above mention percentages, we can infer that most of the respondents are aware of the cause, effects, and consequences of climate change.

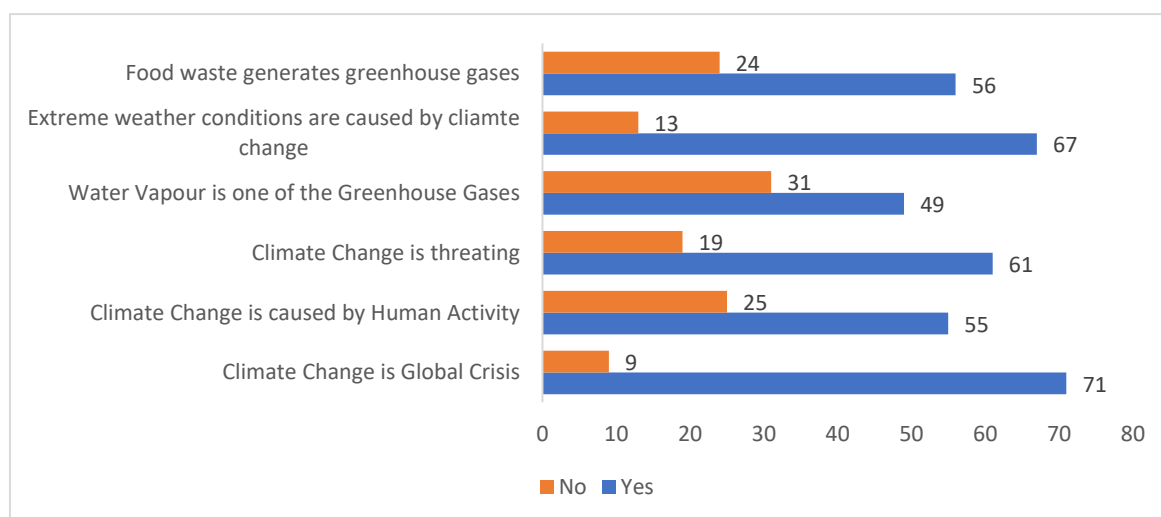


Chart – IV Awareness about Cause, Consequences and Effect of Climate Change



Major chunk of respondents believe that Industries are the main source of greenhouse gases when in reality Energy sector or Energy producing activities like electricity, extraction of fossil fuels are major source of greenhouse gas emission.

