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Applying Behavioral Insights to Develop Affective Approaches to Climate Change

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Abstract
The term "climate change" refers to a change in climate patterns primarily brought on by natural systems and human activity-related greenhouse gas emissions. Global warming, which is currently about 1.0°C over pre-industrial levels, is expected to rise by 1.5°C between 2030 and 2052 if present emission rates are upheld.315 instances of natural disasters, many of which are climate-related, occurred around the world in 2018. A total of 68.5 million people were impacted, and $131.7 billion in economic damages were incurred, with storms, floods, wildfires, and droughts accounting for around 93% of those losses. It is highly concerning that the economic losses linked to wildfires in 2018 alone are roughly comparable to the total losses from wildfires recorded over the previous ten years. The most vulnerable industries to climate change attacks are food, water, health, ecosystems, human habitat, and infrastructure. With the primary goal of reducing the rise in global temperatures to 2°C by 2100 and pursuing attempts to restrict it to 1.5°C, the Paris agreement was introduced in 2015. Despite what the headlines may suggest, even conservative estimates for the potential of changing behaviors to reduce natural resource consumption represent an enormous contribution to reducing global emissions. Both direct and indirect types of human consumption are responsible for almost two thirds of all world emissions. However, achieving this potential is a difficult task.It necessitates developing creative strategies for involving people, homes, and communities as well as altering deeply rooted production and consumption practices. The most promising behavioral insight categories at the individual and household levels are reviewed in this research. Finally, it emphasizes how diverse behaviorally-insights approaches can be used to address climate change.
Keywords- Environmental, *Responsiveness, Climate Change, behavioral insights, GHG's*

1. Introduction

Climate change is a term generally that can apply to both the causes and the results of changes in the Earth's climate at local, regional, and global stages. The term "climate change" has become most commonly used to refer to changes in the Earth's climate that have been primarily caused by human activity since the pre-Industrial period, particularly the burning of fossil fuels and the clearing of forests, which has led to a relatively quick rise in the atmospheric concentration of carbon dioxide. The two possible strategies to climate change are mitigation and adaptation. Mitigation entails lowering and stabilizing the quantities of heat-trapping greenhouse gases (GHG) in the atmosphere.
It is one of the most significant indicators of global changes, the terms "global warming" and "climate change" are frequently used interchangeably."Global warming" refers to the increase in average global temperatures, which has a substantial effect on ecosystems, species, and people worldwide. The phrase "climate change" is used to

encompass these extra effects because there are more causes that have an impact on rising surface temperatures. There is broad agreement among scientists—representing 97% of climate scientists who are actively publishing work—that human activity has been the main driver of observed warming trends since the 20th century. As of early 2020, there were 413 parts per million (ppm) of carbon dioxide in the atmosphere compared to a pre-Industrial average of roughly 280 ppm. In recorded history, there has never been a carbon dioxide concentration this high. According to scientists, in order to stop global warming, we must get back to a "safe" concentration of 350 ppm by the year 2100.

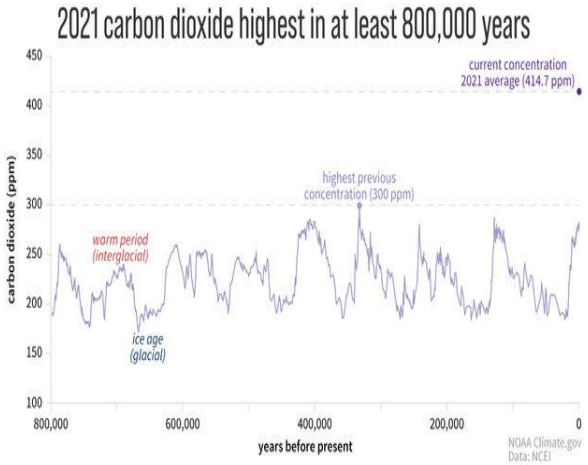
The average global warming of 1 or 1.5 degrees Celsius will vary greatly around the globe; many locations will warm up far more quickly. For instance, the Arctic is warming 1-2 times more quickly than any other region of the planet. Rising sea levels, glacier retreat, alterations in the timing of seasonal events (plant flowering, migratory patterns), and an increase in the frequency and severity of extreme weather events are only a few of the far-reaching repercussions of global warming. People and wildlife are affected both directly and indirectly by these types of impacts. The displacement of people and communities as a result of sea level rise and extreme weather events is one of the direct repercussions. On the other hand, there are indirect consequences that can affect economic growth, food production, the escalation of water crises, and public health hazards.

