**The Necessity of Ecological Management to Sustainably Mitigate Climate Change**

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**Abstract**

First, any analysis of climate change warrants a basic discussion of the reality of the situation and a mild refutation of the erroneous notions regarding the existence of unfortunate climate phenomena and their anthropogenic nature. This must come jointly with a description of the basic science behind climate change, namely the greenhouse effect. Second, the proximate cause of said harms necessitates its own evaluation, in order to come to terms with the definitive issues that must be address in regards to a solution to the climate problem. Finally, this analysis of structural harms of climate change meets their proximate causes in a comparative analysis of the plausible sustainable transitions from the unrestricted nature of modern American society towards the climate. This brings the conclusion forth that macro-level management of the environment is the only method of mitigating both the causes and harms of climate change.

**The Status Quo**

The first inquiry commonly used to stifle any discussion of solutions to climate change is whether it is even real. There is no doubt that this question held a good degree of value when signs of climate change first arose in the early 20 century. This speculation included However, a great deal of time has passed, and with it a great deal of additional analysis and research has come forth to prove the validity of climate change.

The basic science behind climate change is found in an important phenomenon known as the greenhouse effect. The idea behind it is that carbon dioxide and other greenhouse gases form a blanket around the earth, that keeps some sunlight from entering and some sunlight from leaving the atmosphere. This layer surrounding the planet is not bad for the environment in any intrinsic way, just as a blanket to keep someone warm is not bad at night. The real issue with the greenhouse effect is that more gases, specifically and mostly carbon dioxide, than can be absorbed by the earth are emitted by human use and increase the intensity of the planetary blanket such that too much sunlight is contained within the earth’s atmosphere, and thus the globe heats.⁠1 This theory has sustained its quality and support for decades and shows no signs of failure to predict the nature of climate change.

The greenhouse theory has clear, recent, and indisputable evidence supporting it. The National Oceanic and Atmospheric Administration has collected data on the proportion of carbon dioxide in the cores of glacial structures for decades.⁠2 These cores show the changes in carbon dioxide levels in the atmosphere over the course of the past 650,000 years, and the carbon density near the top shows that the amount of carbon in the atmosphere had never passed 300 ppm until 1950, following a century of industrial expansion. This proportion recently crossed 400 ppm in 2014.

The greenhouse effect is not only clearly correlated to human cause, but also its effects are clearly evident. The global sea level has rose 17 centimeters during the last century,⁠3 showing that the increased sunlight held within the atmosphere is melting arctic sea ice.⁠4 The snow present on many mountains throughout the northern hemisphere has substantially declined as well, showing a trend over the course of the last five decades.⁠5

The much more reasonable and evidence driven argument countering solutions to climate change is the theory that it might not be caused by humans but rather is a result of other uncontrollable phenomena such as increased sunlight or processes not yet known by humans. The problem with the sun hypothesis is that an increase in sunlight would have an equal effect of heating all parts of the earth’s surface; rather, the northern hemisphere has experienced significant cooling recently while the southern hemisphere has had record high temperatures.⁠6 Additionally, numerous studies show that the intensity of sunlight over the past 250 years has actually declined and been intermittent over the past 250 years, meaning that the earth should be net cooling if the sun was controlling the current climate crisis.⁠7

Finally, even if all evidence and all possible arguments surrounding climate change were irrelevant, there is a vast consensus among scientists that the climate crisis is real and anthropogenic, including all U.S. scientific government agencies, 18 American scientific societies, and the Intergovernmental Panel on Climate Change.⁠8 The facts are clear, and the argument is over. It’s time to discuss solutions.

**On Inevitability**

The discussion on how to end the harmful consequences of climate change generally falls between two large theories of environmental sustainability: that humans must abandon industrial expansion and return to the roots of society, and that humans must find ways the incorporate a solution to climate change within a larger process of stabilizing the development of the world’s natural resources. The issue with industrial regression is that it cannot stop the harms of climate change that are already inevitable due to human activity.

Human emissions have created pools of carbon dioxide in the atmosphere that are unlikely to disappear for 1,000 years. This means that the greenhouse effect cannot be reversed by simply stopping emissions of carbon; rather, it can be stopped from becoming worse. This means that the trapping of sunlight in the earth’s atmosphere will continue unabated regardless of future human actions.⁠9

In addition to the inevitability of the consequences of the greenhouse effect, the earth itself has fallen prey to another cycle which makes mitigating the effect of climate change difficult. Positive feedback loops occur when global warming causes other parts of the climate to shift which exacerbate the rate of climate change. As polar ice melts, its place gives way to the dark arctic sea and trillions of compounds of methane gas. This not only releases huge quantities of greenhouse gases, it also increases the speed of oceanic temperature rise as the dark sea absorbs much more sunlight than the bright white arctic glaciers.⁠10

In light of the inevitability of the negative consequences of climate change, it would not be productive to abandon modern society and seek a pre-industrial world. This does not mean that a substantial reduction in carbon emissions would be bad; rather, it must continue in coordination with a much larger challenge to the climate crisis on a macro-political scale.

**On Management**

Once one understands the situation at hand with climate change, it is clear that the final goal of ending it is not a viable short term strategy. While it may become possible in the future to vastly reduce the levels of greenhouse gases in the atmosphere, it is clear that catastrophic warming events and climate disasters will continue in the coming years. The most important part of the solution to current climate events is making sure that civilization survives and thrives long enough to create a solution to the climate crisis.

The main target of modern climate disasters is the infrastructure that connects and supports modern society. Extreme weather such as storms erodes roads, highways, and bridges by damaging the supports of infrastructure.⁠11 Flooding is already a constant threat to tens of thousands of roads throughout the United States, and threatens to bring them to unusable quality in only a few years. Heat waves damage the functionality of many basic infrastructural elements, such as expanding the components of rail hinges, causing train derailments.⁠12

These issues can be mitigated if not entirely resolved through organizational strategies that adapt the structure of society to withstand the impacts of global climate change. One example of this is the elevation of transit systems. Highways, roads, and mass transit systems can all be elevated to avoid most flooding.⁠13 Another example is realignment of major traffic areas. Important roads as well as business centers can be relocated to less vulnerable areas away from flood and heat wave zones to avoid personal, property, and public damages. Finally, confrontational strategies such as blockages and walls can be used to block floods and excessive perspiration.⁠14

The most important part of these strategies is not the technology or the science behind them, those have been mostly sorted out; the issue is one of planning and management. Government bureaucracy and regulation have commonly become associated with evil, yet there is really no question that every interest group stands to benefit from intervention to protect societal structures from decay due to short term climate events.⁠15 Anyone can put a stone in the way of a flood, but only the government can build a wall.

Not only is the extent of government action needed, but also its organizational power. There are many different stakeholders and communities who would be affected by an adaptive strategy to climate events, and each would need to be united into a concerted effort to make the process effective.⁠16 The climate is not confined by political districts or boundaries, and thus only a macro-level government approach can hope to take into account the scope of climate disasters.

Given the inevitability, existence, and magnitude of short-term climate events, only a macro-level, management-driven, adaptive approach can hope to maintain the fabric of society long enough for a final solution to climate change to emerge.

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