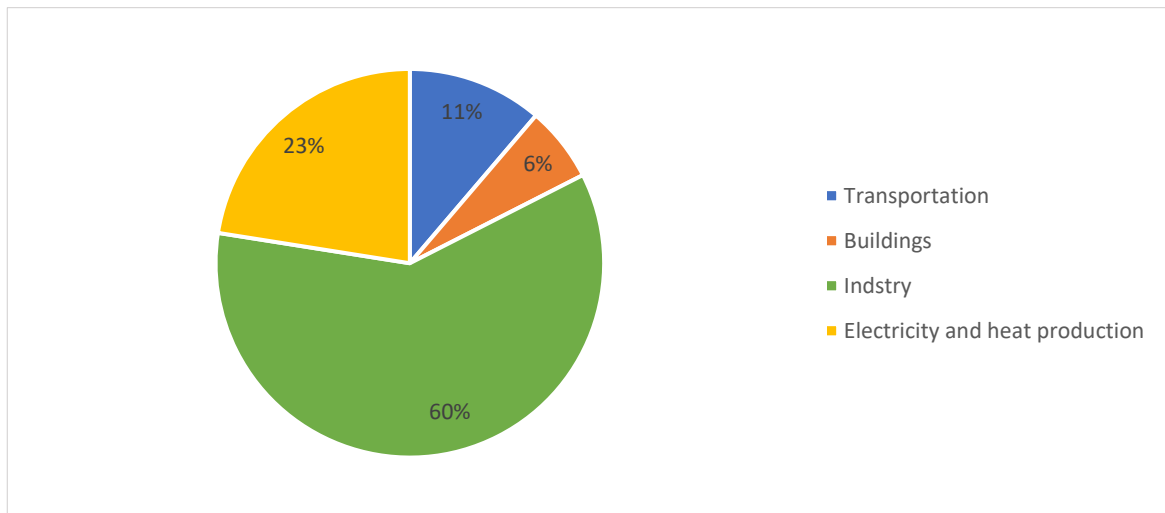


Chart – V Source of Greenhouse Gas

Though awareness level about climate change is high among the respondents, still only **23.8%** (19 respondents) are aware of the Paris Agreement. Paris Agreement is one of the most important agreements formed at the international level which unites all nations against the threat of Climate Change. The main objective of the Paris Agreement is to keep the global temperature below 2 degrees Celsius and limit the warming of the planet to 1.5 degrees Celsius. Out of **80 respondents**, **40%** know what is Paris Agreement and only **31%** are sure that India is part of the Paris Agreement. This shows that though respondents are aware of Climate Change still the knowledge about what the world is doing what India is doing to tackle this issue is not much.

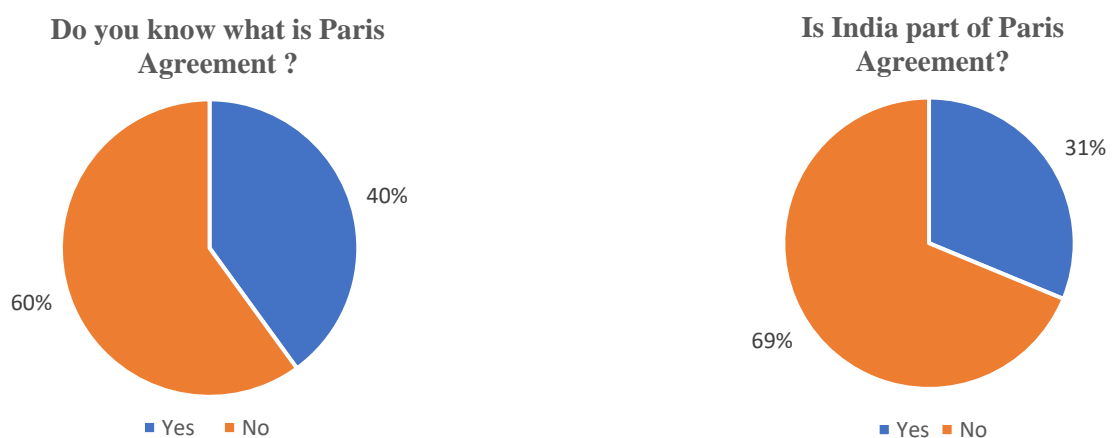


Chart – VI Awareness about Paris Agreement

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## Data Analysis Method

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The research attempts to find the association between education with awareness level about Climate. The study is based on the quantitative approach. The collected data were subjected to Statistical Analysis. Inferential Statistic tool, Chi-Square was used to determine if there is any association present between these variables.

### Result of Chi-Square Test

#### Association between Demographic Variable and Awareness about Climate Change

##### 1. Education and Awareness about Greenhouse Gas Effect

| Observed Frequencies                        |           |      |         |      |       |
|---|-----------|------|---------|------|-------|
| Awareness level about Greenhouse Gas Effect |           |      |         |      |       |
| Education                                   | Very Good | Good | Average | Poor | Total |
| Graduation                                  | 5         | 13   | 9       | 2    | 29    |
| Post-Graduation                             | 12        | 17   | 18      | 4    | 51    |
| Total                                       | 17        | 30   | 27      | 6    | 80    |

| Expected Frequencies                        |           |        |         |       |       |
|---|-----------|--------|---------|-------|-------|
| Awareness level about Greenhouse Gas Effect |           |        |         |       |       |
| Education                                   | Very Good | Good   | Average | Poor  | Total |
| Graduation                                  | 6.1625    | 10.875 | 9.7875  | 2.175 | 29    |
| Post-Graduation                             | 10.8375   | 19.125 | 17.2125 | 3.825 | 51    |
| Total                                       | 17        | 30     | 27      | 6     | 80    |

Table – I Education and Awareness about Greenhouse Gas Effect

### Hypothesis

**H0 – There is no association between Education and Awareness Level about Greenhouse Gas Effect.**

**H1 – There is association between education and Awareness Level about Greenhouse Gas Effect.**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.773017**

