An Analysis of the Influences Impacting Individuals Understanding of Global Climate Change

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Nicole Piatko

Spring 2023

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Bryn E. Seabrook, Department of Engineering and Society

Introduction

How can an individual stop global climate change? The average emission per person needs to drop from 2.5 to 2 tons of carbon dioxide per year by 2030 to prevent the climate from reaching an unlivable standard (Nations, n.d.). While governments and citizens hold concerns for protecting communities and the environment, climate change is already causing more extreme weather events like wildfires, floods, and severe winter storms (*The Latest IPCC Report*, n.d.). To understand one's role in preventing global climate change, it is important to understand what influences an individual in decision making. An individual can make more sustainable consumption choices and can push for political actions that reduce environmental impact. To make an informed decision, it is helpful to understand entities' methods of spreading information and their motivation for spreading that information. The Science Technology and Society (STS) research paper addresses the following research question: what are the influences that change an individual's perception of climate change? Answering this question entails understanding the impact of the influences and where the power of the influences come from. The Wicked Problem framework is used to analyze this question. Global climate change is a Wicked Problem because it is a complex problem with many factors and obstacles to solving it as well as a large number of stakeholders.

Methods

Documentary research methods and case studies are used to answer the question: what are the influences that change an individual's perception of climate change? The University of Virginia databases are used to give access to research information and articles. The Wicked Problem framework is used with an approach that splits stakeholders into groups of influences. These groups of influence are researched and studied to understand their impacts on society and

individuals. Table 1 includes each separate group and the keywords used when searching for articles. The research information and case studies provide a general overview of the relationships individuals have with different stakeholders. The goal of this research is for an individual to be able to start to define and understand the role outside actors play in influencing one's decisions and ability to combat climate change.

Table 1.

The topics and keywords researched to help answer the question of interacting influences on the individual (Piatko, 2023) .

Topic	Keywords
Social Media and News Media	polarization, discussion, information spreading
Marketing and Consumers	greenwashing, environmental advertising, sustainability
Fossil Fuel Industry	messaging, carbon
Government and Policy	transportation, education, environmental justice
Beliefs and the Individual	values, religion

Background Information on Global Climate Change

On March 20th, 2023, the United Nations (UN) released a report stating the Earth is on track to reach catastrophic levels of warming in the next decade unless dramatic changes are made (The New York Times [@nytimes], 2023). The history of discussions of international environmental politics started in 1972 in Sweden at an UN-convened conference. In 1990 the Intergovernmental Panel on Climate Change (IPCC) published its first assessment on human activities increasing greenhouse gases. The Kyoto Protocol was agreed upon in 1997 and enforced from 2005 to 2020, having goals to reduce greenhouse gas emissions from

industrialized countries (Hirst, 2020). The Paris Agreement was completed in 2016 with goals to limit global warming to well below 2 degrees Celsius and reduce greenhouse gas emissions, taking legal effect in 2020 and including less developed countries in the agreement (*The Paris Agreement | UNFCCC*, n.d.).

In 2022, the IPCC released a report based on more than 14,000 studies about the science of climate change. The report concludes that the world will face climate impacts at least for the next 30 years and have a 1.5 degrees Celsius increase in temperature by 2040 or sooner, emphasizing that there is still time to make changes to prevent further warming and catastrophe (Fountain, 2021). The IPCC estimates investing in changing emissions in agriculture, forestry, and land use would cost about $400 billion. This investment to create a healthier environment would also improve the quality of living for society, for example, cleaner air to breathe and cleaner water to fish in (*The Latest IPCC Report*, n.d.).

The group that holds the most responsibility for contributing to climate change are fossil fuel companies. The Carbon Disclosure Project (CDP) reports that just 100 fossil fuel producers are the source of over 70% of carbon emissions. High-income households and wealthy countries, as well as people who live in wealthy countries, are also responsible for contributing to emissions because of the large amount of energy and products they consume (Timperley, n.d.).

The UN has 10 actions that individuals can do to reduce their carbon emissions. Some actions that are practical for people that live in the United States include consuming less meat and buying less new clothes. Actions such as switching to an electric vehicle can be difficult for people with different socioeconomic statuses and locations, and riding bikes or walking does not consider the high risk of injury or death from vehicular accidents (Nations, n.d.). The last piece of advice given from the UN is to speak up and take action at a consumer and political level, but

it is also important to consider that many people who live in high carbon emitting countries live in a system that encourages further consumption (Timperley, n.d.). The changes needed to reach sustainable goals do not always consider the accessibility of sustainable actions for an individual.

