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Human Influences On Climaite Change And Global Warming-A General Overview

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Abstract:

The average pattern of weather, called climate, usually remains uniform for centuries if it is left to itself. However, the Earth is not being left alone. People are taking multi-dimensional actions that are gradually changing the morphology, physiology, and anatomy of the planet Earth and its climate in large scale. The single human activity that is most likely to have a large impact on the climate is the burning of "fossil fuels" such as coal, oil and gas. citizens are in denial about climate change, refusing to take responsibility for controlling their emissions of carbon dioxide (CO2) and the other greenhouse gases (GHGs) that cause global warming.Global warming is a phase of climate change, which is associated with the increasing trend in the average temperature of the Earth's near-surface air and oceans in recent decades and its projected continuation. Global average air temperature near the Earth's surface rose 0.74 ± 0.18 °C (1.3 ± 0.32 °F) during the past century. The Intergovernmental Panel on Climate Change (IPCC) concludes, "most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (http://www.ipcc.ch/SPM2feb07.pdf), which leads to warming of the surface and lower atmosphere by accelerating the greenhouse effect. Natural phenomena such as solar variation combined with volcanoes have probably had a small warming effect from pre-industrial times to 1950, but a small cooling effect since 1950.

1.Background Of The Study

The single human activity that is most likely to have a large impact on the climate is the burning of "fossil fuels" such as coal, oil and gas. These fuels contain carbon. Burning them liberates carbon dioxide gas in the atmosphere. Since the early 1800s, when people began burning large amounts of coal and oil, the amount of carbon dioxide in the earth's atmosphere has increased by nearly 30%, and average global temperature appears to have risen between 1° and 2°F. This increment of temperature is keenly related to the basic property of the gas. Carbon dioxide gas traps solar heat in the atmosphere, partly in the same way as glass traps solar heat in a sunroom or a greenhouse. For this reason, carbon dioxide is sometimes called a "greenhouse gas." As more carbon dioxide is added to the atmosphere, solar heat faces more trouble in getting out. The result is that, if everything else remains unchanged, the average temperature of the atmosphere would increase. As people burn more fossil fuels for energy they add more carbon dioxide to the atmosphere. This creates a blanket of carbon dioxide over the Earth's surface, which allows the short waves of the sun to penetrate the Earth's atmosphere, but prevents the long wave radiations (emitted from the Earth's surface) to get out. If this activity continues for a long period of time, the average temperature of the atmosphere will almost certainly rise. This is commonly referred to as global warming. Global warming is thus the increase in the average temperature of the Earth's near-surface air and oceans in recent decades and its projected continuation. The term "global warming" is a sub-set of the universal set climate change, which also encompasses another sub-set namely "global cooling." The United Nations Framework Convention on Climate Change (UNFCCC) uses the term "climate change" for human-induced changes and "climate variability" for other changes. Climate change is therefore any long-term significant change in the "average weather" that a given region experiences and involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years. The roots of these changes can be related to several dynamic processes on Earth, external forces including variations in sunlight intensity, and more recently by human activities.

2.Objectives

#. To identify major human influences on climate change.

#. Collect qualitative and quantitative data on perceptions of powerlessness and the commons dilemma in relation to climate change.

#. Report results and analyze data in relation to hypotheses.

#. Discuss findings about the importance and causes of powerlessness and the common dilemma in relation to climate change.

#. Accept or challenge hypotheses. Draw conclusions on hypotheses.

3.Methodology

The intuitive approach to costing adaptation involves comparing a future world without climate change with a future world with climate change. The difference between these two worlds entails a series of actions to adapt to the new world conditions. And the costs of these additional actions are the costs of adapting to climate change. With that in mind, the study took the following four steps:

• Picking a baseline. For the timeframe, the world in 2050 was chosen, not beyond (forecasting climate change and its economic impacts becomes even more uncertain beyond this period). Development baselines were crafted for each sector, essentially establishing a growth path in the absence of climate change that determines sector-level performance indicators (such as stock of infrastructure assets, level of nutrition, and water supply availability). The baselines used a consistent set of GDP and population forecasts for 2010–50.

• Choosing climate projections. Two climate scenarios were chosen to capture as large as possible a range of model predictions. Although model predictions do not diverge much in projected temperatures increases by 2050, precipitation changes vary substantially across models. For this reason, model extremes were captured by using the two model scenarios that yielded extremes of dry and wet climate projections. Catastrophic events were not captured, however.