### **Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness level about Greenhouse Gas Effect Chi-Square analysis was carried out. Table- I show that out of 80 respondents 29 respondents are graduates while 51 are post graduates. The calculated Chi-Square value was tested against a 5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about greenhouse gas effect. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents

### **2. Education and Awareness about Melting of Glaciers**

| Observed Frequencies                      |           |      |         |      |       |
|---|-----------|------|---------|------|-------|
| Awareness level about Melting of Glaciers |           |      |         |      |       |
| Education                                 | Very Good | Good | Average | Poor | Total |
| Graduation                                | 1         | 11   | 14      | 3    | 29    |
| Post-Graduation                           | 5         | 17   | 23      | 6    | 51    |
| Total                                     | 6         | 28   | 37      | 9    | 80    |

| Expected Frequencies                      |           |       |         |        |       |
|---|-----------|-------|---------|--------|-------|
| Awareness level about Melting of Glaciers |           |       |         |        |       |
| Education                                 | Very Good | Good  | Average | Poor   | Total |
| Graduation                                | 2.175     | 10.15 | 13.4125 | 3.2625 | 29    |
| Post-Graduation                           | 3.825     | 17.85 | 23.5875 | 5.7375 | 51    |
| Total                                     | 6         | 28    | 37      | 9      | 80    |

Table – II Education and Awareness about Melting of Glaciers

### **Hypothesis**

**H0 – There is no association between Education and Awareness Level about Melting of Glaciers**

**H1 – There is association between Education and Awareness Level about Melting of Glaciers**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.757595**

**Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness about greenhouse Chi-Square analysis was carried out. Table- II show that out of 80 respondents 29 is graduates while 51 is post-graduates. The calculated Chi-Square value was tested against a 5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about melting of glaciers. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents.

### 3. Education and Awareness about Deforestation

| Observed Frequencies                |           |      |         |      |       |
|-------------------------------------|-----------|------|---------|------|-------|
| Awareness level about Deforestation |           |      |         |      |       |
| Education                           | Very Good | Good | Average | Poor | Total |
| Graduation                          | 4         | 10   | 9       | 6    | 29    |
| Post-Graduation                     | 8         | 22   | 11      | 10   | 51    |
| Total                               | 12        | 32   | 20      | 16   | 80    |

| Expected Frequencies                |           |      |         |      |       |
|-------------------------------------|-----------|------|---------|------|-------|
| Awareness level about Deforestation |           |      |         |      |       |
| Education                           | Very Good | Good | Average | Poor | Total |
| Graduation                          | 4.35      | 11.6 | 7.25    | 5.8  | 29    |
| Post-Graduation                     | 7.65      | 20.4 | 12.75   | 10.2 | 51    |
| Total                               | 12        | 32   | 20      | 16   | 80    |

Table – III Education and Awareness about Deforestation

#### Hypothesis

**H<sub>0</sub> – There is no association between Education and Awareness about Deforestation**

**H<sub>1</sub> – There is association between Education and Awareness about Deforestation**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.785824**

**Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness about greenhouse Chi-Square analysis was carried out. Table- III show that out of 80 respondents 29 is graduates while 51 is post-graduates. The calculated Chi-Square value was tested against a 5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about deforestation. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents.

#### 4. Education and Awareness about Global Warming

| Observed Frequencies                 |           |      |         |      |       |
|--------------------------------------|-----------|------|---------|------|-------|
| Awareness level about Global Warming |           |      |         |      |       |
| Education                            | Very Good | Good | Average | Poor | Total |
| Graduation                           | 4         | 12   | 7       | 6    | 29    |
| Post-Graduation                      | 10        | 22   | 10      | 9    | 51    |
| Total                                | 14        | 34   | 17      | 15   | 80    |

| Expected Frequencies                 |           |        |         |        |       |
|--------------------------------------|-----------|--------|---------|--------|-------|
| Awareness level about Global Warming |           |        |         |        |       |
| Education                            | Very Good | Good   | Average | Poor   | Total |
| Graduation                           | 5.075     | 12.325 | 6.1625  | 5.4375 | 29    |
| Post-Graduation                      | 8.925     | 21.675 | 10.8375 | 9.5625 | 51    |
| Total                                | 14        | 34     | 17      | 15     | 80    |

