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A Study on CO_2 Atmosphere Level and its Impacts in Tuticorin District

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***Abstract*: The Inter-Governmental Panel on Climatic Change (IPCC) reports that the average air temperature at the end of 21st century will rise 4.0 degrees Celsius from current levels in the case of the fossil energy intensive scenario. Agricultural production will be affected by global warming through changes in yields and market prices. The dominant factor of rising temperature is the increasing concentration of carbon dioxide (CO_2), which represents the greatest exhaust quantity among the greenhouse gases (GHG), which increased in value from 280ppm in the pre-industrial period to 386ppm in 2008. This research examines possible effects of climatic change focusing on global warming and its impacts on three villages from Tuticorin District and suggests measures to mitigate climate change. The general objective of this research is to expand understanding people's experience of climate variability and responses made to overcome impacts of climate change.**

***Keywords*: Atmosphere Level**

1. Introduction

Global warming is one of the major issues we are being faced with. The term signifies an increase in the atmospheric temperature near the earth's surface, which is caused by various reasons. Scientists are of the opinion that a rise in the carbon dioxide levels will further aggravate the situation. The greenhouse effect causes the earth's heat to be trapped in the atmosphere, which results in the increase in temperature. Global warming has thus caused a change in the climate of the earth, causing temperatures to rise. This in turn has an effect on various species dependent on the basic laws of nature. A change in the same makes survival a difficult issue. A warmer earth also causes changes in the rainfall patterns and thus affects humans, plants and animals as well. The major cause of global warming is the emission of greenhouse gases like carbon dioxide, methane, nitrous oxide etc. into the atmosphere. Human use of fossil fuels is the main source of excess greenhouse gases.

2. Current and Future Climate Patterns in India

The mean annual precipitation over India as computed from the CRU data was seen to be about 1094 mm and the mean annual temperature was about 22.7°C. The projected climate (average for 2071–2100) for the more moderate B2 scenario is both wetter (an average increase of about 220 mm) and warmer (an average increase of about 2.9°C) compared to the HadRM3 baseline. The corresponding values of increase for the more extreme A2 scenario are about 300 mm and 4.2°C respectively. The mean annual precipitation for the projected values or B2 scenario turns out to be 1314 mm and the projected mean temperature is about 25.6°C.

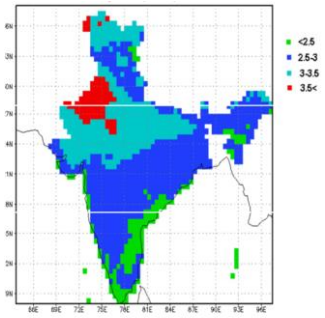

Fig. 1. Predicted change in Temp (degrees C) by 2085, B2 Scenario

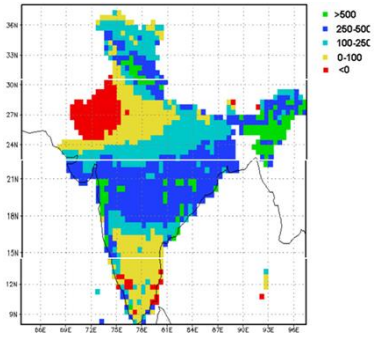

Fig. 2. Predicted change in Rainfall Temp (mm) by 2085, B2 Scenario

There is considerable geographical variation in the magnitude of changes for both temperature as well as rainfall. Northwestern India is likely to become drier, while northeastern India is likely to become much wetter. The temperature increase in northwestern India is also much more than that in the northeast. Southern and southeastern parts of India are likely to experience only a moderate increase in temperature.

3. Impacts of Global Warming

- Ice is melting worldwide, especially at the Earth's poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice.

- Researcher Bill Fraser has tracked the decline of the Adélie penguins on Antarctica, where their numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.
- Sea level rise became faster over the last century.
- Some butterflies, foxes, and alpine plants have moved farther north or to higher, cooler areas.
- Precipitation (rain and snowfall) has increased across the globe, on average.
- Spruce bark beetles have boomed in Alaska thanks to 20 years of warm summers. The insects have chewed up 4 million acres of spruce trees.
- Sea levels are expected to rise between 7 and 23 inches (18 and 59 centimeters) by the end of the century, and continued melting at the poles could add between 4 and 8 inches (10 to 20 centimeters).
- Hurricanes and other storms are likely to become stronger. Since warm ocean waters and warm, moist air fuel storms, global warming would increase the number and intensity of tropical cyclones.
- Species that depend on one another may become out of sync. For example, plants could bloom earlier than their pollinating insects become active.
- For most places global warming will result in frequent, longer and more intense heat waves.
- Floods and droughts will become more common. Rainfall in Ethiopia, where droughts are already common, could decline by 10 percent over the next 50 years.

