Middle States Geographer, 2020, 53: 43-50

BELIEFS AND PERCEPTIONS OF MILLENNIALS PERTAINING TO CLIMATE CHANGE AND SUSTAINABILITY

Rae Cade* and Jessica Miller
Earth and Environmental Sciences
Montclair State University
Montclair, NJ, 07043
Email: cader1@montclair.edu, miller1j@msu.edu

ABSTRACT: *Current environmental science research rarely amalgamates environmental science with an individual's ability to effectively cognize the information. This has left many researchers concerned about millennials ability to adequately understand the complexity of environmental research. This study explores 18-28-year-old perceptions and social media consumption related to climate change and sustainability. Results suggest that participants used social media as a source to acquire information about climate change and sustainability. This is pertinent when taking into consideration the larger issue, in terms of generational information acquisition. Data was collected from a purposeful sample of 14 university students who were non-environmental science majors. Findings revealed that students used social media primarily as a source of news, including news concerning climate change and sustainability. Findings also suggest that an interdisciplinary approach of encompassing disciplines such as communication, political science, and anthropology should be incorporated into climate change and sustainability research to more effectively disseminate information.*

Keywords: *Millennials, Climate Change, Perceptions, Environmental Communication, Social Media*

INTRODUCTION

Climate change is a global phenomenon that is detrimental to humanity and has become increasingly more central in the public discourse (Paerregaard, 2020). Consequently, researchers are confronted with the overall challenge of bridging the gap between climatic changes and communicating these challenges to the general public. This is significant because it raises a question: How can we as researchers effectively communicate with members of the public about environmental concerns as we will continue to see the increased potential for urban flooding, devastating droughts, heat waves, and the increased likelihood for hurricanes to be normalized as "cruel weather" (Wells, 2019)? This is a critical question because many researchers question whether or not younger people are more concerned about the environment than their predecessors. Furthermore, Gray, Raimi, Wilson, and Árvai, (2019) pointed out that older generations are less likely to act on environmental issues, when compared to younger generations. This lack of action and concern is partly relating to older generations attempting to preserve their social standing in the dominant social order (Gray, Raimi, Wilson, & Árvai, 2019).

While Gray, Raimi, Wilson, and Árvai (2019) indicate that American youth are more likely to be actively engaged in climate change through activism and voting, Monyei and Oladeji (2019) indicate that uncertainties arise in terms of whether or not millennials have the necessary knowledge and understanding needed to sustain humanity with the surmounting complications related to Earth's changing climate. Some research suggests that millennials are more willing to become actively engaged in climate change as opposed to their older counterparts. However, there is limited research that explores the perceptions about climate change and sustainability amongst millennials. The purpose of this study is to explore the beliefs and perceptions of millennials on the subjects of climate change and sustainability, and to determine what types of information they consume and find valuable concerning these issues. Millennials were chosen as the focus for this study, given that (Monyei & Oladeji, 2019) highlighted a concern pertaining to their lack of requisite knowledge on the subjects of climate change and sustainability.

Conceptual Framework

Observations, or rather lived experiences, hold more credence to an individual when compared to scientific data (Yeh, 2016). Particularly because individuals are able to more effectively understand data when it relates to their lived experiences. While Yeh (2016) explains that individuals' lived experiences must be a starting point in terms of climate change research, Brown (2017) underlines the need for a societal understanding of climatic changes in which anthropogenic activities are highlighted. Coupled with Brown's (2017) discussion is the pertinent notion that Yeh (2016) has highlighted, in that individuals typically interpret issues based on their lived experiences. The global

phenomenon of climate change will result in regional changes across the globe. Rind, Suozzo, Balachandran, & Prather (1990) called attention to the concept of climate change by indicating that the continuous secretion of greenhouse gases will result in a doubling of CO_2 concentrations by 2040. Wells (2019) reinforces this by indicating that researchers are now faced with challenges in bridging the gap between climatic changes and the general public.

The supporters of the Kyoto Protocol indicated that global temperature should not surpass 2°C due to the potential for global catastrophic outcomes, such as increased flooding, devastating droughts, and heat waves (Wells, 2019). Additionally, Wells (2019) highlighted that hurricanes, which would previously have been deemed "natural disasters", will soon become normalized as simply cruel weather if global emissions continue rising at their current rates. The odds of avoiding such anomalies seems to dwindle as emissions continuously rise (Wells, 2019). Since supporters signed the Kyoto Protocol twenty years ago, global emissions have increased. As a result, global leaders attempted to establish another agreement. This agreement, founded in 2016, was the Paris Agreement in which 2°C was once again set as a global goal. However, Wells (2019) suggests that the global goal for 2°C is appearing to be seen as a "best case scenario".