Wicked Problem Framework

The Wicked Problem framework is used to analyze global climate change as it is a complex problem where humans impact the environment and the environment impacts humans. The concept of a wicked problem was originally introduced by Host Rittel and Melvin M. Webbet. Some characteristics of a wicked problem include that the problem cannot be definitively described and that there is no optimal solution or answer (Rittel & Webber, 1973).

With the definition of a wicked problem, there have been critiques of not attempting to define a method of using the framework or define properly what a wicked problem constitutes. One strategy to use the wicked method created by Nancy Roberts, is to describe methods of responsibility between stakeholders as Authoritative, Competitive, or Collaborative (Roberts, 2000). Other methods look at the system and the organized structures within to aim at managing the complex social problems with governance theories even if there is a lot of uncertainty (Ruhl & Salzman, n.d.)

Sustainable engineering science has been proposed as a way to resolve wicked problems, with emphasis on awareness of the ethics and responsibility of research, and methods of studying unintended consequences from technological innovation (Seager et al., 2012). The wicked problem framing has also been used in problems such as sustainability and aviation where there are many stakeholders and a large environmental impact (Whalen, 2022). All wicked problems do not have a clear solution, but breaking up and defining roles in the problems can help point to

relationships and groups that have power to narrow down and target where change should happen.

<u>Discussion of the Individual and Stakeholders</u>

This section covers five main topics: social media and new media, marketing and consumers, fossil fuel industry, government and policy, and beliefs and the individual. Each section goes over examples that describe the influence or impact on an individual's understanding of climate change. Limitations of the research are also discussed after the five main topics. Each topic is examined as well as their connection to the environment and the individual to show that there are many forces that shape an individual's perception of climate change. Being able to define who holds the power and ability to influence individuals gives power to individuals in their decision-making as well as an understanding of the system they are in.

<u>Media</u>

Mainstream news media and social media are two methods of receiving new information daily that many people are exposed to. These sources of information in media often come from politicians, journalists, academics, grassroots campaigners, activists, or everyday social media users. The presentation of information from media and social media are framed in different ways depending on the source. In a study publish January 2023, researchers looked at news media discourse on Twitter from 2018 to 2021 to understand how different actors presented information. In general, mainstream news media frames climate change through a lens of economics and uncertainty, and often avoiding criticizing capitalism, favoring the existing status quo because they want to keep advertisers. Everyday users on twitter often discuss climate change framed by political affiliations and geographic locations (Chen et al., 2023). Their

research found that news organizations focus on political debates, consequences of climate change, bills and laws that are focused on energy production, and less than 4% of the news mention climate protest. Climate movement actors focused on climate solution, climate consequences as well, specific political action, and providing information about climate science and environmental justice (Chen et al., 2023). In recent decades climate change discussions have shifted from focusing on individual responsibility to addressing societal, collective and policy level issues (Chen et al., 2023). The representation of the media consumed can impact the way one values the environment, and the view of one's ability to combat climate change.

Social media gives people a place to discuss and build a platform on caring about climate political action and inspiring others to be environmentally consciousness. A good example of a famous climate movement actor is Greta Thunberg who rose to fame through Instagram. Greta Thunberg started her political activism at age 15 and has been able to appeal to the general public and political leaders around the world on the topic of addressing climate change. From a study on Greta Thunberg's Instagram posts, it was found she often used the issue of morality and ethics, emotional appeal of hope, and a motivational framing when communicating climate change. Her posts are also different from the usual influencer trend of building self-image by often posting images of people as a collective acting together to fight against climate change (Molder et al., 2022).