Table – IV Education and Awareness about Global Warming

#### Hypothesis

**H<sub>0</sub> – There is no association between Education and Awareness about Global Warming**

**H<sub>1</sub> – There is association between Education and Awareness about Global Warming**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.887113**

**Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness about greenhouse Chi-Square analysis was carried out. Table- IV show that out of 80 respondents 29

is graduates while 51 is post-graduates. The calculated Chi-Square value was tested against a 5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about global warming. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents.

## 5. Education and Awareness about Biodiversity Depletion

| Observed Frequencies                         |           |      |         |      |       |
|--|-----------|------|---------|------|-------|
| Awareness level about Biodiversity Depletion |           |      |         |      |       |
| Education                                    | Very Good | Good | Average | Poor | Total |
| Graduation                                   | 4         | 8    | 13      | 4    | 29    |
| Post-Graduation                              | 7         | 17   | 20      | 7    | 51    |
| Total  | 11        | 25   | 33      | 11   | 80    |

| Expected Frequencies                         |           |         |         |        |       |
|--|-----------|---------|---------|--------|-------|
| Awareness level about Biodiversity Depletion |           |         |         |        |       |
| Education                                    | Very Good | Good    | Average | Poor   | Total |
| Graduation                                   | 3.9875    | 9.0625  | 11.9625 | 3.9875 | 29    |
| Post-Graduation                              | 7.0125    | 15.9375 | 21.0375 | 7.0125 | 51    |
| Total  | 11        | 25      | 33      | 11     | 80    |

Table – V Education and Awareness about Biodiversity Depletion

### Hypothesis

**H0 – There is no association between Education and Awareness about Biodiversity Depletion**

**H1 – There is association between Education and Awareness about Biodiversity Depletion**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.95299**

**Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness about greenhouse Chi-Square analysis was carried out. Table-V show that out of 80 respondents 29 is graduates while 51 is post-graduates. The calculated Chi-Square value was tested against a

5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about biodiversity depletion. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents.

## 6. Education and Awareness about Carbon Footprint

| Observed Frequencies                   |           |      |         |      |       |
|--|-----------|------|---------|------|-------|
| Awareness level about Carbon Footprint |           |      |         |      |       |
| Education                              | Very Good | Good | Average | Poor | Total |
| Graduation                             | 3         | 4    | 16      | 6    | 29    |
| Post-Graduation                        | 3         | 15   | 24      | 9    | 51    |
| Total                                  | 6         | 19   | 40      | 15   | 80    |

| Expected Frequencies                   |           |         |         |        |       |
|--|-----------|---------|---------|--------|-------|
| Awareness level about Carbon Footprint |           |         |         |        |       |
| Education                              | Very Good | Good    | Average | Poor   | Total |
| Graduation                             | 2.175     | 6.8875  | 14.5    | 5.4375 | 29    |
| Post-Graduation                        | 3.825     | 12.1125 | 25.5    | 9.5625 | 51    |
| Total                                  | 6         | 19      | 40      | 15     | 80    |

Table – VI Education and Awareness about Carbon Footprint

### Hypothesis

**H0 – There is no association between Education and Awareness about Carbon Footprint**

**H1 – There is association between Education and Awareness about Carbon Footprint**

**5% Level of Significance- 0.05**

**Chi- Square calculated value- 0.436087**

**Interpretation- Null hypothesis is not rejected.**

To identify whether there is any relation present between education and awareness about greenhouse Chi-Square analysis was carried out. Table-VI show that out of 80 respondents 29 is graduates while 51 is post-graduates. The calculated Chi-Square value was tested against a 5% level of significance. As the calculated value is greater than 0.05, the null hypothesis is not rejected hence we can state there is no association between education and awareness about

carbon footprint. Hence there is a possibility that awareness towards climate change does not differ according to the education of the respondents.