Climate change is a global phenomenon that is detrimental to humanity and its way of life. However, this is not apparent to everyone. In order to understand why the urgency of climate change is not apparent to some people, we must first understand how people perceive the conception of space and nature (Smith, 2008). While the concept of "nature" is socially constructed and space is individually perceived, they are actively being reinforced socially, which impacts how we view climate change. Given that climate change is such a large phenomenon and challenging to some, the active reinforcement of the socially constructed concept of space needs to be taken into consideration. Climate change is a global issue, but one characteristic of climate change that is rarely addressed is the changes that can potentially be witnessed if the Earth experiences warming beyond 2°C (Wells, 2019). Wells (2019) hypothesizes that the lack of addressing the habitability of our planet if it warms beyond 2°C might be due to fear, fearmongering, market faith, skepticism, or perhaps debates. Wells (2019) describes market faith as encompassing trust in economic productivity that developed countries experience. The lack of choice in addressing climate change places populations at risk. Wells (2019) also indicates that while scientists warn of rising temperatures and the increased risks, the "outside world" appears unchanged. The outside world in this case appears to be a socially constructed version of our perceived space.

Newman (2015) references the French Philosopher Henri Lefebvre who addresses the production and formation of space, while referring to the socially constructed boundaries that exist between the natural and constructed environments. Lefebvre stated that the notion of production is essentially abstract. There are certain questions that an individual or group of individuals must ask themselves. Questions such as: what is produced, how is it produced, why it is produced, who is it produced for, as well as who produces it (Nicholson-Smith, 1991)? These questions are essential in understanding the production of various spaces because the concept of space was transformed throughout history. Nicholson-Smith (1991) cited Lefebvre in stating that the concept of space was solely utilized in a geometrical sense, which conjured an empty space image. Until recently, the formation of the concept of social space was not common. Social space as defined by Sundstrom (2003) is composed of our daily practices and experiences. It is the space that is the outcome of social organization because humans tend to experience space through social interactions (Sundstrom, 2003). Additionally, Jones (2010) cites Nystuen (1963) in stating that a new point of view in geography must be taken into consideration in relation to *direction*, *distance*, *connection*, *orientation*, *or relative position*. Jones (2010) further conceptualizes relational *space* in terms of *boundaries* that does not exist.

As previously stated, observations and lived experiences hold more credibility to individuals when compared to data (Yeh, 2016). This results in a challenge pertaining to how researchers can connect to the general public given that data is not immediately sought out in terms of information acquisition. This is particularly relevant in terms of climate change because of its complexity. Furthermore, building on Lefebvre's context of space and exploring the space in which the public acquires their information related to climate change is useful, particularly amongst the American youth. American youth are born into a society with readily accessible online information, and roughly 95% of American youth are already in possession of smartphones with the ability to access such information (Firth, Torous, Stubbs, Firth, Steiner, Smith, et al., 2019). Understanding how environmental knowledge is disseminated through virtual space is an important space to explore.

The Critical Disconnect

Climate change is a vast and complex issue, and there is evidence that some are unable to grasp unless witnessed first-hand or have formal education pertaining to that environmental issue (Greussing, 2020; Howarth & Anderson, 2019; Paerregaard, 2020; Schäfer & Schlichting, 2014). Schäfer and Schlichting (2014), postulated that one reason for this critical disconnection is that climate change is a large issue in which many individuals believe will impact future generations (Hmielowski, Feldman, Myers, Leiserowitz, & Maibach, 2014). Particularly because many

individuals have trouble fully grasping the magnitude of climate change because the extent of it lies far beyond the ability to perceive it. Phrases in published environmental research are often utilized so that individuals are able to comprehend the magnitude, or the extent, to which climatic changes will alter the environment. Wells (2019) highlights a common phrase that is often utilized by teachers in academic settings to describe how the Earth has changed over time: "*the last time the planet was this much warmer…sea levels were here*". Can the average person comprehend the degree to which the environment has changed? In our work, we found that phrases such as this one do not have a significant impact on the overall understanding of environmental concepts to the students we surveyed.