• Predicting impacts. An analysis was done to predict what the world would look like under the new climate conditions. This meant translating the impacts of changes in climate on the various economic activities (agriculture, fisheries), on people's behavior (consumption, health), on environmental conditions (water availability, oceans, forests), and on physical capital (infrastructure).

The research work prepared in three stages which are as follows –

3.1.Pre-Field Work

This stage includes - i) collection of districts map ii) collection of secondary information from district handbook, census report, others books and journals etc. iii) preparation of questionnaire statistical schedule for collection of primary data which are closely related with the research work.

3.2.Field Work

By questionnaire schedule primary data will be collected from the study area. Observation schedule also help to collect the information.

3.3.Post Field Work

Collected data will be classified in a master table and various cartographic and statistical techniques will be made in support of the theoretical discussion.

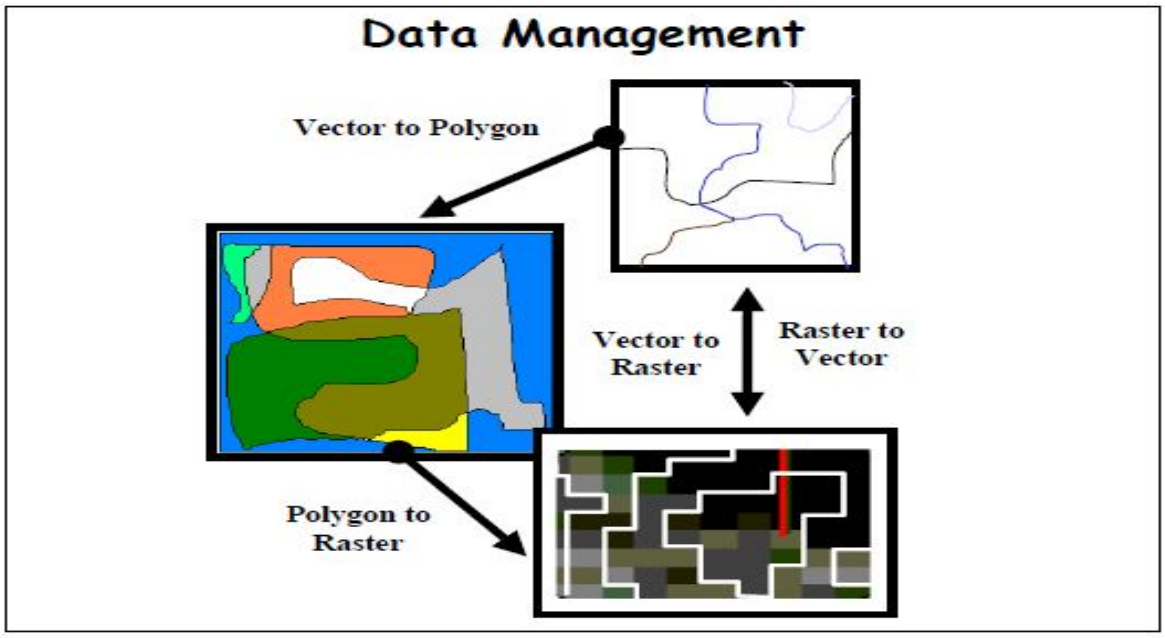

Figure 1: Process of Data Management

4.Results

4.1.Human Influences On Climate Change

Anthropogenic factors are human activities that change the environment and influence climate. The emission of CO_2 due to burning of fossil fuels or the increase of green house gas concentrations due to rapid urbanization, industrialization and expansion of tourism are unquestionable human influences on climate change. However, in some cases the chain of causality is direct and unambiguous (e.g., by the effects of irrigation on temperature and humidity), while in others it is less clear. Various hypotheses for human-induced climate change have been debated for many years.

According to Church et al. (2001) the amount of anthropogenic change in land water storage systems cannot be estimated with much confidence. A number of anthropogenic factors can contribute to sea level rise. First, natural ground water systems typically are in a condition of dynamic equilibrium where, over long time periods, recharge and discharge are in a balance. When the rate of ground water pumping greatly exceeds the rate of recharge, as is often the case in arid and even semi-arid regions, water is removed permanently from storage. The water that is lost from ground water storage eventually reaches the ocean through the atmosphere or surface flow, resulting in sea level rise. Second, wetland contains standing water, soil moisture and water in plants equivalent to water roughly 1m deep. Hence, wetland destruction (for urbanization, industrialization and tourism etc.) contributes to sea level rise. Over time scales shorter than a few years, diversion of surface waters for irrigation in the internally draining basins of arid regions results in increased evaporation. The water lost from the basin hydrologic system eventually reaches the ocean. Third, forests store water in living tissue both above and below ground. When a forest is removed, transpiration is eliminated so that runoff is favoured in the hydrologic budget.