Climate Change Impacts

The effects of climate change on various societal segments are interconnected. Drought can be destructive to both human health and food production. Flooding has the power to destroy ecosystems, infrastructure, and spread illness. Health issues can affect the availability of food, lower worker productivity, and increase death. Every region of the planet where we live is seeing the effects of climate change. However, the effects of climate change are not uniform throughout the nation and the world; even within a single town, the effects of climate change might vary between neighborhoods or people. Underserved communities, who frequently have the highest exposure to risks and the fewest means to respond, might become increasingly vulnerable as a result of long-standing socioeconomic disparities.

2.1 Climate Change In Our Region

Our earth is being impacted by climate change from pole to pole. Here are some of the changes that NOAA has observed in the data it collects on the world's climate. Since 1958, when the instrumental record began, the annual growth rate of the average CO2 concentration on the planet was at its fifth-highest level. CO2 reached its maximum concentration in the current record and in records going back 800,000 years using data from ice cores at 414.7 ppm (0.1). Since 1993, the pace of sea level rise has increased from 1.7 mm/year, which it was for the most of the twentieth century.



2.1.1 WATER

Water resource changes can have a significant impact on our globe and our daily life. The problem of flooding is getting worse as a result of climate change. The majority of the United States is experiencing both stronger and more frequent exceptionally heavy precipitation events compared to the early 20th century. On the other hand, droughts are also getting more frequent, especially in the West of the United States. More water is being consumed by people, particularly for

agriculture. Similar to how humans perspire more when it's hot outside, plants lose more water as a result of hotter weather, thus farmers must provide them with extra water. Both show how more water is required in areas where supplies are running low.

2.1.2 Food

Climate and weather have an impact on our food supply. Existing changes will be challenging to manage, even though farmers and researchers may be able to adapt some agricultural processes and technologies or invent new ones. The farmers and herders that produce the food that goes on our tables face difficulties due to rising temperatures, drought and water stress, illnesses, and harsh weather. Human farm labourers are susceptible to health problems brought on by the heat, such as exhaustion, heatstroke, and heart attacks. Animals can suffer from heat stress and rising temperatures.

2.1.3 Human Health

Human health is already being impacted by climate change. Life is at stake when weather and climatic trends change. Heat is one of the most destructive weather phenomena. As ocean temperatures rise, hurricanes are getting more powerful and wetter, which can lead to both direct and indirect mortality. Dry weather increases the likelihood of fires, which is dangerous for your health. Frequent flooding can raise the danger of chemical exposure, mishaps, and waterborne illnesses. Ticks and mosquitoes can carry disease to new locations, and their geographic ranges are growing. Due to the aggravating effects of climate change, the most vulnerable groups, such as children, the elderly, those with pre-existing medical illnesses, outdoor labourers, persons of colour, and those with poor income, are at an even higher danger. However, in order to assist people comprehend and prepare for the health implications of climate change, public health organizations can collaborate with regional communities.

2.1.4 The Environment

Despite the fact that all ecosystems and organisms are affected equally, climate change will continue to have a substantial impact on them. Given that it is warming at a rate at least twice as fast as the world average and that melting land ice sheets and glaciers significantly contribute to this warming, the Arctic is one of the ecosystems most sensitive to the effects of climate change.

The ability of some living things to adapt to climate change can be seen in the early blossoming of some plants and the potential global expansion of some species. But because of stressed ecosystems brought on by rising temperatures and shifting precipitation patterns, these changes are occurring too quickly for many other plants and animals. Climate change may enable some invasive or bothersome species, such as lionfish and ticks, to spread even further.

The ocean is also undergoing changes. About 30% of the carbon dioxide produced into the atmosphere by the combustion of fossil fuels is absorbed by the ocean. As a result, the water's acidity is rising, which is bad for marine life. In addition to the melting of ice sheets and glaciers, thermal expansion is raising sea levels, increasing the risk of erosion and storm surge in coastal communities.