Table 1
Details of Temperature in Tuticorin District for 2018-2019

Month	Mean Maximum		Mean Minimum		Humidity in %	
	Normal	Actual	Normal	Actual	Max	Min
Jun-18	35.50	35.60	26.80	27.50	78	34
July-18	34.40	35.70	26.50	24.50	77	51
Aug-18	34.50	34.70	26.30	26.90	92	91
Sep-18	33.90	33.70	26	26.50	94	31
Oct-18	31.90	32.00	25.10	25.80	94	42
Nov-18	29.10	29.00	23.80	26.10	93	66
Dec-18	27.80	29.10	22.60	25.00	91	62
Jan-19	27.60	29.10	22.30	24.50	95	51
Feb-19	28.20	29.80	23.00	25.10	89	47
Mar-19	27.70	31.50	23.90	27.00	85	44
Apr-19	31.90	32.60	26.50	27.70	86	57
May-18	34.30	34.50	26.90	28.80	83	37

- Less fresh water will be available. If the Quelccaya ice cap in Peru continues to melt at its current rate, it will be gone by 2100, leaving thousands of people who rely on it for drinking water and electricity without a source of either.
- Some diseases will spread such as malaria carried by mosquitoes. Global warming would increase smog pollution in some areas and intensify pollen allergies and asthma.
- Ecosystems will change some species will move farther north or become more successful; others won't be able to move and could become extinct. Wildlife research scientist Martyn Obbard has found that since the mid-1980s, with less ice on which to live and fish for food, polar bears have gotten considerably skinnier. Polar bear biologist Ian Stirling has found a similar pattern in Hudson Bay. He fears that if sea ice disappears, the polar bears will as well.

4. Methodology

The study was conducted in Tuticorin District of Tamilnadu. This study is compiled with the help of the primary data covered only three months period (2019). The primary data was collected with the help of specially prepared interview schedule. In this research, total of 364 interviewees were selected from Tuticorin District viz., by using simple random sampling method. This is purely a descriptive study. In-depth interviews encourage capturing of respondents' awareness in their own words, a very desirable strategy in qualitative data collection. A list of simple questions was prepared prior to the actual fieldwork. In-depth Interviews was conducted by making transect walk together the household information, attitude of local peoples toward climate change, their knowledge and experiences regarding climate variability, impacts and adapting activities. The data has been presented in the form of tables for easy understanding and analysis. Secondary data was collected through journals, articles, thesis, reports, Publications, web sites. Commensurate with the set objectives various analytical tools were employed for the analysis and interpretation of the data.

Table 2
Time Series Data of Rainfall by Seasons (Last 10 Years)

Year	South west monsoon		North east monsoon		Winter season		Hot weather season		Total		% deviation (+ or – or=) from Normal
	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	
2009-10	59.9	30.2	429.4	659.5	62.0	10	110.9	94.3	662.2	794.0	+119.90
2010-11	59.9	152.4	429.4	525.6	62.0	69.10	110.9	17.5	662.2	764.7	+115.48
2011-12	59.9	40.2	429.4	297.0	62.0	127.0	110.9	55.5	662.2	519.7	-21.5
2012-13	59.9	127.9	429.4	312.8	62.0	52.3	110.9	127.0	662.2	520.0	_6.4
2013-14	59.9	57.8	429.4	286.52	62.0	27.4	110.9	141.5	662.2	513.4	-22.4
2014-15	70.1	27.7	426.0	359.0	42.6	59.9	116.1	112.4	654.8	557.0	-14.9
2015-16	86.8	48.1	410.1	319.5	46.6	47.10	112.2	108.6	665.7	517.9	-21.0
2016-17	86.8	151.1	410.1	551.4	46.6	61.5	112.2	171.1	665.7	935.10	+42.6
2017-18	86.8	48.4	410.1	453.6	46.6	36.1	112.2	139.9	665.7	678.0	+3.4
2018-19	86.8	62.0	410.1	670.6	46.6	40.2	112.2	64.4	665.7	837.2	+27.7

5. Data Analysis

Table 3
Temperature change

Temperature	No.of Respondent	Percentage
Increased	291	79.9
Decreased	14	3.8
Don't know	59	16.3
Total	364	100

Source: Primary Data

The result revealed that 364 of the local people interviewed perceived long-term changes in temperature. While, most of them (80 percent) perceive the temperature has been increased. Only 4 percent noticed the contrary, a decrease in temperature.

Table 4
Drought occurrences opinion of the respondents

Drought	No.of Respondent	Percentage
Increased	307	84.3
Decreased	40	10.9
Constant	17	4.8
Total	364	100

Source: Primary Data

Almost 84 percent of the respondents said that the occurrence of drought has been increasing and link it with the untimely and unusual rainfall patterns over thepast few years. Key informants also shared their experience that this year (2010) there was lessor no rainfall in the monsoon season.

Table 5
Rainfall Pattern awareness of the respondents

Rainfall	No. of Respondent	Percentage
Predictable	22	6.1
Unpredictable	324	89.0
Constant	18	4.9
Total	364	100

Source: Primary Data

89 percent of the respondents observed an unpredictable rainfall patterns over the past 10 years, 6 percent noticed a predictable and 5 percent noticed constant rainfall patterns.