While social media is a force of promoting discussion, spreading information, and uplifting spokespeople for the benefit of good change, it is also a force that promotes harmful speech and misinformation. In a study of climate change deniers Facebook pages, it was found that the groups repeatedly misrepresented peer reviewed scientific research by hyperlinks and blogging (Bloomfield & Tillery, 2019). A small group of users can spread misinformation to

many people, as shown in the study where the climate change deniers posts had a lot of interactions. Technology itself is also responsible for the information you see on the internet. Social media algorithms are designed to keep users engaged, and the posts users see are not neutral. Often posts are designed for users to feel moral outrage against other groups, and target strong emotions such as feeling as if their group identity is "under threat" (Shapiro et al., 2022). Algorithms and constant social media use can lead to the issue of affective group polarization which is negative attitudes toward the oppositional group. Affective group polarization in politics and beliefs has decreased civil discourse between opposing groups, and threatens democracy as both opposing groups are unable to communicate between each other (Carpenter et al., 2021).

Media is an important source of information for an individual as it is often where one reads the news and can hold online discussions. Climate change is presented in different frameworks by new media, climate activists, and climate denialists. By understanding the frameworks and methods used in presenting information, viewers can be critical of the information they are reading and the sources' background. The wicked problem presents itself in the interactions of media and the individual as social media and news media have powers of doing good to society by communicating information and uplifting speech, but also has the power to rapidly spread misinformation and to polarize society even further.

Marketing

The United States and other wealthy nations have cultures that support capitalism. This culture leads to values of materialism and wastefulness as companies encourage consumers to consume more so that they make more of a profit. Marketers goals and consumer goals become intwined in a climate change social trap, which is a behavior of entities that favor short-term

positive consequences over long-term negative consequences of climate change for society (Rashidi-Sabet & Madhavaram, 2021). Marketing researchers have started to call for clearer definitions of sustainability and to make sustainable development part of marketing strategies for issues such as fast fashion (Rashidi-Sabet & Madhavaram, 2022). The wicked problem presents itself as marketers and consumers both are comfortable with a history of unsustainable practices and indulgence. Consumers can continue to make wasteful purchases supporting capitalistic culture, and companies and marketers can continue to persuade consumers to make unsustainable choices or not provide sustainable options.

Companies and firms can promote sustainability and green products to improve brand image to their advantage, which can lead to greenwashing which is "the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service" (Schmuck et al., 2018). Two major types of greenwashing are false appeals, for example a company claiming it recycles plastic but in reality throws it into landfills, and vague appeals, for example phrases such as "all natural"(Schmuck et al., 2018). In a study conducted in 2018, it was found that when consumers looked at an advertisement that had false claims and nature imagery, the positive attitudes of the nature imagery had a stronger effect on attitudes than inspection of the validity of claims (Schmuck et al., 2018). The United States consumer's public knowledge of environmental issues is worse than German consumers. While all German consumers in the study could detect a false claim, not all United States consumers could unless they were someone with more environmental knowledge (Schmuck et al., 2018). The presentation of products and companies can project that they have sustainable practices to bolster their image without truthfully helping the environment or stopping habits such as fast

fashion or overconsumption. It is important to be aware of greenwashing and the climate change social trap when individuals make purchasing decisions.

Fossil Fuel Industry

A total of 100 fossil fuel producers are the source of over 70% of emissions (Timperley, n.d.). Fossil fuel companies, including owners and shareholders, have delayed action against climate change by driving climate change denialism. These actors have funded yearlong campaigns to convince the public that science on global warming is uncertain or incorrect (Bonds, 2016). Fossil fuel companies also have a lot of political power. According to the Center for Responsive Politics, large oil, gas, and coal mining companies spent more than $141 million on lobbying Congress and federal agencies and an estimated $74 million on campaigns for political candidates in 2014. In 2013, $88 billion was subsidized to explore new oil, gas, and coal reserves (Bonds, 2016). Fossil fuel companies rely on unrestrained use of fossil fuel extraction, and have investing in exploration and development of fossil fuel reserves even though the use of those reserves would push us beyond the limit of warming of 2 degrees Celsius (Bonds, 2016).

Fossil fuel companies also have influence in school education. Education programs sponsored by BP and Shell have told students 'it's too soon to tell if the earth is heating up, but "a little warming might be a good thing" (Tannock, 2020). A children's book made by the Oklahoma Energy Resources Board in 2016 called Petro Pete's Big Bad Dream featured Petro Pete having nightmare where all the oil disappeared and so did all of his everyday items made out of petroleum, and Chevron supports a STEM education organization that has been criticized for promoting 'uncritical acceptance of the dominant economic-political order' and facilitates 'classroom silence and confusion about the contemporary global economy and its impact on humanity' (Tannock, 2020). Fossil fuel companies further politicized climate science by

developing a media strategy to promote climate deniers and accuse the news media of being biased if their denialists were not included in the media (Eaton & Enoch, 2020). News media attempts to find balance in coverage but instead giving climate deniers cause viewers to have growing skepticism, distrust, and confusion in climate change issues (Eaton & Enoch, 2020).

