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Original Articles

Global Climate: Much more complex than measuring Greenhouse Gases and Carbon Footprints

Clima mundial: Mucho más complejo que medir gases de efecto invernadero y la huella de carbono

Wellington E. Wonsang[1] https://orcid.org/0000-0003-3936-9705

[1]*LifeWork Adapter., LLC.*, Killeen, TX, USA
wonsangwellington@gmail.com

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Abstract

This article analyzes the assertion that 97% of climate scientists concur that humans are the primary driver of global warming and climate change, significantly contributing to rising temperatures. The study examines common myths about climate change, the standard arguments against it, and the perspective and solutions offered by representatives from all sides of the debate. While researching this topic, primary and secondary sources are examined by analyzing their content, including interviews and arguments from credible experts within a wide range of sources, from climate change advocates to deniers and "climate doomers." While most climate scientists agree that human activities contribute somewhat to global warming, many highly reputable scientists and groups rightfully challenge this consensus and the proposed data. This includes prominent academics, corporate figures, and respected Nobel Peace Prize laureates and their works. In conclusion, all perspectives are driven by their concern for the future and survival of humanity and our planet.

Keywords: climate change, global warming, deniers, consensus, climatology, energy.

Resumen

Este artículo analiza la afirmación de que el 97% de los científicos climatólogos coinciden en que el ser humano es el principal impulsor del calentamiento global y el cambio climático con un importante contribuyente al aumento de las temperaturas. El estudio examina mitos comunes sobre el cambio climático, los argumentos estándar contra el cambio climático, y la perspectiva y soluciones ofrecidas por representantes de todos los lados del debate. Durante la

Summary: Introduction, Materials and Methods, Results and Discussion and Conclusions.

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investigación de este tema, se examinan fuentes primarias y secundarias analizando su contenido, incluyendo entrevistas y argumentos de profesionales encontrados dentro de un amplio rango de fuentes que van desde defensores del cambio climático, negacionistas y catastrofistas del clima. Aunque la mayoría de los científicos del clima coinciden en que las actividades humanas contribuyen en algo al calentamiento global, muchos científicos y grupos de gran reputación cuestionan con razón este consenso y los datos propuestos. Entre estos prestigiosos profesionales se encuentran destacados académicos y personalidades empresariales, así como respetados Premios Nobel de la Paz y sus obras. La conclusión es que todas las perspectivas están apasionadas por su preocupación por el futuro y la supervivencia de la humanidad y de nuestro planeta.

Palabras clave: cambio climático, calentamiento global, negacionistas, consensos, climatología, energía.

Introduction

I have always found it disingenuous and worrisome when the Mainstream Media (MSM) and high-profile individuals start echoing scripted talking points like "This is extremely dangerous to our democracy." and "If you have been vaccinated and taken the recommended booster shots, you are not going to get infected or become a carrier." So, when I hear these same people saying that "about 97% of climate scientists have concluded that humans are changing the climate" (Molina et al., 2014, p.2), my level of concern tends to increase, and my mind understandably goes into high alert mode.

The materials used to develop this article varied widely, including academic writings, governmental and NGO documents, and reputable peer-reviewed journals. The keywords used to generate much of the information encompassed a myriad of combinations, using terms such as climate change, global warming, climate change deniers, conspiracists, consensus, and majority. In addition to traditional sources, content from expert interviews representing both sides of the debate was incorporated. The material also encompassed several impressive collections of reasons why humans are the leading cause of climate change, debunking common myths about global warming, an extensive list of highly respected climate change deniers, and even common arguments against the "consensus." This emotionally charged, thought-provoking, and occasionally uncomfortable article is intended to prompt you into researching some of the sensitive topics it brings to light.

Materials and Methods

This study aims to present an analytical perspective of the key sides of the climate change debate. Content analysis is conducted using primary and secondary sources. The research examines the content of various academic works and media content, including interviews and arguments from recognized experts found through prestigious sources, including climate change proponents, skeptics, and doomsayers.

The main search keywords were: "climate change" OR "global warming" AND ({climate change deniers} OR conspiracists) AND (consensus OR majority). In addition, this comprehensive content analysis also incorporated media materials featuring interviews with experts from both perspectives of the debate.