This disconnect between environmental data and millennials, particularly between the ages of 18-28, can have an effect on how environmental issues are perceived and where to find reliable environmental information. While climate change is a vast, complex, and global issue, it has also become deeply integrated into politics and policies (Christensen & Nilsson, 2018). Realizing this, it is a good exercise to analyze how diverse media platforms have shaped the multitude of climate change narratives. Christensen & Nilsson (2018) point out that media must be explored in the midst of climatic changes because of the ways in which the media shapes the overall issue. While climate change is challenging to perceive for some, media (such as newspapers, magazines, television news, etc.) has often been valuable in communicating climate change to society (Schäfer & Schlichting, 2014).

In the few decades in which the internet has been commercialized, society has transformed the way in which information is gathered (Firth, Torous, Stubbs, Firth, Steiner, Smith, et al., 2019). The utilization of social media is deemed useful for the dissemination of information because of its growing popularity (Hamid, Ijab, Sulaiman, Anwar, & Norman, 2016). While environmental scientists realize the potential of utilizing such networking spaces, the act of utilizing social media for disseminating information and raising awareness is not widely understood. According to Andersson and Öhman (2017), the utilization of social media as a virtual space amongst the younger population is steadily increasing. With the increasing use of social media, Andersson and Öhman (2017) expressed that understanding how important issues are conceived and given meaning to is relevant particularly in relation to the environment and sustainability. When young individuals partake in discussions while occupying virtual space, education and the conception of important issues can take place (Andersson & Öhman, 2017).

The commercialization of the internet has shifted how we gather information, by making it possible for us to personalize our news feed and retrieve information from news sources that disseminate information that is aligned with our beliefs and perceptions (Ninmark & Pitschner, 2019). Therefore, it is critical to understand the limitations of such commercialization, and how individuals gather information has changed specifically, in the recent past few decades (Firth, Torous, Stubbs, Firth, Steiner, Smith, et al., 2019). The utilization of social media amongst 18-28-year-olds is steadily increasing, and with this steady increase there are concerns pertaining to how climate change is portrayed and perceived, particularly because of the fact that climate change discussions amongst the millennial's population between the ages of 18-28 take place on social media (Andersson & Öhman, 2017). Such discussions occur on social media platforms primarily because information is spread worldwide on social media within minutes, which keeps individuals informed about the various occurrences across the globe (Sandoval-Almanzan & Gil-Garcia, 2014). With the steady exposure to information about these issues, are individuals consuming and processing correct or best informed information? What information is misconstrued or left out of these discussions via social media platforms?

It is necessary to attempt to understand how the rapid distribution of viral information, and ever-increasing smartphone and device accessibility impact our relationship to information. In 2019, researchers found that 95% of American teens possessed a smartphone. Similarly, Karahan and Roehrig (2015) pointed out that in 2015 roughly 48% of millennials attained their information from social media. Seeing as this study is from 2015, the percentage is likely to be higher given that the internet has altered the way in which our global society accesses information (Firth et al., 2019). Likewise, Joosse and Brydges (2018) reiterated Karahan and Roehrig (2015) by highlighting that gathering information via social media is drastically increasing and becoming normalized, which further stresses the importance of understanding how environmental knowledge is disseminated through this form of virtual space. With the rapid shift to accessing information from social media, there are increasing concerns that American youth are drastically understudied on subjects pertaining to environmental science (Craig & Sayers, 2019). Accessing environmental science information from social media applications appears to provide short, quick, and easy-to-digest information. Still it is an open question whether people retain their capacity to question the validity of the information, but is the ability to question the validity of this information possible, if that is what so many rely on for news and other information?

METHODOLOGY

This research consisted of a qualitative multi-case study which included a semi-structured focus group. Participants were recruited from two universities in northern New Jersey, near New York City. Between the two campuses, participants consisted of 14 non-environmental science majors, and the focus group was approximately 75 minutes in length. Participants were given pseudonyms in order to protect their identities. Open coding was used to unearth patterns and develop categories and themes for analysis. In addition, realizing that emotions are considered as a universal experience that influences individuals' perceptions and decision making, emotional coding was also utilized, in order to uncover actions and experiences that guide their decisions, as well as explore the participant's feelings on the given topics (Saldaña, 2016). Lastly, axial coding, which is the process of associating categories with each other, was utilized in order to collapse and regroup regularities that were previously observed (Merriam, 2009). In order to refine the emerging themes in relation to millennials' beliefs and perceptions of climate change and sustainability, key quotes that supported them were gathered and transcribed.