## **Ways to Control Climate Change**

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### **Speak Up**

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Spreading awareness about climate change is the first step to stop it. It's high time now, that we all start talking about climate change. Over the years scientists and researchers were the only people who are talking about it and sharing their knowledge with others, but still, people find it hard to understand the scientific data or proofs. Hence most people are still unaware of the concept of climate change, what it is, how it occurs, why it occurs, and how it impacts us. Thus, talking about the cause and effect of climate change will be the first step towards the new world and to make people understand this threat we have to become a little creative. Dr. Veerabhadran Ramanathan an environmental scientist he conducted various research over the years but was not able to convince the people about it. So, he got creative and in the year 2014 Dr. Veerabhadran Ramanathan got an opportunity to talk with Pope Francis directly and requested him to ask people to take care of planet by polluting them less and according to research, 35% of catholic people said that their views on climate change changed after the speech of Pope Francis. So, by just changing the messenger impact changed.

### **Waste Less Food**

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The food Waste problem is just the result of a bad habit and it is one of the problems that are easiest to solve. Buying more food than required, letting fruits, grains, and eggs spoil in the fridge, piling plates with food, and in the end throwing it in dustbins, etc. These are some of the bad habits on which we have to put a stop as they put our environment in the danger. To overcome this issue MIT Media Lab of US came up with the idea of FoodCam. This FoodCam is placed in every cafeteria and canteens of the institute and whenever there is extra food available it just alerts people with the simple message 'Come and Get it. This simple and creative idea reduced the food waste generated by the institute significantly. At an individual level also, we can make sure that we buy only limited and essential food items that will help us to reduce the waste as we will use it more cautiously, we can also donate the leftover food and avoid giving pre-packed food to people in any gatherings so people can take what they want and how much they want.



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### **Use More Renewable Energy**

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Switch to renewable energy sources. As humans are evolving the need for energy is also increasing hence instead of relying on fossil fuels, we can use renewable energy sources. Many housing societies, institutes, and commercial buildings in Mumbai are also switching to solar rooftops. Encourage neighbours, and friends to use solar energy. All these small steps can have a huge impact on our environment. The use of solar energy is not only environmentally friendly but is also cost-saving.

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### **Buy Better Equipment's**

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Buying energy-efficient appliances is the best way to save energy and thus again preventing climate change. Appliances like washing machine, fans, air conditioner, refrigerators take more electricity and also these appliances have a big share in the electric bill so when we change regular appliances to the more energy-efficient ones, we significantly reduce our electric bill and also at the same time we save a lot of energy, and water.

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### **Electric Vehicles**

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As we know CO<sub>2</sub> emission from vehicles makes up most of the atmospheric greenhouse gases and thus switching to electric vehicles is the best way to reduce the carbon emission. It's not only environmentally friendly but also it is a budget-friendly option. The Indian government even has started the plan of the National Electric Mobility Mission Plan (NEMMP) 2020 this plan's objective is to achieve the faster adaptation of electric cars in the country. In 2020 Norway became the first country to sell 50% electric cars among all new cars sold globally. According to the study of the National Research Development Corporation (NRDC) switching to electric cars can dramatically reduce the greenhouse gas emission as 60% of the greenhouse is emitted by road vehicles so if we address this issue by using the electric car then we can reduce 45% of reduction. Another way to reduce the CO<sub>2</sub> is to more frequently use the option of car and bike pool, to use public transportation, and avoid using vehicles for a short distance.

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### **Plantation**

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Plants are the natural absorber of atmospheric CO<sub>2</sub> and thus it is important we proactively involve in the plantation. Plants also control soil erosion, hold more CO<sub>2</sub> in soil, releases oxygen in the air, and also provide protection to the people living near the coastal region from floods. Due to deforestation, we have already loosed many forests and now also we are losing very important forests like Amazon and Sundarbans but now it's time that we take steps to

restore these forests and plant more outdoor and indoor plants and trees around our environment.