The fossil fuel industry is a wicked problem as it has a history of being powerful using methods of disseminating information in politics, media, education, and marketing. With so much money invested in the fossil fuel industry, there are a lot of stakeholders who do not want to lose their profit. The fossil fuel industry has been a main proponent in delaying climate change action by creating skepticism and confusion of climate science consensus so that they can continue to support the industry and profit from the unsustainable energy source.

<u>Government</u>

In 2004 Hurricane Katrina brought climate justice into public policy discussion in the United States when 986 people were killed and billions of dollars of damage were done to properties, disproportionally affected low-income communities and communities of color (Resnik, 2022). The United States has a history of policies that are unequitable and unjust, and as climate change starts to impact people's lives, these policies can continue to harm low-income and minority communities. Assessments of the demographics of 100-year floodplains find that the residents are disproportionately low-income and non-white compared to surrounding areas that have lower flood risks (Motta, 2022). Government entities such as the National Flood Insurance Program (NFIP) assess risk based on geography and home values, which would likely lead to lower risk valuation for people with low incomes. In a 2018 survey of the NFIP, more than 40% of subsidized policies went to homes worth more than $500,000 and 12% went to homes worth $1 million or more (Motta, 2022).

Policy often is designed in a way to intentionally or unintentionally harm underrepresented, underserved groups. Most researchers conclude that climate change mitigations policies will disproportionally harm low-income populations unless they are specifically designed to protect them from the negative impacts (Resnik, 2022). The methods that government entities use to decide policies are not designed to protect people or consider communities' histories. Executive Order 13563 mandates that all agencies have a cost-benefit analysis in their decisions, but cost-benefit analysis has flaws in it. Cost-benefit analysis values short-term gain over long term actualization, which does not include addressing underrepresented communities vulnerabilities that can be worsened in climate change policy decisions (Afgani, 2021). Understanding an individual's identity and background can expose one's privileges or disadvantages in society.

Governments are responsible for investing in the future. They do this by creating policies that promote different innovations or designs. For example, electric vehicles can reduce carbon dioxide emissions but producing more electric cars is not the answer to creating sustainable cities. Electric vehicles currently rely on electricity created by fossil fuels which still produce emissions, and natural resources for batteries are limited to select countries. Cobalt mining for batteries has also been linked to water-quality problems, armed conflicts, child labor, respiratory disease, and birth defects in the Democratic Republic of Congo (Maclean et al., 2022). While the United States has implemented tax incentive program for buying new electric vehicles, a shift towards investing in public transit and better urban planning to allow for more bicycling and walking would cut emissions drastically (Maclean et al., 2022). In 2014 IPCC reported that prioritization of pedestrian and public transit systems resulted in "higher levels of social and economic prosperity" around the world (Burgess, 2023). While research and innovation are

important, the government must also address necessary changes to the built landscape, infrastructure, and systems that were designed to be unsustainable. Methods of transportation are important in an individual's life and impactful to climate change. Knowing the role the government has in establishing sustainable efforts and creating options for sustainable choices is important for an individual when they advocate for change.

Environmental and climate change knowledge is low in the United States public. A study in 2010 found that 63% of Americans believed that global warming is happening, but many do not understand why. Of the knowledge assessments that were taken 8% received an equivalent of an A or B, 40% received a C or D, and 52 percent got an F (Leiserowitz, n.d.). While the general United States public likely has more knowledge now in 2023, Congress still has not passed a measure to support climate change education in national science standards, leaving it up to each state to determine what schools teach ("Climate Education in the U.S.," 2023). This is an issue as some states such as Florida do not have the term "climate change" in their education standards for elementary and middle school, and textbook publishers avoid discussions of climate change to appeal to states such as Texas who is a top oil and natural gas producing state ("Climate Education in the U.S.," 2023). The government at the state and national level oversees informing and educating the public, and failing to do so on the topic of climate change has created doubt in scientific consensus.