Voices from both sides of the climate change debate are presented with the inclusion of currently overlooked perspectives, such as those of the deniers. The author relies on academic databases, journals, and media sources for this analysis. With a content-driven and

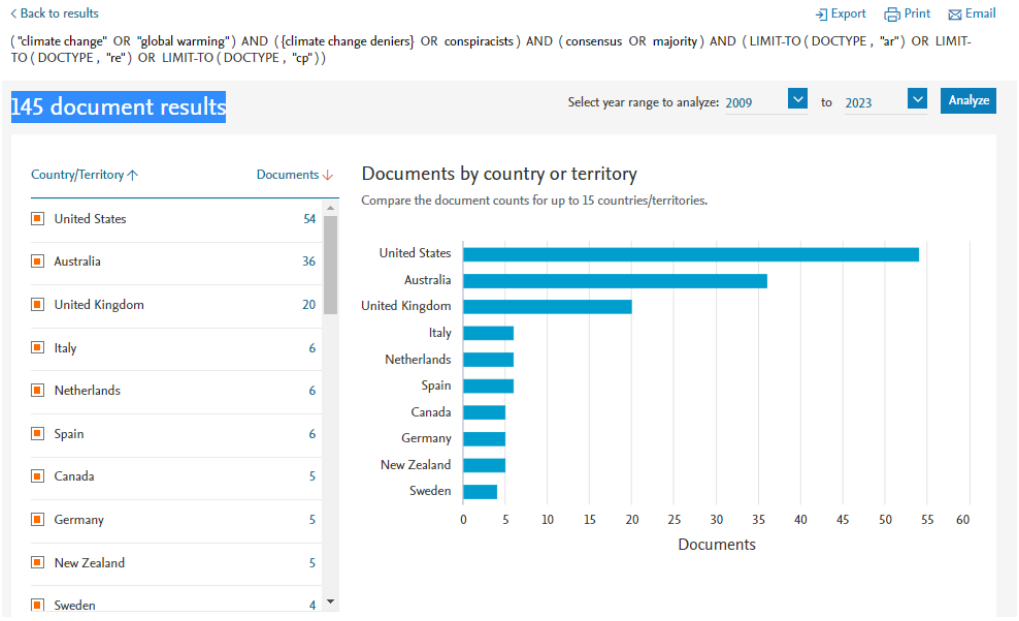
critical analysis approach, tables and figures are used to guide the readers to consider what is beyond the common and standard discourse on climate change, also known as global warming. Finally, this article concludes with the author's reflective stance.

Results and Discussion

The first source search was conducted through an academically accepted search engine, Scopus Elsevier. After applying the search keywords, the search yielded 145 documents from 2009 to 2023. Most contributions were from the United States, Australia, and the United Kingdom (Figure 1).

Figure 1

Document results by country



Source: Scopus SciVal Publication Set Trends Report

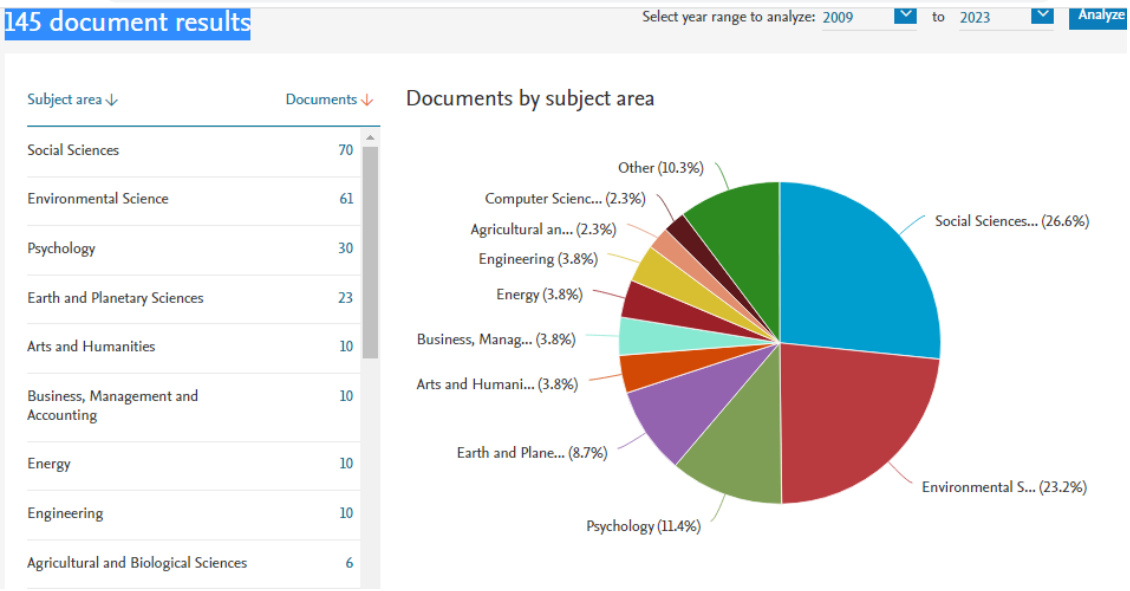
The list of prominent authors that resulted from this search included M.J. Hornsey, K.S. Fielding, S. Lewandowsky, A. Godwin, and E.A. Harris, among others. However, it is notable that none of the known climatologists were included, like M. Ghil, J. Curry, A. Jenkins, T. Harris, J. Christy, W. Harper, S. Manabe, K. Hasselmann, or G. Parisi. Figure 2 offers a view of the area of knowledge of the publications, which sheds light on this observation: most of the publications were in Social Sciences, Environmental Science, and Psychology, with fewer numbers on Earth and Planetary Science and none on the area of Climatology per se.