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### **Switch to Green Product & Take Small Steps**

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Nowadays consumer holds more power over the MNCs', they can demand products they want, and thus consumer can force MNCs' to make their products eco-friendlier. Avoid using products made from plastic, wood, leather, and products that have high chemicals which can harm the environment. Farmers can switch from chemical fertilizers to natural ones, we can depend more on the e-book, buy more energy-saving equipment, use compostable cutlery and bowls, use cosmetics made from natural ingredients, products made from recycled plastic, use biodegradable plastic, waste less paper, etc. All these small steps can lead to greater changes as waste and by-products produced by these giant companies are more responsible for the greenhouse gas emission and thus, we have to start demanding more eco-friendly products.

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### **Demand Answers**

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Now and then we hear or read news about how our environment is in threat and what government and companies are doing to control it but we never really pay attention to this news that's why now it's our moral responsibility to start demanding answers from our government, from the leaders and to the people around us. What they are doing to control climate change? What strategies and policies they have made to control the pollution level? What is the implementation rate of those policies? When we start questioning only then we can see the change around us.

## Chapter – 5 Result and Discussion of the Study

- Data collected from secondary research showed that Greenhouse Gases, deforestation, and Intensive Farming are major reasons for Climate Change.
- Disappearing Cities, Melting of Glaciers, Impact on Agriculture, Biodiversity Depletion, Spread of Diseases, Extreme Weather Conditions are some of the effects of Climate Change on human life.
- Data shows that 74% of the population are very well aware of the concept of Climate Change.
- 88.8% and 76.3% of respondents believe that Climate Change is a global crisis and it is threatening to humans respectively.
- 68.8% of respondents also believe that Climate Change is caused by human activities.
- 83.8% of respondents said that Climate Change is the major reason behind the extreme weather conditions that can be found around the earth.
- 48.8% of respondents are not well aware of the initiative taken by India to control Climate Change whereas 60% of the population is completely unaware of the Paris Agreement.
- Chi-Square analysis was done to find the relation between the respondent's awareness level about climate change and demographic variable since the calculated Chi-Square value was greater than the level of significance thus null hypothesis was not rejected and hence, we can possibly say that there is no relation between these two factors.
- It is possible to combat the threat of Climate Change for that purpose we can implement very easy methods and techniques at the individual level to minimize our contribution to this crisis. Speaking about Climate Change and spreading awareness about it, wasting less food, using renewable energy, buying energy-efficient appliances, opting for electric vehicles, planting more trees, switching to green products, and last but not the least is to start demanding answers from our nation's leaders.

## **Chapter – 6 Recommendations and Suggestions**

The outcome of this research suggests that some people are aware of Climate Change but not all are. Thus, there is a certain area that needs attention, which will enable people to take care of our environment more consciously and this will help in effectively overcoming the threat of Climate Change. This study tries to find the awareness level among the population about Climate Change, cause and consequences of Climate Change and also suggests some ways by which people can manage their carbon footprint at the individual level and thereby reducing the generation of greenhouse gases which is the primary cause of Climate Change. Everyone deserves a safe and secure environment but for this to happen people need to adapt some of the methods mentioned above in their day-to-day life. These steps will not only help to reduce the greenhouse gas emission and thereby reducing the impact of Climate Change but it will also help to spread more awareness about it. Due to certain limitations, this research study is conducted within a short span hence it contains only the basics of Climate Change. Also, as convenience sampling method was used the respondent's population is diverse and it is kept minimum maybe because of this, the research study could not find any relation between demographic variable which is education and awareness level about Climate Change hence further study is needed on a larger population with different sampling technique to check whether any relation between these two variables exists or not. Further, more demographic variables can be introduced to study which population is more aware of Climate Change. There is also a need to do an extensive research study on this topic, as innovative ideas are needed which will help and motivate people to talk about this problem with more confidence it will also improve the awareness level and thus leading to the formation of a balanced environment where humans and our mother nature live in harmony.

## Chapter – 7 Conclusion

Based on the findings from the analysis of survey data and secondary data, the following conclusions can be drawn in the context of the objectives of this research study.