Government can also enact policies to bring attention to wastefulness and value and worth of a clean environment. A study done in 2015 in England, charged six cents for each single-use plastic bag taken from large stores, which in turn showed a reduction in plastic bag usage within one month after the extra six cents was introduced (Thomas et al., 2019). Starting January 1, 2023, the City of Charlottesville implemented a 5 cent tax on disposable plastic bags

at stores with goals of reducing degradation of the water and soil in the region (*Plastic Bag Tax | Charlottesville, VA*, n.d.). The government can place taxes or enforce restrictions that change behaviors and bring awareness to consumption of products and protection of the environment.

The government plays a particular role in the wicked problem of climate change as climate change policies created to target improving the environment can harm historically disadvantaged and low-income communities. Individuals that are encouraged to take steps towards taking sustainable actions may not have the options because of their location, status, or income. The government is responsible for creating opportunities and infrastructure for individuals to make sustainable choices and drive climate action, but the growing polarization of politics makes it difficult to enact sustainable changes. The Wicked Problem framework used to define stakeholders and connections starts to point towards problems that have stalled climate action.

<u>Beliefs and the Individual</u>

Background, religion, and values can also influence perception of climate change. In some Christianity there are beliefs that climate change is God's will or that humans were meant to rule over the rest of nature, which gives reasons for people to have strong climate change skepticism or denialism (Haltinner & Sarathchandra, 2022). Increased religious service attendance is an indicator of an increase in the likelihood that one believes climate change is a hoax and the more religious someone is, the less likely they view science positively or trust scientific information (Haltinner & Sarathchandra, 2022). However, the church has the power to change communities because it is a gathering place for people. Some churches have started to ask what does it mean to be a green church, and how should churches respond to the climate crisis (Woofenden, 2022). Some church groups have encouraged starting points for sustainable

practices such as changing what disposable plates they use and encouraging community gardens (Woofenden, 2022).

Each person has different characteristics that make their personality, which also impacts one's interactions with climate action. In general, self-transcendent (other-focused) people are more likely to express environmental justice concern while self-enhancing (self-focused) are less likely (Motta, 2022). This sense of care and concern for other people can also be compared to the coronavirus pandemic. A study shows that while coronavirus and climate change have similarities as a worldwide issue, people feel less personal responsibility and have lower levels of support for action addressing climate change (Poortinga et al., 2022). Climate change anxiety comes from worrying about climate change and its effects. Climate change anxiety can been managed by contributing to environmental activism or focusing on one's well-being (Bingley et al., 2022).

Framing and wording also impacts individuals' perception as a study in 2021 found that Americans associate natural gas with "clean" and methane gas with "pollution" even though natural gas is almost entirely methane (Hassol, 2023). In 2022 Nature Communications published research that showed although 66 to 80 percent of people in the United States support climate change policies, people believe only 37 to 43 percent of the population does (Hassol, 2023). The Wicked Problem framing shows the variety of individuals' perceptions and connections to larger entities. The large variety of interactions can make it bewildering for individuals to define what role they play in combating climate change. Understanding and defining these interactions are important to be able to empower people to enact change in daily life.