Upon reviewing the content of those sources, we can start by suggesting that stances on climate change have followed a political agenda. Studies have shown a pronounced gap between those who identify with right-wing politics and those who align with left-wing politics regarding climate change beliefs and policy support. In two experimental investigations with 126 and 646 participants, respectively, the effect of the politics of climate change on the movement around these inequalities was explored (Unsworth & Fielding, 2014). Results indicate that individuals who openly express their political identity are less likely to believe in an anthropogenic origin of climate change and less likely to support government-driven climate change actions compared to those who do not overtly reveal their political affiliations. The

findings highlight the significance of one's political identification in shaping attitudes and ideas, even regarding climate change.

Figure 2

Document results by Area



Source: Scopus SciVal Publication Set Trends Report

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for evaluating the science related to climate change. Their assessments arm governments with scientific insights they can use to create climate policies based on data points provided by "reputable scientists." IPCC assessments are key talking points at international negotiations addressing climate change initiatives and a foundation for creating climate policies and regulations. The IPCC reports are drafted and reviewed in several stages. This guarantees objectivity, transparency, and credibility (IPCC, 2023). Therefore, the IPCC stands as one of the most consulted authorities for information on climate change.

Similarly, studies examining climate change beliefs present challenges for academics, practitioners, and policymakers. A meta-analysis of the factors associated with climate change denial combined data from 25 polls and 171 academic research from 56 different countries to study 27 variables (Hornsey et al., 2016). The study concluded that beliefs, ideologies, worldviews, and political orientation proved to be more robust predictors of outcomes compared to numerous intuitively appealing variables, such as education, sex, subjective knowledge, and experience with extreme weather events. Furthermore, those beliefs about climate change demonstrated a mild to moderate influence on people's willingness to take climate-friendly actions.

Studies asserting that conspiracy theories and conservative ideology play a role in fostering skepticism about human impact on climate change are largely based on data gathered in the United States. Therefore, rather than being a global occurrence, it is claimed that the ideological basis of climate change views is unique to the United States (Hornsey et al., 2018), as the United States exhibited stronger and more consistent positive correlations between ideological indices and climate skepticism than the other 24 studied countries. This suggests that Americans are particularly influenced to evaluate climate research through the lens of their American political culture rather than those of other countries.

Furthermore, the disparity between the consensus among scientists and the public is alarmingly wide. A study shows that more than one-third of polled Americans doubt that humans are mostly to blame for rising temperatures leading to climate change. Hornsey and Fielding (2017) suggest that opposition to a message supported by evidence stems from illiteracy or a lack of understanding of the evidence, which mirrors the "deficit model" of scientific communication and introduces the idea of "attitude roots," which are the underlying anxieties, ideologies, worldviews, and identity needs that sustain and motivate particular "surface" attitudes like creationism and climate skepticism. The study proposes a "jiu-jitsu" model of persuasion, which employs those attitude roots instead of combating them to effect change.

Therefore, communication strategies play an important role in shaping people's thinking toward climate change. For scientists, policymakers, and communication strategists, engaging the public in reducing or adapting to the hazards posed by climate change presents considerable obstacles. In light of these challenges, audience segmentation emerges as a potential approach to create more persuasive communications that are personalized and targeted to subsets of the public who share comparable values, beliefs, habits, and/or policy preferences regarding climate change (Hine et al., 2014). The conclusion of this study indicates that audience segmentation and focused messaging are generally useful methods that could improve climate change communication, thus suggesting careful attention to conceptual and methodological challenges when conducting and analyzing the findings of segmentation studies. Finally, the study advocates the need for further research on tailoring and targeting messaging to certain demographics.

Top Five Reasons Why Humans Are the Leading Cause of Climate Change

As found in the European Commission's website on Climate Change (n.d.), these are the top five leading reasons for human-driven CO_2 emissions, according to the European Commission General Directorate for Climate Action (Table 1).