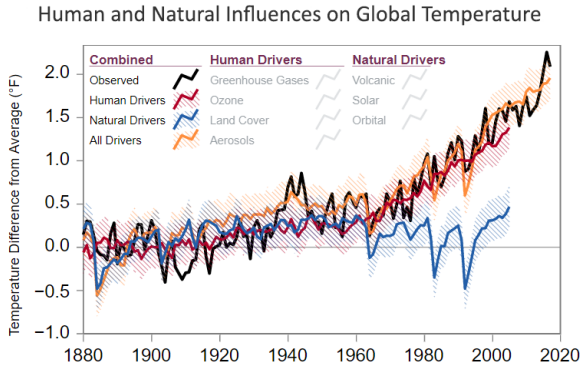
Human Contributions to Warming

Various detailed studies of the climate system come to the conclusion that from the middle of the 20th century, rising anthropogenic GHG concentrations have been the main cause of global warming. While the amount of greenhouse gases (GHGs) in the atmosphere has changed over time, leading to seven cycles of glacial advance and retreat in the last 650,000 years alone, the current rate of increase in GHG concentrations and global temperature is unmatched by any rate seen over timescales ranging from decades to millennia. The sources and sinks of GHG emissions have a direct impact on how frequently they are released into the atmosphere. Anything that causes an increase in GHG emissions, such as decomposition, the burning of fossil fuels, and the use of chemical fertilizers, is a source of GHGs. As opposed to sources, sinks include anything that traps GHGs,

such as soils, oceans, and forests. We can lessen the atmospheric GHGs that cause global warming by altering the ratio of sources to sinks. Bathtubs are frequently used as metaphors for how GHG emissions enter and exit the atmosphere.

The effects of climate change will be locked in for generations, if not millennia, due to the total cumulative GHG emissions, which are continually rising. A thorough understanding of how each industry (such as transportation, energy, and agriculture) contributes to projected warming is necessary for effective responses to the climate crisis. It is widely acknowledged that there is a need to address emissions from diverse industries, and new technologies are opening up possibilities for a speedier decarbonization. What is frequently absent is the political will to act, which is frequently a result of a lack of awareness among societies of the costs of inaction and the reality that addressing climate change can have a multiplicity of positive effects on development. Another key ingredient is a full-fledged bottom-up commitment across societies, starting at individual level, to bring about the deep and rapid shifts needed.

A full-fledged bottom-up commitment throughout societies, beginning at the individual level, to bring about the necessary profound and quick adjustments is another essential component.



Source: U.S. Global Change Research Program, Fourth National Climate Assessment

2. Climate Change Mitigation

Mitigation of climate change refers to human action to either decrease GHG emission sources or improve GHG emission sinks. With the first-ever worldwide targets for lowering emissions and slowing the rise in global temperatures, the 2015 Paris Agreement represented a significant advance in the fight against climate change.

The Paris Agreement's main goal is to keep the rise in global temperatures this century well below 2 °C and to use all reasonable efforts to keep it under 1.5 °C. All nations are required by the Paris Agreement to reduce their national emissions in accordance with their own Nationally Determined Contributions (NDCs). The formal commitments made in the Agreement, which are significant, establish a five-year cycle of progressive ambition with the aim of ensuring that all countries continue to make efforts to reduce emissions in accordance with the established temperature targets. This "ambition mechanism" is essential to implementing this Agreement.

Currently, assessments show that even if nations completely implement the conditional and unconditional climate action promises contained in their individual NDCs, the consequence will be temperature increases of between 2.7oC and 3.7oC.

20 More must be done. The entire global economy, particularly high-emitting nations, must make considerable mitigation efforts if the Paris Agreement's goals are to be met. According to mitigation scenarios, global CO2 emissions must reach their peak between 2020 and 2030, then rapidly decline until they reach zero in the latter part of the century in order to meet the Agreement's temperature target of "far below 2 °C."

Importantly, the larger the gap between our emissions' peak and drop, the greater the need for rapid, major emissions reductions—which will be difficult from a technological and financial standpoint.