Limitations

The topic of individuals' perception of climate change could not be fully researched in this paper. There were many topics, such as art, movies, tv shows that can further the argument of influences. Other large entities such as the food industry and various other sources were not discussed. In addition to these limitations of stakeholders, the generalizations of the individual and stakeholder was mostly described in the context of the United States and its public. Each country has a different media, consumer, government, and cultural setting than the United States. The Wicked Problem of Climate Change has an innumerable amount of interactions between individuals and different groups making it difficult to study. This research paper starts to cover a general overview of large actors in climate change and the relationship with the individual summarized in Figure 1. Further research can be done to understand other sources of influence on climate change understanding and impactful actions individuals can take to mitigate global warming.
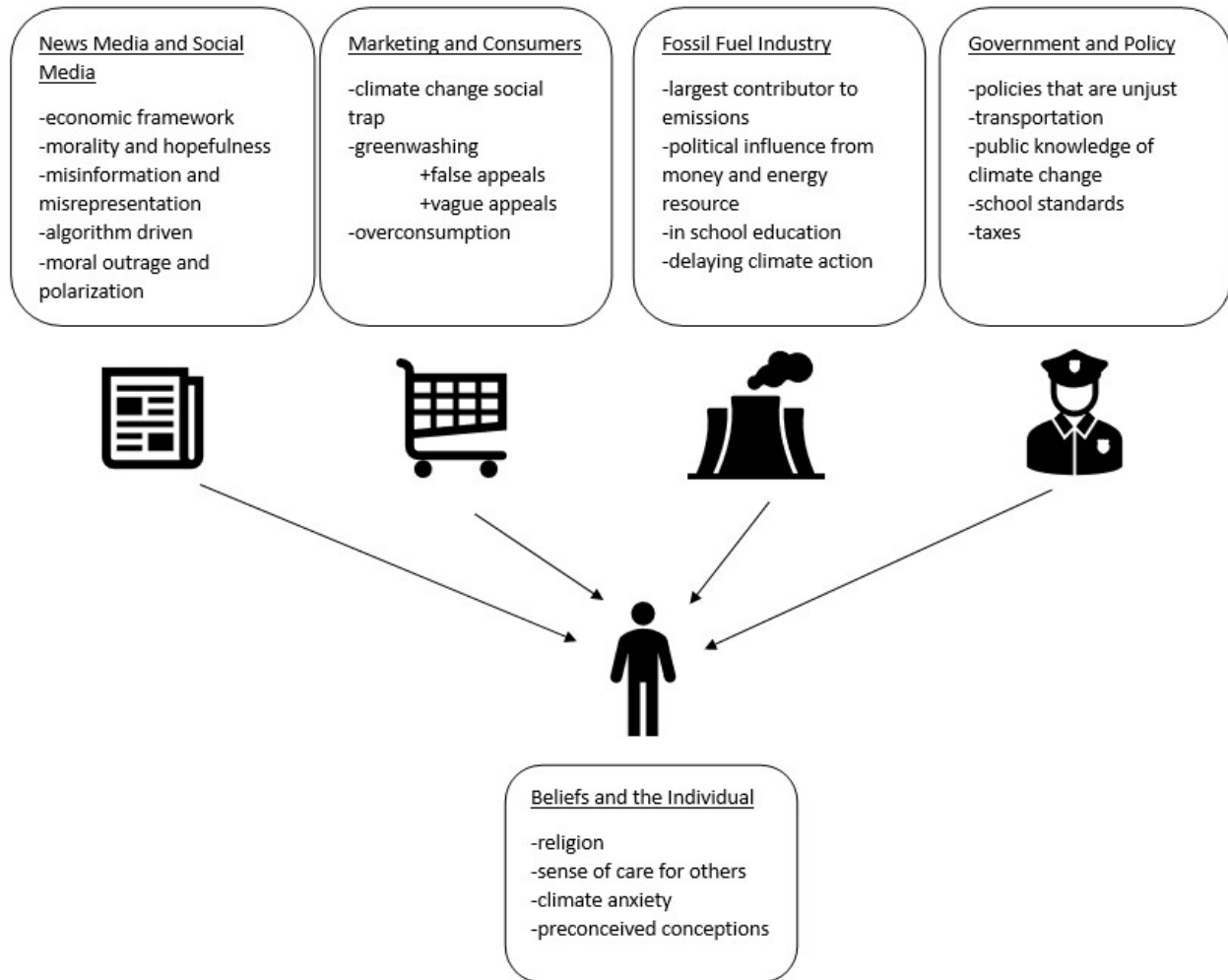
Figure 1. A graphic of each stakeholder with keywords of the discussion and the relationship to the individual (Piatko, 2023).

Conclusion

In each separated section there was a discussion of stakeholders' own wants, method of influence, and an impact on the individual. These relationships can cause actors such as news media to falsely balance climate denialism and necessary climate action in their coverage and companies to market unsustainable practices as sustainable for profit. Understanding the background and the tactics used such as misrepresentation of information, frameworks, and emotional appeals can allow viewers to understand the representation of the information they are receiving. Knowing where one's viewpoints come from and the relationships between one's

identity and society can empower individuals take action against climate change and to make more sustainable choices.

Work Cited

Afgani, C. (2021). Choosing Life Over Liberty and Property: Environmental Justice in a World

    Ravaged by Climate Change. *UCLA Law Review*, *68*(3), 786–840.