RESULTS

In attempting to glean how virtual space assists in the dissemination of environmental information, findings revealed that 90% of American youth in the study relied on social media for information pertaining to climate change, with 10% stating they did not utilize social media. News sources are occasionally utilized for climate change information, and depending on the individual, documentaries play a role in their understandings of climate information. While climate change is highly publicized, less than 5% of participants responded that they engage in conversations pertaining to climate change and sustainability. Findings also suggest that social media assists in disseminating information pertaining to climate change and sustainability. While social media does not act as a catalyst for inspiring millennials to become climate activists, it seems to assist millennials in generating thought-provoking questions pertaining to their role in climate change and sustainability.

Knowledge and Understanding

Participants were asked what they understood by the statement "the Earth is warming by 2°C" and their responses can be seen in Figure 1 in which arrows link and build on their understanding of the statement "the Earth is warming by 2°C". Participants generally responded by referencing occurrences that have and will take place such as the melting of glaciers and ice caps and sea levels rising. In addition to their awareness of some events that will take place with the increased warming of the Earth's climate, the uncertainty of converting Celsius to Fahrenheit was also present. Though this uncertainty pertaining to how to convert Celsius to Fahrenheit was present, there was basic awareness of the negative outcomes associated with climate change.

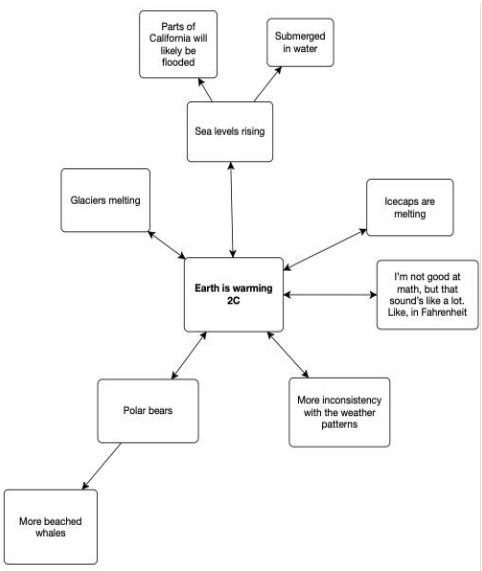

Figure 1. "The Earth is warming by 2°C", what does that mean to you?

In order to understand how American youth between the ages of 18-28 define climate change and sustainability, we explored the sources that millennials utilize in order to attain information pertaining to climate change and sustainability. The participants identified social media, such as Twitter, Snapchat, and Instagram, and news sources such as Washington Post, CNN, and Huffington Post as resources for information they consume. One student, Simon, stated that he has "read a few papers" because it was required for a specific class assignment. Connor stated that he does not utilize social media; instead, he attains his information from television, conversing with friends, and from the homepage on an electronic device. None of the participants, despite having consumed information related to climate change for classes, had relied on academic sources for the information they had obtained.

Diane explained why she believes millennials preferred social media as a source of information. Diane stated,

> "People our age, our generation and younger, they like to go through things quickly. It's not like they like to read a whole paragraph. It's either like, watch a video that's two minutes or like we…or like look at a picture. So like for it to be like on social media…like for me I think, I watch stories on Snapchat and then like I've seen like news, and I go through it 'cause it's quick and then they talk about and then they have like a short like paraphrase and then like that just gives me some knowledge. And then if you're like more interested you can obviously go online and look for it more but it…at least it's like out there and you…it gives you like a sort of generalization and like it makes you more interested 'cause it's quicker."

This participant suggested that the length of time it takes to consume information is important to her, but not the quality or depth. However, it is unclear that the sources students rely on pertaining to key issues, such as climate change, are valuable, or of quality. Utilizing Snapchat, as Diane stated, is absolutely a method for sharing information, but what quality of information is being shared in a two-minute video and a picture that has a character limit? Another participant, Marcus pointed out that environmental news and/or information has to compete with other "news", some of which is less relevant. Marcus explained that individuals who are not active on social media will still be informed about the information that is less relevant. Additionally, Marcus explained that individuals such as celebrities should also contribute to the change that is occurring. He stated, "God, if they only helped…just a little bit" and reflects on the interview that rapper Cardi b had with Bernie Sanders as an example of how musicians can contribute. In that, he believed that conversations addressing climate change and sustainability should be inclusive of politicians, musicians, artists, celebrities, and scientists. A question that resonates from the statement that Marcus made, is why celebrities on social media are able to reach more individuals and resonate with them when compared to climate scientists and their research. Additional research is needed on how millennials access important environmental information and the impact this information has on broader climate change beliefs.