Behavioural Insights to Reduce Emissions

We can considerably lessen GHG emissions by altering how people consume goods and services derived from natural resources worldwide. Measured, modelled, and

described in the recently released best-seller Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming are the 80 most important existing methods to address climate change mitigation. Numerous strategies mentioned in the book are household- or individual-level initiatives that directly depend on shifting consumption trends. These particular acts are referred to by other researchers as "behavioural wedges" of a wider pie of required steps to minimise emissions. With regard to solutions, Drawdown took into account every sector of the global economy, from food and materials to energy and transportation, and then developed scenarios that illustrated the potential for mitigation of rapidly scaling up these solutions from 2020 to 2050. Three scenarios were offered in the book, ranging in ambition from a realistically strict rate of solution adoption (the plausible scenario) to a rate at which solutions reach their full potential by 2050, completely replacing current technology and processes (Optimum scenario). The reference case, which predicts no change over the following 30 years and continuing emissions rise consistent with historical averages through 2050, is used to compare each possibility with.

5.1 **Thirty Behavioral Approaches for Mitigation of Climate Change**

1. Lessening food loss and waste along the whole food supply chain, from production to consumption
2. Diets high in plants eating more vegan meals and less meat and other animal products (e.g., meat, dairy.)
3. Utilizing cook tops that burn fuel more effectively, clean them.
4. Composting Instead of disposing of biodegradable garbage in landfills, turning it into a helpful soil fertiliser
5. Silvopasture-Increasing pasture production by including trees
6. Tropical evergreens- For a source of protein, lipids, and carbs, one can grow trees and other perennial crops.
7. Overgrowth of trees - Trees and annual crops can both be grown in the same area.
8. Regenerative farming implementing four out of the following six agricultural techniques: green manures, no-till or reduced tillage, cover crops, crop rotation, compost application, and/or organic production
9. Restoring farmland restoring damaged, abandoned farmland so that it can be used to grow crops or native plants
10. Controlled grazing modifying the time, intensity, and stocking rates of grazing in grassland soils
11. Rice intensification and better rice farming system implementing low-methane rice production techniques in both small- and large-scale operations
12. Sustainable agriculture using cover crops, decreased tillage, and crop rotation on agricultural land
13. Managing nutrients lowering the use of fertiliser on agricultural land
14. Installing water- and energy-saving irrigation methods, such as drip irrigation, on farmland
15. Electric automobiles driving electric and plug-in automobiles instead of gasoline-powered ones
16. Carpooling or using ride-sharing services
17. Public transportation using public transit as opposed to private vehicles to go around cities
18. Telepresence, replacing commercial aircraft with video conferencing technologies
19. Hybrid vehicles Driving hybrid cars instead of conventional cars
20. Infrastructure for bicycles instead of driving, commuters in cities might use bicycles
21. Walking-friendly cities Walking rather than taking a car to get where you're going in cities
22. bicycles with electric motors commuting in the city on electric bikes rather than a car

23. rooftop solar putting in rooftop solar systems that are less than one megawatt
24. Solar water utilising solar energy to warm or pre-heat water for usage in buildings
25. Methane digesters, number Using methods that use anaerobic digestion of organic waste to produce biogas for home heating
26. LED lighting household use of energy-efficient lighting
27. Saving water in the home by using water-saving fixtures like low-flow showerheads
28. Smart thermostats Household recycling and recycled paper
29. Using appliances that reduce heating and cooling demand through sensors and settings in the home Recycling glass, plastic, metal, and paper
30. A light wind putting in a few tiny windmills to provide the home's electricity demands

Conclusion

Human decision-making and behaviour are complicated. There are still many questions about the most efficient and sustainable approaches to behaviour change, especially if we are to change ingrained patterns of natural resource consumption that are so crucial to developed, consumption-driven economies. This complexity has evolved from purist "rational choice" models of human behaviour to much more nuanced theories of behaviour that capture psychological and sociological insights. In contrast to the revolution taking place in other fields, the behavioural and social sciences have maybe been neglected in the environmental field, but new initiatives have started to do just that. We do not claim that a single, all-encompassing theory of design will exist or even that such a theory would be the best theory. Instead, we propose that further work is required to transform the growing body of insights, models, and theories into useful tools that are readily available to and understandable by, practitioners all across the world. It has been discovered that one method to start doing that is to give some convincing instances of how these technologies are being used to alter people's behaviour in order to lessen global warming. The social and behavioural sciences teach us that emotional appeals, social incentives, and choice architecture are three additional "levers" to impact behaviour that are particularly promising to motivate and facilitate behaviour change for climate change.

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