Table 1

European Commission's List of Greenhouse Gas Producers

a) Burning coal, oil, and gas	These products produce greenhouse gases such as Carbon Dioxide (CO_2) and Nitrous Oxide (N_2O).
b) Cutting down forests or deforestation	Deforestation and elimination of other plant life build up Greenhouse gases, reducing the environment's capacity to regulate the climate by absorbing CO_2 from the atmosphere. When trees and other plant life are cut down, the beneficial effect of releasing Oxygen (O) back into the atmosphere is lost, and the carbon stored in the plants is released into the atmosphere, adding to the greenhouse effect.
c) Increasing livestock farming	Cows and sheep produce large amounts of methane when they digest food. N2O emissions increase the production of greenhouse gases primarily by body gases released when the livestock eructate. Eructation is when animals release air or gas from the stomach or esophagus through the mouth.
d) Fertilizers containing Nitrogen (N)	Using these fertilizers increases the production of N2O emissions, increasing the production of greenhouse gases.
e) Fluorinated gases include N_2O and Methane (CH_4)	These gases are emitted from equipment and other products that use these gases. Such emissions have a strong warming effect on our atmosphere, up to 23,000 times greater than CO_2, another standard greenhouse gas.

Source: Own elaboration

Debunking Common Myths About Global Warming

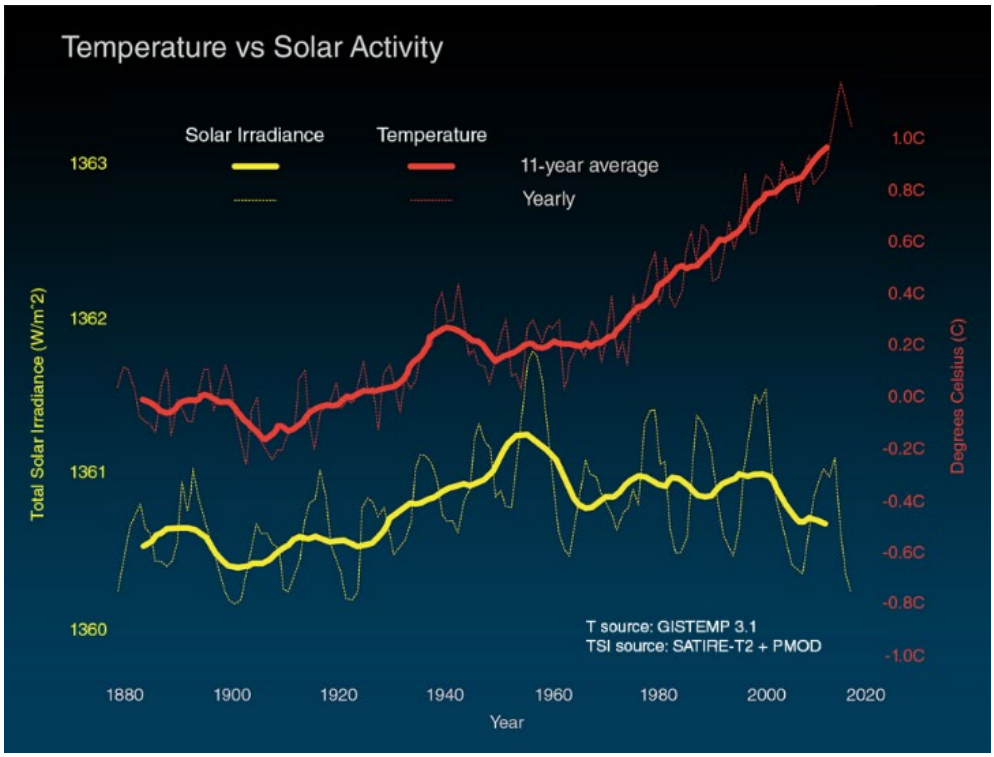
Climate scientists Dr. Deepti Singh and Dr. Benjamin Cook debunked thirteen myths about Global Warming (Insider Science, 2021). With all the disinformation being shared for political reasons, manipulating public opinion to shape policy, and advancing the agenda of lobbyists and special interest groups, it is worthwhile to explore a few of these "myths" that have been discredited.

Myth #1 – The sun is responsible for Global Warming.

Even though energy given off by the sun affects Earth's climate, the amount of energy we get from the sun has not changed significantly over the past 150 years. The following graph, elaborated and provided by NASA satellites (Figure 3), shows no correlation between the sun's solar activity, which has remained largely consistent over time, and the increasing global temperature of the Earth.

Figure 3

NASA's Correlation Graph: Temperature vs Solar Activity



Source: NASA Goddard Institute for Space Studies

Myth #2 – Scientists disagree on what causes climate change.

An extensive review of published literature in reputable journals by esteemed scientists reveals unanimous agreement that human activity impacts Earth's temperature. The matter of just how much is where much of the debate occurs. However, all research and data indicate that human activity does affect global warming.

Myth #3 – Global Warming is caused by cow farts.

First of all, cows burping, not flatulence, causes Greenhouse Gases. *Agriculture, forestry, and other land use* represent 24% of the United States' carbon footprint, as reported by the IPCC (2014), slightly below *Electricity and heat production* with the highest percentage (25%). In comparison, *Buildings* account for the smallest share at 6% (IPCC2014; Newsham, 2018).