Bingley, W. J., Tran, A., Boyd, C. P., Gibson, K., Kalokerinos, E. K., Koval, P., Kashima, Y.,

    McDonald, D., & Greenaway, K. H. (2022). A multiple needs framework for climate

    change anxiety interventions. *American Psychologist*, *77*(7), 812–821.

    https://doi.org/10.1037/amp0001012

Bloomfield, E. F., & Tillery, D. (2019). The Circulation of Climate Change Denial Online:

    Rhetorical and Networking Strategies on Facebook. *Environmental Communication*,

    13(1), 23–34. https://doi.org/10.1080/17524032.2018.1527378

Bonds, E. (2016). Upending Climate Violence Research: Fossil Fuel Corporations and the

    Structural Violence of Climate Change. *Human Ecology Review*, *22*(2), 3–23.

    https://doi.org/10.22459/HER.22.02.2016.01

Burgess, I. (2023, January 10). *We Can Save the World with Public Transportation and Not*

    Electric Cars. Earth.Org. https://earth.org/save-the-world-with-public-transportation-and-

    not-electric-cars/

Carpenter, J., Brady, W., Crockett, M., Weber, R., & Sinnott-Armstrong, W. (2021). Political

    Polarization and Moral Outrage on Social Media. *Connecticut Law Review*, *52*(3), 1107–

    1120.

Chen, K., Molder, A. L., Duan, Z., Boulianne, S., Eckart, C., Mallari, P., & Yang, D. (2023).

    How Climate Movement Actors and News Media Frame Climate Change and Strike:

    Evidence from Analyzing Twitter and News Media Discourse from 2018 to 2021. *The*

International Journal of Press/Politics, *28*(2), 384–413.

https://doi.org/10.1177/19401612221106405

Climate Education in the U.S.: Where It Stands, and Why It Matters. (2023, February 9). *State of the Planet*. https://news.climate.columbia.edu/2023/02/09/climate-education-in-the-u-s-where-it-stands-and-why-it-matters/

Eaton, E., & Enoch, S. (2020). The bias of balance: What Canada's fossil fuel industry wants students to think about climate change. *Our Schools / Our Selves*, 5–7.

Fountain, H. (2021, August 9). 5 takeaways from the major new U.N. climate report. *The New York Times*. https://www.nytimes.com/2021/08/09/climate/un-climate-report-takeaways.html

Haltinner, K., & Sarathchandra, D. (2022). Beyond Religiosity: Examining the Relative Effects of Religiosity and Religious Ideation on Climate Skepticism. *Journal of Rural Social Sciences*, *37*(3), 1–29.

Hassol, S. J. (2023). CHANGING the LANGUAGE of CLIMATE CHANGE. *Scientific American*, *328*(2), 64–67.

Hirst, D. (2020). *The history of global climate change negotiations*. https://commonslibrary.parliament.uk/the-history-of-global-climate-change-negotiations/

Leiserowitz, A. (n.d.). *ClimateChangeKnowledge2010*.

Maclean, H. L., Milovanoff, A., & Posen, I. D. (2022). The Electric Vehicle is not Enough: To decarbonize road transport we need to complement EVs with bikes, rail, city planning, and alternative energy. *IEEE Spectrum, Spectrum, IEEE, IEEE Spectr.*, *59*(11). IEEE Xplore Digital Library. https://doi.org/10.1109/MSPEC.2022.9941035

Molder, A. L., Lakind, A., Clemmons, Z. E., & Chen, K. (2022). Framing the Global Youth

    Climate Movement: A Qualitative Content Analysis of Greta Thunberg's Moral, Hopeful,

    and Motivational Framing on Instagram. *The International Journal of Press/Politics*,

    27(3), 668–695. https://doi.org/10.1177/19401612211055691

Motta, M. (2022). The pre-political origins and policy consequences of environmental justice

    concern. *Politics and the Life Sciences*, *41*(2), 182–199.

    https://doi.org/10.1017/pls.2022.7

Nations, U. (n.d.). *Start with these ten actions!* United Nations; United Nations. Retrieved

    February 5, 2023, from https://www.un.org/en/actnow/ten-actions

Piatko, N. (2023). *An Analysis of the Influences Impacting Individuals Understanding of Global

    Climate Change*.