DISCUSSION

The purpose of this qualitative study was to examine the knowledge, beliefs, and perceptions of millennials on climate change and sustainability. Based on participant responses, findings suggest that social media assists in disseminating information pertaining to climate change and sustainability. However, we also assert that social media should not be the only mechanism of disseminating information. While social media does not act as a catalyst for inspiring millennials to become climate activists, it seems to assist millennials in generating thought-provoking questions pertaining to their role in climate change and sustainability. Karahan and Roehrig (2015) indicated that roughly 48% of millennials attained information via social media in 2015. However, it is likely to assume that this figure has drastically increased since this study. As mentioned, 90% rely on social media, and Karahan and Roehrig (2015) have highlighted the need for an integration of social media into this age group's education in much more depth in order for them to better comprehend environmental issues, attitudes, as well as cultivate environmental awareness. While this may be difficult, it is critical. The results from this research study suggest that the dissemination of information to millennials has transformed over time to include social media. Firth et al., (2019) and Arevalo, Verbrugge, Haan, Baart, Voort, & Hulscher, (2019) reiterates this by stating that the emergence of the internet has altered the way in which society accesses information.

Limitations

This work is part of an exploratory project, the sample size was small, relying on responses from a purposeful sample of 14 participants, who took part in focus groups at two universities in northern New Jersey. Another potential limitation was restricting the age range of participants between 18 - 28. While this did not contribute to bias, and assisted in narrowing participants, it limited the ability of many willing individuals to participate in this research. Despite these limitations, this demographic provided the opportunity for the researchers to learn from American youth more about their beliefs and perceptions pertaining to climate change and sustainability.

CONCLUSION

Realizing that the participants, and more broadly, other youth in the U.S. retrieve most of their information from social media, we recommend that professors also incorporate the use of social media into their courses. While there are benefits to incorporating the utilization of social media into coursework, there are also potential challenges. It is imperative that educators provide youth with necessary tools needed to navigate and make sense of the information they consume and aid them in understanding the barriers that these short bursts of information have on providing depth and clarity in their knowledge of an issue. By incorporating social media into coursework, assignments can involve students finding social media posts pertaining to an environmental issue and conduct a semester-long research product pertaining to that issue that helps deepen or strengthen their understanding of it. This is reiterated by Korhonen, Ruhalahti, and Veermans (2019) in that roughly 70% of an individual's learning takes place via informal learning. It is imperative that this not only includes acquiring factual knowledge, in order to debunk the myths surrounding their chosen environmental related topic, but also maintaining a journal or reading log that tracks a shift in students thinking as they engage in this semester-long project. This is essential because students need better preparation for navigating the world of vast, but sometimes shallow information. By incorporating the utilization of social media into courses, we recommend that professors structure their courses in such a way that generates discussions that will assist students in debunking the myths that are shared on social media. This will assist in students developing the requisite knowledge needed to help society by maintaining their awareness of climate change and sustainability.

REFERENCES

Arevalo, V., Verbrugge, L., Haan, R., Baart, F., Voort, M., & Hulscher, S. 2019. Users' Perspectives About the Potential Usefulness of Online Storylines to Communicate River Research to a Multi-disciplinary Audience. *Environmental Communication 13*(7) 909-925.

Andersson, E. & Öhman, J. 2017. Young people's conversations about environmental and sustainability issues in social media. *Environmental Education Research 23*(4) 465-485.

Brown, K. 2017. Global environmental change II: Planetary boundaries – A safe operating space for human geographers? *Programs in Human Geography 41*(1) 118-130.

Christensen, M. & Nilsson, A. 2018. Media, Communication, and the Environment in Precarious Times. *Journal of Communication 68* 267-277.

Craig, C. & Sayers, E. 2019. Building clean energy support with young millennials in the United States. *The Electricity Journal 32*(1) 18-24.

Firth, J., Torous, J., Stubbs, B., Firth, J., Steiner, G., Smith, L., Alvarez-Jimenez, M., Gleeson, J., Vancampfort, D., Armitage, C., & Sarris, J. 2019. The "online brain": how the Internet may be changing our cognition. *World Psychiatry 18*(2) 119-129.

Gray S., Raimi, K., Wilson, R., & Árvai, J. 2019. Will Millennials save the world? The effect of age and generational differences on environmental concern. *Journal of Environmental Management 242* 394-402.

Greussing, E. 2020. Powered by Immersion? Examining Effects of 360-Degree Photography on Knowledge Acquisition and Perceived Message Credibility of Climate Change News. *Environmental Communication 14*(3) 316-331.