Myth #4 Plants and Animals will adapt.

A century ago, this assertion may have been true. Today, other factors make it more challenging for plants and animals, such as the pace of change, habitat fragmentation, environmental pollution, and other stressors.

Myth # 5 Social Media Myths – Global Warming is Natural

Although the climate and the temperature have indeed been changing throughout history, there have been other eras marked by diverse climates, such as the age of the dinosaurs and the last Ice Age.

Myth #6 Carbon Dioxide is the problem.

CO_2 in itself is not the primary concern; rather, the issue arises from its increased concentration in the atmosphere. The pockets of concentrated CO_2 have caused a rapid rise in temperature over the last 100 years. It began to increase during the first Industrial Revolution, which transitioned from creating goods by hand to using machines. Scholars widely debate its start and end, but the period generally spanned between 1760 to 1840 (Wilkinson, 2022). Preceding this era, CO_2 levels were around 208 parts per million. Then, the second Industrial Revolution followed from 1867 to around 1914 (Longley, 2021).

Myth #7 A few degrees difference is not a big deal.

Bakers and doctors understand what difference a few degrees can make in preparing a meal or a patient's well-being. In the context of human health, the ideal body temperature is 98.6º Fahrenheit (37º Celsius). If the body is one or two degrees warmer, it is classified as a low-grade fever, while an increase of three to four degrees can signify a serious illness. Most of the Earth's population does not have air conditioning and would not manage well without air conditioning or a good fan. Even a shift of two or three degrees, and the body feels it. The same happens with the Earth's ecosystem.

Myth #8 Global Warming will destroy the Earth by the year 2030.

As disruptive and dangerous as many presume climate change deniers to be because they challenge the 'consensus", climate doomists are equally, and some may say excessively more, perilous. Climate doomists like Greta Thunberg, Alexandria Ocasio Cortez, Leonardo DiCaprio, Justin Trudeau, and Mark Ruffalo exemplify the other extreme of the spectrum. They fervently proclaim predictions of Earth's destruction by 2030, creating anxiety and panic. Since climate doomists are more vocal and often have celebrity status, they are more adept at swaying public opinion and applying immense pressure to convince politicians and policy setters to spend billions on implausible hypotheses based on their popularity instead of certifiable scientific evidence.

Myth #9 Global Warming is China's fault.

Given that Greenhouse gases can linger in the atmosphere for many years, if not centuries, the existing carbon footprint results from the residual impact of America and Europe's Industrial Revolutions. China's emissions are parallel to those of the United States, but the predominant portion of the atmospheric content is presumed to be from the U.S. and Europe. It is important to remember that when the weather was considerably colder, the CO_2 in the atmosphere was 1300% higher than its present level today (Butos & McQuade, 2015).

Myth #10 Renewable energy is too expensive to be realistic.

While it is true that renewable energy is becoming cheaper, when people begin to delve deeper, they discover that taxpayer-funded subsidies facilitate these cost reductions. Nevertheless, increased competition in that market space, better quality of production, and

more proficient logistics have also contributed to lowering prices. However, the more significant issue remains: the industry, as a whole, is still being heavily subsidized by taxpayer dollars. Whether individuals participate in the shift to renewable energy or not, all share this financial burden. Another issue is that mining raw materials and manufacturing processes still require electricity, fossil fuels, and transportation via truck and train. It also requires manufacturing, which adds to the carbon footprint.

Myth #11 Extreme weather is not caused by Global Warming.

Since some regions of the planet, like the United States, have historically experienced extreme weather, this assertion needs to be revised. However, it must be acknowledged that the effects of these extreme weather events are affected by the warming trend, much of which, but not exclusively, was caused by human activities. Even though human beings cannot dictate the cessation of such events through legislation or payments, we can still use common sense and practice good stewardship over the Earth's resources.

Myth #12 The temperature record is unreliable.

Scientists have been collecting and documenting weather data for nearly two centuries, and today nearly half a dozen independent groups worldwide have been collecting temperature readings from thousands of thermometers worldwide. For nearly two centuries, the estimated changes in global temperatures have exhibited consistency across various sources. The collected data are publicly available for anyone to review and study.

Myth# 13 It is too late to do anything about it.

While ant climate change-related catastrophes might take centuries to occur, there are plenty of protective measures we can take to avoid these potentially "imminent" scenarios. These include avoiding the purchase of energy-intensive meat products, with government policies minimizing electricity and fossil fuels for mining, manufacturing, and transportation, and allocating funding for universities to create new and innovative alternatives to fossil fuels.