Table 6
Health Impacts due to Climate Change

Impact on Health	No. of Respondent	Percentage
Skin cancer	6	1.6
Cataract	4	1.1
Diarrhea	31	8.5
Malaria	72	19.8
Dengue and yellow fever	59	16.3
Cholera	14	3.8
Heat related Mortality	3	0.8
Infectious Disease	175	48.1
Total	364	100

Source: Primary Data

The weather has a direct impact on the respondent's health. If the overall climate becomes warmer, there will be an increase in health problems. Local people past experience showed increasing warming days, 48% affected by infectious disease and 20% respondents reported by affected Malaria disease,16% Dengue and Yellow fever, 9% Diarrhea Disease, 4% Cholera, 2% Skin cancers,1% Cataracts, and 1% affected by Heat related mortality. It is further anticipated that there will be an increase in the number of deaths due to greater frequency and severity of heat waves and other extreme weather events.

Table 7
Impact of Climate Change

Impact of Climate Change	Yes(%)	No(%)	Don't Know(%)	Total(%)
Damage to agriculture	307(84.3)	31(8.5)	26(7.2%)	364(100)
Behavioural changes in livestock	22(6.1)	283(77.7)	59(16.2)	364(100)
Changes in fish species in the sea	278(76.4)	54(14.8)	32(8.8)	364(100)
Increasing availability of water	157(43.1)	193(53.1)	14(3.8)	364(100)

Source: Primary Data

Many respondents (84%) reported that new diseases in agriculture crops in the study area are in critical condition. 78% local people revealed that there are no behavioural changes in livestock. Though drinking water is increasing due to availability of water storage tanks and water pipes, 43% people said that they are facing more drought periods resulting decrease in natural springs and irrigation water. This may affect agriculture, and subsequently food security. 76% people revealed that there are changes in fish species in the sea.

6. Measures to Mitigate Climate Change

To reduce the impact of climate change there can be two approaches: one is mitigation and the second is adaptation to climate change. Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or reduce the effects of disasters when they occur. At present, 62–63% of electricity is generated using fossil fuels and coal. It is important therefore to move away from coal and instead generate renewable energy using other sources such as solar energy, wind energy, etc. Migration of coastal population, increasing public transportation and forestry are the main adaptations that India can opt for. As accepted by the State Government of Maharashtra, one third or 33% of land needs to be covered with forests. At present, however, forest land is only around 20%; so the challenge here is to find more land, which can then be converted into forests. Today, the forests present are covering only 12% of land. Policy makers in India either do not know about, or do not take seriously, the economic, health-related and environmental impacts of climate change. This is largely because they feel no pressure from the public to deal with the problem. It is therefore important to make sure that the local government representatives understand this threat and feel pressure from the people to take action. Urban and rural communities should pressurize their representatives to take up the issue with the state and central government, and develop strategies at three levels:

- At the local level, steps should be taken to minimize the impacts of global warming on communities, and to build

adaptive capacities where possible. For instance, constructing sea walls can reduce the threat of coastal flooding. Crop varieties tolerant to saline water should be developed for regions likely to suffer salt-water intrusion in their aquifers.

- At the national level, a wide section of the Indian civil society, including economists, scientists and legal experts, should be involved in understanding the threats from global warming to the country, and in developing strategies to deal with them. In particular, scientists should be encouraged to further study the impacts of climate change, to better understand the nature of the impacts and take preventive action where possible.
- At the global level, India should demand that industrialized countries, largely responsible for causing global warming, should reduce their emissions of harmful gases and pay for the damage they have already caused. The positions taken by the Indian government on climate change at global meetings should be made public, and Indian civil society should be allowed to participate in their formulation.

7. Conclusion

To mitigate the affect of climate change, all the countries need to conserve energy and reduce emissions of CO_2, CH_4 and N_2O. Systematic long term studies need to be carried to analyze technical options for mitigating GHG and other harmful emissions from use of tractors, combines and diesel engines which are used on the form for doing various farm operations. There is also need to identify and rank the barriers to the introduction of selected technical option such as zero-tillage, reduced tillage, laser land levelling, solar energy, and bio fuels to mitigate environmental emissions. We also need to develop varieties which are drought and flood tolerant. The pollution in the urban areas is bound to increase thus effecting climate. The emission levels can be reduced by certain technical options such as, use of alternate fuels e.g. Use of dual fuel (LPG & gasoline); more efficient tractors & diesel engines; and methanol or ethanol run tractors and diesel engines. A mega project in this respect is launched to meet the challenges of global warming. The concept of Conservation Agriculture as has evolved under varying situations, calls for integrated and participatory approach by involving plant breeders, agronomists, soil scientists, environmentalists and engineers to solve emerging problems and suggest efficient method of cultivation of crops and their efficient management to mitigate the effect of climate change.

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