Plastic Bag Tax | Charlottesville, VA. (n.d.). Retrieved February 5, 2023, from

    https://charlottesville.gov/1620/Plastic-Bag-Tax

Poortinga, W., Latter, B., & Wang, S. (2022). Comparing coronavirus (COVID-19) and climate

    change perceptions: Implications for support for individual and collective-level policies.

    Frontiers in Psychology, *13*, 996546. https://doi.org/10.3389/fpsyg.2022.996546

Rashidi-Sabet, S., & Madhavaram, S. (2021). Climate Change, Social Traps, and Marketing

    Strategy: An Exploration of Leading Firms in the Fashion Industry. *AMA Winter

    Academic Conference Proceedings*, *32*, 28–32.

Rashidi-Sabet, S., & Madhavaram, S. (2022). A Strategic Marketing Framework for Emerging

    Out of the Climate Change Social Trap: The Case of the Fashion Industry. *Journal of

    Macromarketing*, *42*(2), 267–291. https://doi.org/10.1177/02761467211058083

Resnik, D. B. (2022). Environmental justice and climate change policies. *Bioethics*, *36*(7), 735–741. https://doi.org/10.1111/bioe.13042

Rittel, H., & Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, *4*(2), 155–169.

Roberts, N. (2000). *WICKED PROBLEMS AND NETWORK APPROACHES TO RESOLUTION*. *1*(1), 20.

Ruhl, J. B., & Salzman, J. (n.d.). Symposium: Governing Wicked Problems Introduction. *VANDERBILT LAW REVIEW*, *73*.

Schmuck, D., Matthes, J., & Naderer, B. (2018). Misleading Consumers with Green Advertising? An Affect--Reason--Involvement Account of Greenwashing Effects in Environmental Advertising. *Journal of Advertising*, *47*(2), 127–145. https://doi.org/10.1080/00913367.2018.1452652

Seager, T., Selinger, E., & Wiek, A. (2012). Sustainable Engineering Science for Resolving Wicked Problems. *Journal of Agricultural and Environmental Ethics*, *25*(4), 467–484. https://doi.org/10.1007/s10806-011-9342-2

Shapiro, A., Levitt, M., & Intagliata, C. (2022, September 9). How the polarizing effect of social media is speeding up. *NPR*. https://www.npr.org/2022/09/09/1121295499/facebook-twitter-youtube-instagram-tiktok-social-media

Tannock, S. (2020). The oil industry in our schools: From Petro Pete to science capital in the age of climate crisis. *Environmental Education Research*, *26*(4), 474–490. https://doi.org/10.1080/13504622.2020.1724891

The Latest IPCC Report: What is it and why does it matter? (n.d.). The Nature Conservancy.

> Retrieved February 5, 2023, from https://www.nature.org/en-us/what-we-do/our-
>
> insights/perspectives/ipcc-report-climate-change/

The New York Times [@nytimes]. (2023, March 20). *Breaking News: Earth is likely to cross a*

> *critical global warming threshold within the next decade unless drastic changes are*
>
> *made, a major UN report said. Https://nyti.ms/3JROaoG https://t.co/tD1DImteEa*
>
> [Tweet]. Twitter. https://twitter.com/nytimes/status/1637801949432012801

The Paris Agreement | UNFCCC. (n.d.). Retrieved October 30, 2022, from

> https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

Thomas, G. O., Sautkina, E., Poortinga, W., Wolstenholme, E., & Whitmarsh, L. (2019). The

> English Plastic Bag Charge Changed Behavior and Increased Support for Other Charges
>
> to Reduce Plastic Waste. *Frontiers in Psychology*, *10*, 266.
>
> https://doi.org/10.3389/fpsyg.2019.00266

Timperley, J. (n.d.). *Who is really to blame for climate change?* Retrieved February 5, 2023,

> from https://www.bbc.com/future/article/20200618-climate-change-who-is-to-blame-
>
> and-why-does-it-matter

Whalen, B. (2022). *The Conflict of Increased Reliance on Aviation and Environmental*

> *Initiatives*. University of Virginia.

Woofenden, A. (2022). Thinking big (and small): WHAT DOES IT MEAN TO BE A GREEN

> CHURCH? *The Christian Century*, *139*(16), 22–25.