Climate Change Deniers

The label "climate change denier" is given to anyone who rejects or expresses skepticism toward the general scientific consensus on climate change, global warming, and its causes. While most climate scientists agree that human activities contribute to global warming, many highly reputable scientists, including highly respected Nobel Prize laureates and groups, rightfully challenge this consensus and the proposed data.

Dr. Simon Clark and his documentary Global Warming: An Inconvenient History

Dr. Clark made a documentary detailing the birth, misinformation, and scientific propaganda of the origins of Climate Change (Clark, 2022). In his documentary, he mentions how many people were under the assumption that in 2006, former Vice President Al Gore introduced the topic of Climate Change. Vice President Gore made a documentary called, *The Inconvenient Truth* and introduced it into mainstream consciousness, making it a household discussion topic, birthing many concerns, and giving rise to many radical activists.

Dr. Clark's academic journey led him to Harvard University in 1965. In his senior year, he studied under a professor named Dr. Roger Ravel, a doctoral candidate at the University of California Berkley. Dr. Ravel was instrumental in writing and creating a book titled, *The International Geophysical Year of 1957*. Additionally, he was the project lead on the study of nuclear detonations on Bikini Atoll and developed the Scripps Oceanographic Institute, where he studied how the oceans absorbed CO_2 and eventually was able to amass a fleet of research

vessels that exceeded the size of many navies. He studied how the oceans absorbed CO_2, which determined how much CO_2 was present in the Earth's atmosphere.

Dr. Clark extended his exploration by producing a follow-up documentary called, *The Many Errors of An Inconvenient Truth* (Clark, 2023). Coinciding with Vice President Gore's receipt of the Nobel Peace Prize for his documentary, *The Inconvenient Truth*, the governments of England, Scotland, and Wales started a project to distribute information about climate change to secondary schools. This initiative gave rise to a group, led by Stewart Dimmock, that filed a case in the U.K.'s High Court of Justice in England and Whales related to the appropriateness of the government's distribution of Al Gore's climate change documentary along with his accompanying manual, "Guidance Note" to English state schools as educational material (Stuart Dimmock v. Secretary of State for Education and Skills, 2007). The claim stated that the government-funded project was an attempt to "politically indoctrinate children." (Dimmock v. Secretary of State for Education and Skills, 2007). While acknowledging that The Inconvenient Truth was "substantially founded upon scientific research and fact, "Justice Michael Burton also recognized that "even if the science was used, in the hands of a gifted politician and communicator, it is to make a political statement and to support a political program." He also determined that the movie advances four primary scientific hypotheses, each of which is backed up by substantial evidence from studies that have been published in respectable, peer-reviewed publications and are consistent with the most recent IPCC conclusions. Nevertheless, the justice did identify nine errors in the film. Dr. Clark broke categorized them into three categories and identified an additional error the judge could not have known about; therefore, it was not included in the court case. See Table 2

Table 2

Justice Michael Burton Categories of Errors

CATEGORY	DESCRIPTION
Category One – Sensationalism	• Greenland melting: Sea levels could reach a seven-foot sea level rise. Gore fails to mention that this catastrophe would take centuries to occur. • Polar Bears drowning: The Polar Bears found drowned were killed by an exceptional event created by a storm. • The Evacuation of the Pacific Islands: Unfounded as the sea level raising 30 cm since 1950. No actual evidence was found for evacuations at this time.
Category Two – Attribution	• Hurricane Katrina: The hurricane may have happened despite Global warming trends. No evidence was available that it did. • The Drying of Lake Chad: Climate change can lead to a lake drying up, but there was no direct evidence that it was the cause. • The Snow Melting on Mount Kilimanjaro: One is highly unlikely to assign climate change as the reason for the snow melting on Mount Kilimanjaro.
Category Three – Insufficient Evidence	• CO_2 and Temperature Correlation: Dr. Thom Harris shared proof from Carlton University that the historical geologic evidence he and others had been finding. The evidence had proven no consistent correlation between CO_2 and Earth's Temperature. He had also shown that when the weather was considerably colder, they discovered that CO_2 was 1300% of what it is today. • Coral Reef Bleaching: No substantial evidence was available at the time. • Gulfstream Shutting Down: The evidence at the time did not support Gore's claim.

Source: Own elaboration from the Dimmock v. Secretary of State for Education and Skills 2007 Case

Dr. Tom Harris – President of the International Climate Science Coalition and former Climate Alarmist

As an Aerospace Engineer, Dr. Harris used to give speeches and write articles that drew parallels between the environmental conditions on Venus and potential scenarios on Earth unless significant changes were made (Fox News, 2022). One day, a Geology Professor from Carlton University reached out to him and said that he was impressed with his work but that his statement about Venus was wrong. He told Dr. Harris that what happened on Venus could not physically happen on Earth and even invited Dr. Harris to his campus lab for a detailed explanation. The Geology Professor shared historical geologic evidence that undermined the notion of a consistent correlation between CO_2 and Earth's Temperature. He showed that when the weather was considerably colder, CO_2 was 1300% of what it is today. Subsequently, Dr. Harris was exposed to many people who supported this alternative perspective. He learned that thousands of scientists had come to the same conclusion, exemplified by the report titled *Climate Change Reconsidered: The Report of the Nongovernmental International Panel on Climate Change (NIPCC)* (Singer & Idso, 2009). Consequently, Dr. Harris transitioned from a climate alarmist to a denier of climate change.