- Climate Change is a global crisis and it is threatening to humans. It is one of the crucial issues right and thus spreading more awareness about it is important.
- For centuries we have taken our mother nature for granted extensive use of fossil fuels and coal has release immense amount of greenhouse gas in nature and thus leading to the increased temperature of the earth and due to this effect like melting of glaciers, biodiversity depletion, extreme weather conditions, the spread of new diseases and adverse impact on agriculture can be seen.
- Over the years Climate Change has impacted our country. Events like the Chennai flood, Uttarakhand flood, the birth of more intense cyclones like Nisarag, and disappearing lands like Sundarbans have contributed to the birth of other problems like an increase in the number of Climate Migrant, the impact of Climate Change on the economy and most severe impact is the death of people.
- As Climate Change is now have become an existential issue thus it is imperative that not only, we participate more in increasing awareness about Climate Change but also, they are being implemented only then we will be able to form a more safe and secure environment for our future generation.
- People are aware of the cause, consequences and have some general knowledge about Climate Change still this knowledge is not adequate to create a sense of emergency among the population and thus it's our moral responsibility that we create more awareness about Climate Change by speaking with our friends, and family.
- Finally overcoming the threat of Climate Change is possible. There are various methods and ways present by which we can make sure that we are contributing less towards Climate Change. Our mother nature is in crisis and without her we humans cannot survive and thus we need to start to speak about it and demand more answers from our leaders about this issue.
- If we fail to combat the existential effect of Climate Change that has on our life then in the coming future the humankind will be suffering from a major crisis. Addressing this increasing threat is now our crucial responsibility and to do so more research and innovative ideas are needed.

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## Appendices

### 1. Gender

- ☐ Female
- ☐ Male
- ☐ Other

### 2. Age

- ☐ 18-30
- ☐ 30-40
- ☐ 40-50
- ☐ 50 and above

### 3. Education

- ☐ High School
- ☐ Graduation
- ☐ Post-Graduation
- ☐ PhD

### 4. Climate change is....

- ☐ Change in average weather conditions such as temperature and rainfall
- ☐ Transition from one season to another season
- ☐ Normal weather condition of particular region

### 5. Climate Change is a global crisis

- ☐ Yes
- ☐ No

### 6. Do you think climate change is threatening?

- ☐ Threatening
- ☐ Not threatening

### 7. Do you know the cause and consequences of climate change?

- ☐ Yes
- ☐ No

- ☐ Maybe
- 8. Do you know how you can help to control climate change?
  - ☐ Yes
  - ☐ No
  - ☐ Maybe
- 9. Water vapor is one of the greenhouse gases
  - ☐ True
  - ☐ False
- 10. Which statement comes closer to your own views
  - ☐ Climate change is caused by natural processes
  - ☐ Climate Change is caused by human activity
- 11. Extreme weather condition like storms & hurricanes, heatwaves, wildfires, more flooding, and Heavier droughts are caused by climate change
  - ☐ Agree
  - ☐ Disagree
- 12. Do you know the initiatives taken by India to control climate change?
  - ☐ Yes
  - ☐ No
  - ☐ Maybe
- 13. Globally, which of the following economic sectors emits the largest percentage of greenhouse gas emissions?
  - ☐ Transportation
  - ☐ Buildings
  - ☐ Industry
  - ☐ Electricity and heat production
- 14. Wasting less food is a way to reduce greenhouse gas emissions.
  - ☐ True
  - ☐ False
- 15. Do you know what is Paris Agreement? and what was agreed to in the Paris Agreement?
  - ☐ Yes, Paris Agreement is about keeping global temperature rise well below 2°C pre-industrial levels and to pursue a path to limit warming to 1.5°C
  - ☐ Yes, Paris Agreement is about protecting biodiversity and end the deforestation of the world's rainforests
  - ☐ Yes, Paris Agreement is about pursuing a goal of 100% clean, renewable energy



☐ No, I don't know what is Paris Agreement

16. Is India part of the Paris Agreement?

☐ Yes

☐ No

☐ Maybe

17. How would you describe your knowledge about the following and its effects?

|                                      | Very Good | Good | Average | Poor |
|--------------------------------------|-----------|------|---------|------|
| Greenhouse gases                     |           |      |         |      |
| Melting of ice or volcanic eruptions |           |      |         |      |
| Deforestation                        |           |      |         |      |
| Global warming                       |           |      |         |      |
| Biodiversity depletion               |           |      |         |      |
| Carbon footprint                     |           |      |         |      |