It has been observed by several researchers that impoundment of water behind dams removes water from the ocean and lowers sea level. Dams have led to a sea level drop over the past few decades of –0.5 to –0.7 mm yr^{-1} (Chao, 1994; Sahagian et al., 1994). Infiltration from dams and irrigation may raise the water table, storing more water. Gornitz (2001) estimated –0.33 to –0.27 mm yr^{-1} sea level change equivalent held by dams (not counting additional potential storage due to subsurface infiltration).

It is very difficult to provide accurate estimates of the net anthropogenic contribution to climate change due to lack of worldwide information on individual factor, although the effect caused by dams is possibly better known than other effects. According to Sahagian (2000), the sum of the anthropogenic effects could be of the order of 0.05 mm yr^{-1} sea level rise over the past 50 years, with an uncertainty several times as large.

In conclusion it can be advocated that the land related contribution to sea level change has not led to a reduction in the uncertainty compared to the IPCC Technical Assessment Report (2001), which estimated the rather wide ranges of -1.1 to +0.4 mm yr^{-1} for 1910 to 1990 and –1.9 to +1.0 mm yr^{-1} for 1990. However, indirect evidence by considering other contributions to the sea level budget suggests that the land contribution either is small (<0.5 mm yr^{-1}) or is compensated for by unaccounted for underestimated contributions.

Today the climate change related researches unanimously suggest that the biggest factor of present concern is the increase in CO_2 levels due to emissions from fossil fuel combustion, followed by aerosols (particulate matter in the atmosphere), which exert a cooling effect. Cement manufacture also plays a vital role in the domain of human induced climate change. Other factors, including land use, ozone depletion, animal husbandry, agriculture, and deforestation, also affect the climatic profile of the planet Earth. These factors are discussed here in brief.

4.2.Fossil Fuels

Fossil fuels constitute the backbone of modern civilization. Beginning with the industrial revolution in the 1850s and accelerating ever since, the human consumption of fossil fuels has elevated CO_2 levels from a concentration of ~280 ppm to more than 380 ppm today (an increase of 35.7 %). These increases are projected to reach more than 560 ppm (an increase of 100 %) before the end of the 21st century. It is known that carbon dioxide levels are substantially higher now than at any time in the last 750,000 years. Along with rising methane levels, these changes are anticipated to cause an increase of atmospheric temperature within 1.4–5.6°C between 1990 and 2100.

4.3.Aerosols

Anthropogenic aerosols, particularly sulphate aerosols from fossil fuel combustion, exert a cooling influence. This, together with natural variability, is believed to account for the relative "plateau" in the graph of 20th-century temperatures in the middle of the century.

4.4.Cement Manufacture

Cement manufacturing is the third largest cause of man-made carbon dioxide emissions. Carbon dioxide is produced when calcium carbonate ($CaCO_3$) is heated to produce the calcium oxide (CaO, also called quicklime), which is the main ingredient for cement ($CaSiO_3$) production. The reaction steps in this manufacture are:

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

$$CaO + SiO_2 \rightarrow CaSiO_3$$

The CO_2 produced in the first step has considerable contribution to global warming. While fossil fuel combustion and deforestation each produce significantly more carbon dioxide (CO_2), cement production is responsible for approximately 2.5% of total worldwide emissions from industrial sources.

4.5.Land Use

Prior to widespread fossil fuel use, humanity's largest effect on local climate is likely to have resulted from land use pattern. Irrigation, deforestation, and agriculture fundamentally change the environment. These activities alter the amount of water going into and out of a given location. They also may change the local albedo by influencing the ground cover and altering the amount of sunlight that is absorbed. For example, there is evidence to suggest that the climate of Greece and other Mediterranean countries was permanently changed by widespread deforestation between 700 BC and 1 AD (the wood being used for shipbuilding, construction and fuel), with the result that the modern climate in the region is significantly hotter and drier, and the species of trees that were used for shipbuilding in the ancient world can no longer be found in the area.