Dr. John Christy - an American scientist at NASA's Jet Propulsion Laboratory

Dr. Christy acknowledges the evidence that extreme weather events have been more frequent in recent years and admits that human activities have left trace evidence of temperature increases. However, his data indicate that the impact is negligible. He says, "It is a small fingerprint, not a large footprint." (NASA Goddard, 2013). The weather history of the United States has consistently indicated that extreme weather has been a part of the nation's climate fabric. However, there has not been a steady uprising. Turbulent weather, such as floods, droughts, tornados, hurricanes, and forest fires, have persisted throughout history. Dr. Christy further acknowledges that shifting weather patterns have led to the melting of sea ice, rising sea levels, and an increased risk profile for those residing in the United States.

Furthermore, Dr. Christy recognizes that our world is warming and that humans do contribute to this phenomenon. However, while acknowledging humans' impact on the planet's warming trend and that human activity affects the planet's temperature, he also underscores our role in the overall warming trajectory since it is just not significant enough to cause alarm.

Dr. Judith Curry – Current CEO of the Climate Forecast Application Sector

Dr. Curry, an American climatologist and former Chair of the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology (BizNewsTv, 2022), has been instrumental in revealing how much of the warming trend can be directly attributed to humans and why motivating the scientific community to reach a "consensus" around "climate change" in such a relatively short period was crucial. However, much of the urgency and importance around creating a consensus was being politically driven to initiate policy change, financial gain, and influence wielded by lobbyists and special interest groups. Terminology also takes on a new level of importance as the labels for the consensus transitioned from global warming to climate change and global heating. With each rebranding event, the names become more ominous and foreboding. Dr. Curry also warns about the dangers of transition risk, which is the risk of rapidly getting rid of fossil fuel while rushing headlong into relying solely on solar and wind too quickly. She also underscores the challenges associated with solutions such as *Hydrogen Backup*, creating a workable infrastructure, and developing innovative alternatives, all of which lie decades away. She strongly advocates that "between today and 2050, we must focus our efforts on technological development and experimentation." Dr. Curry also encourages us to work collaboratively with different countries and states and experiment with different things to identify what works effectively. She suggests that our transition must be

economically sound, well-planned, executed, and responsibly done. Thus, transitioning will require more electricity, mining, and drilling. She adds that wind and solar are "a near-term solution and niche solution for some places, is not a long-term global solution."

Dr. William Happer – a Physics Professor at Princeton University specialized in the study of Atomic Physics, Optics, and Spectroscopy

Dr. Happer was interviewed on Climate Physics (Ammous, 2022), where he claimed that there is "no overwhelming consensus.". He added that about half of meteorologists are still unconcerned about global warming despite years of propaganda and even employment-related pressures. Furthermore, he stated that the alignment of theoretical predictions with observable data serves as a more robust measure of the validity of scientific theories than mere consensus. He highlights that the "pause" or "hiatus" in warming that has been noticed since around the year 2000 was not predicted by nearly any climate models. He also mentioned that in conventional science, scientists would attempt to identify the mistakes and correct the incorrect models. Dr. Happer pointed out that many alarmists are working hard to manipulate the observational data to make it coincide with the models' inaccurate forecasts.

In the same interview, Dr. Happer made an assertion about "scientists with a more objective approach." Despite a substantial annual federal spending of around $20 billion on climate change, their accomplishments remain relatively modest. He reckoned some climate scientists are producing commendable results, such as accurate measurements of the atmosphere and oceans. However, he highlights the challenge they face due to the intensity of backlash anticipated for those who dare to deviate from the established narrative. Finally, he concluded that most people who have doubts about climate concerns should keep them private.

Nobel Peace Prize Laureates

In addition, some recipients of the Nobel Peace Prize have also challenged the prevailing consensus, for example, Albert Einstein, Marie Salomea Skłodowska–Curie, and Wilhelm Conrad Röntgen. Furthermore, Syukuro Manabe, Klaus Hasselmann, and Giorgio Parisi, the first in Climatology to receive the Nobel Prize in Physics in 2021, are among the climate scientists against the consensus. This recognition was attributed to their groundbreaking work in physically modelling Earth's climate, quantifying variability, and reliably predicting global warming. Their prominence helped attain prestige and legitimacy in the Climate Sciences and discipline.