Hamid, S., Ijab, M., Sulaiman, H., Anwar, R., & Norman, A. 2016. Social media for environmental sustainability awareness in higher education. *International Journal of Sustainability in Higher Education 18*(4) 474-491.

Hmielowski, J., Feldman, L., Myers, T., Leiserowitz, A., & Maibach, E. 2014. An attack on science? Media use, trust in scientists, and perceptions of global warming. *Public Understanding of Science 23*(7) 866-883.

Howarth, C. & Anderson, A. 2019. Increasing Local Salience of Climate Change: The Un-tapped Impact of the Media-science Interface. *Environmental Communication 13*(6) 713-722.

Jones, M. 2009. Phase space: geography, relational thinking, and beyond. *Progress in Human Geography 33*(4) 487-506

Jones, M. 2010. Limits to thinking space relationally. *International Journal of Law in Context 6*(3) 243-256.

Joosse, S. & Brydges, T. 2018. Blogging for Sustainability: The Intermediary Role of Personal Green Blogs in Promoting Sustainability. *Environmental Communication 12*(5) 686-700.

Karahan, E. & Roehrig G. 2015. Constructing Media Artifacts in a Social Constructivist Environment to Enhance Students' Environmental Awareness and Activism. *Journal of Science Education and Technology 24*(1) 103-118.

Korhonen, A., Ruhalahti, S., & Veermans, M. 2019. The online learning process and scaffolding in student teachers' personal learning environments. *Education and Information Technologies 24*(1) 755-779.

Merriam, S. 2009. *Qualitative Research: A Guide to Design and Implementation*. San Francisco, CA: Jossey-Bass.

Monyei, C. & Oladeji, O. 2019. Why a global decarbonization agenda needs input from well-informed millennials. *The Electricity Journal 32*(6) 20-23.

Newman, A. 2015. *Landscape of Discontent: Urban Sustainability in Immigrant Paris*. Minneapolis, MN: University of Minnesota Press.

Nicholson-Smith, D. (1991). *The Production of Space: Henri Lefebvre*. Hoboken, NJ: Blackwell Publishing.
Nimark, K. & Pitschner, S. 2019. News media and delegated information choice. *Journal of Economic Theory 181* 160-196.

Nystuen, D. 1963. Identification of Some Fundamental Spatial Concepts'. *Papers of the Michigan Academy of Science, Art and Letters 48* 373-384.

Paerregaard, K. 2019. Communicating the Inevitable: Climate Awareness, Climate Discord, and Climate Research in Peru's Highland Communities. *Environmental Communication 14*(1) 112-125.

Rind, D., Suozzo, R., Balachandran, N., & Prather, M. 1990. Climate Change and the Middle Atmosphere. Part I: The Doubled CO_2 Climate. *Journal of the Atmospheric Sciences*. *47*(4) 475-494.

Sandoval-Almazan & Gil-Garcia, J. 2014. Towards cyberactivism 2.0? Understanding the use of social media and other information technologies for political activism and social movements. *Government Information Quarterly 31*(3) 365-378.

Saldaña, J. 2016. *The Coding Manual for Qualitative Researchers*. Newbury Park, California: Sage.
Saunders, C., Rutkowski, A., Genuchten, M., Vogel, D., & Orrego, J. 2011. Virtual Space and Place: Theory And Test. *MIS Quarterly* 35(4) 1079-1098.

Schäfer, M. & Schlichting, I. 2014. Media Representations of Climate Change: A Meta-Analysis of Research Field. *Environmental Communication8*(2) 142-160.

Siwek, T. 2003. Virtual space in geography. *Acta Universitatis Carolinae 38*(1) 381-386.

Smith, N. 2008. Uneven Development: Nature, Capital, and the Production of Space. Athens, GA: University of Georgia Press.

Sundstrom, R. 2003. Race and place: social space in the production of human kinds. *Philosophy & Geography 6*(1) 83-95.

Veil, S., Buehner, T., & Palenchar 2011. A Work-In-Process Literature Review: Incorporating Social Media in Risk and Crisis Communication. *Journal of Contingencies and Crisis Management 19*(2) 110-122.

Volkmer, S. & Lermer, E. 2019. Unhappy and addicted to your phone? – Higher mobile phone use is associated with lower well-being. Computers in Human Behavior. *93* 210-218.

Yeh, E. 2016. 'How can experience of local residents be "Knowledge"?' Challenges in interdisciplinary climate change research. *Area 48*(1) 34-40.

Wells, D. 2019. *The Uninhabitable Earth Life After Warming*. New York, NY: Tim Duggan Books.