A controversial hypothesis by William Ruddiman called the early anthropocene hypothesis suggests that the rise of agriculture and the accompanying deforestation led to the increases in carbon dioxide and methane during the period 5000–8000 years ago. These increases, which reversed previous declines, may have been responsible for delaying the onset of the next glacial period, according to Ruddimann's overdue-glaciation hypothesis.

In modern times, a 2007 Jet Propulsion Laboratory study found that the average temperature of California has risen about 2 degrees over the past 50 years, with a much

higher increase in urban areas. The change was attributed mostly to extensive human development of the landscape.

4.6.Livestock

According to a 2006 United Nations report, livestock is responsible for 18% of the world's greenhouse gas emissions as measured in CO_2 equivalents. This however includes land usage change, meaning deforestation in order to create grazing land. In the Amazon Rainforest, 70% of deforestation is to make way for grazing land.This is the major factor in the UNFAO report (2006), which was the first agricultural report to include land usage change into the radiative forcing of livestock. In addition to CO_2 emissions, livestock produces 65% of human-induced nitrous oxide (which has 296 times the global warming potential of CO_2) and 37% of human-induced methane (which has 23 times the global warming potential of CO_2).

Interplay of factors

Balance is the art of nature and the natural components always try to maintain a stable or ground state. If a certain forcing or inducing factor (for example, solar variation) acts to change the climate, then there are mechanisms that act to amplify or reduce the effects. These are called positive and negative feedbacks respectively. Researches have forwarded the view that the climate system is generally stable with respect to these feedbacks: positive feedbacks do not "run away." Part of the reason for this is the existence of a powerful negative feedback between temperature and emitted radiation: radiation increases as the fourth power of absolute temperature.

A number of important positive feedbacks do exist in the domain of climate change. The glacial and interglacial cycles of the present ice age provide an important example. It is believed that orbital variations provide the timing for the growth and retreat of ice sheets. However, the ice sheets themselves reflect sunlight back into space and hence promote cooling and their own growth, known as the ice-albedo feedback. Further, falling sea levels and expanding ice decrease plant growth and indirectly lead to declines in carbon dioxide and methane. This leads to further cooling. Conversely, rising temperatures caused, for example, by anthropogenic emissions of greenhouse gases could lead to decreased snow and ice cover, revealing darker ground underneath, and consequently result in more absorption of sunlight. Water vapour, methane, and carbon dioxide can act as significant positive feedbacks - their levels rising in response to a warming trend, thereby accelerating that trend. Water vapour acts strictly as a feedback (excepting small

amounts in the stratosphere), unlike the other major greenhouse gases, which can also act as forcing.

More complex feedbacks involve the possibility of altered water currents within the oceans or air currents within the atmosphere. A significant concern is that melting glacial ice from Greenland may interfere in changing the thermo hyaline circulation of water in the North Atlantic, affecting the Gulf Stream, which brings warmer water to replace sinking colder water; which would effect the distribution of heat to Europe and the east coast of the United States.

Other potential feedbacks are not well understood and may either inhibit or promote warming. For example, it is unclear whether rising temperatures promote or inhibit vegetative growth, which could in turn draw down either more or less carbon dioxide. Similarly, increasing temperatures may lead to either more or less cloud cover. Since cloud cover has a strong cooling effect, any change to the abundance of clouds has high probability to affect the climate at local level and even at regional level.

5.Conclusion

The most intriguing story is what has been happening in state legislatures, at city council meetings, and in corporate boardrooms, as well as on college campuses, in community groups, and in a range of other local settings. Across the nation, numerous climate action programs are moving aggressively to reduce emissions of GHGs. It is rare that a week goes by without the announcement of a new initiative. These natural calamities are direct threats to the security of the poor people, which not only result in the displacement of people from their root, but also pose adverse impact on their socio-economic conditions and livelihoods. The restoration phase can be initiated by strengthening the call for an adaptive management style that focuses on transparency and learning. Such an approach needs to involve all stakeholders in decision making and implementation at the level of landscapes and seascapes. Coalitions, including governments and their agencies, NGOs, local communities and research institutions, can support immediate actions, plan for the medium term and establish key priorities for the longer term. Whether constituted at the regional, national or international level, these coalitions should aim to bring about change in environmental management strategy to accelerate the process of adaptation of ecosystems and their components to oscillating climate of the planet Earth.

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