Common Arguments that Contradict the Consensus

Hand-in-hand with their groundbreaking achievements also emerged opposing viewpoints that brought forth sound arguments against their positions. Given the plethora of negative comments, here are the five most common arguments, points, and counterpoints. These debates between Climate Change Deniers and the larger Climate Scientific Community, which challenges the consensus, are summarized in Table 3.

It is important to acknowledge that the IPCC and numerous scientific bodies worldwide support the arguments presented by climate change deniers. The consensus asserts that human activities drive global warming and emphasizes the need to take measures to mitigate its impacts. However, it is not often mentioned the actual impact of other factors.

Also, it is essential to highlight that equilibrium theories have been crucial for understanding climate change's economic and climate aspects. However, recent developments in macroeconomic literature emphasize the need to consider natural climate variability. One is the CoCEB-S model, a coupled climate-economy-biosphere model that highlights the

effectiveness of mitigation strategies like low-carbon technologies, deforestation reduction, and carbon capture and storage (Ogutu et al., 2022).

Table 3

Common Arguments of the Consensus Debate

Argument	Point	Counterpoint
Natural Climate Variability	Some skeptics argue that natural processes primarily drive climate change and that human activities play a minor role. They suggest that Earth's climate has always undergone natural fluctuations, and the current warming trend is within the range of historical variability.	Scientific studies have shown that the current rate of warming is unprecedented and cannot be explained by natural factors alone. The influence of human activities, particularly the emission of greenhouse gases, has already been demonstrated (Ghil, 2002; IPCC, 2023).
Temperature Plateau or Cooling Trends	Skeptics often point to short-term temperature fluctuations or cherry-pick data to argue that global warming has stopped or that cooling trends exist.	Climate scientists look at long-term trends and global averages, consistently showing a warming climate. Short-term variations, such as natural climate oscillations or volcanic eruptions, can temporarily affect temperatures but do not negate the overall warming trend (Jenkins, 2009).
Climate Models' Inaccuracy	Some Skeptics claim that climate models used to project future climate scenarios are flawed or inaccurate.	While models are imperfect, they have proven valuable tools for understanding the climate system and have successfully replicated past climate changes. In addition, they provide projections based on different emission scenarios and help inform policymakers about potential future impacts (Cho, 2023).
Natural Causes of Climate Change	Skeptics may emphasize natural factors, such as solar activity or cosmic rays, as the main drivers of climate change.	However, extensive research has shown that these factors cannot account for the observed warming trends over the past century. Multiple lines of evidence consistently attribute the most recent global warming to human activities (Turrentine, 2022, IPCC, 2023).
Data Manipulation or Conspiracy Claims	Some skeptics argue that climate scientists manipulate data or engage in a global conspiracy to promote a particular agenda.	These claims are not supported by evidence and are often based on misinterpretations or misrepresentations of scientific practices. The scientific process involves peer review, transparency, and rigorous scrutiny to ensure the accuracy and integrity of research findings (Michaels & Burnett, 2019).

Source: Own elaboration

The history and effects of scientific consensus-building efforts by the Intergovernmental Panel on Climate Change (IPCC) about perilous anthropogenic climate change were examined by Curry and Webster (2013). They claim that the philosophy of science and the social and psychological problems that contribute to prejudice are used to create a broad view of consensus that influences policymaking. They suggest a stand based on scientific research would be the best way to improve decision-making and enhance the interface between climate research and policy. In the same vein, Butos and McQuade (2015) provide evidence of a biased approach toward the consensus and state there is no denial of the effect of human action on the environment but its arguably significant effect on climate variations.

Conclusions

While human activities certainly contribute to temperature increases in certain regions of the planet, it is important to acknowledge that many highly reputable scientists and groups rightfully challenge the extent of human impact, especially compared to other natural contributing factors. The existence of a consensus can also often create resistance or prejudices to the ideas or positions of the minority. Within the dissenting group, one can find reputable professionals, prominent academics, including Nobel Peace Prize laureates, and famous personalities such as celebrities and policymakers. Given the rising popularity of social media, influencers, celebrities, politicians, and activist groups wield considerable influence over their followers and the general public. Social media also affects how people think, spend money, and vote. The Internet provides them with a robust platform where almost any information posted gains instant credibility and interest, often leading to ignorance, false presuppositions, and the misguidance of individuals who do not often do their own research. Historically, being in the majority has not guaranteed to be right or the optimal preparation for a better future. The dominance of a consensus often results in the neglect of innovations and advancements of the minority, whose ideas are discredited or labeled as conspiratorial. In the case of climate change, this tendency can impact the future and survival of humanity and our planet.

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