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Climate Change Solutions: National Parks

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ABSTRACT

Climate change has become an increasingly pressing issue. In spite of this, climate change education continues to fall short of the urgent need. National parks are the perfect place to raise awareness and reduce climate change overall due to their 300 million visitors each year. Not only do they provide a unique public space with the opportunity to educate and inform a wide variety of people spanning socioeconomic, ethnic, religious, and geographic groups, but they also allow for a vital tactic in teaching: place-based education. Place-based education is the process of using the local environment as a starting point to teach concepts, which is perfect for National parks as they are directly involved with climate and environmental factors. To determine the best strategies for education, I will explore each of the 63 national park websites in the U.S. using place-based education. I will also interview a minimum of ten people, each from different national parks spanning various geographic regions. Professors at place-based education universities will also be contacted and interviewed. The end goal is to consolidate the best education methods in order to highlight the most important practices and contribute to continued improvements in methods for educating the general public regarding climate change. As it currently stands, we do not have consolidated information on practices and challenges related to education on climate change in national parks or similar politically neutral and non-academic settings. This analysis will thus try to create a framework to better understand climate change education in these settings.

Introduction

Climate change is propaganda created to mislead the public. Global warming is an overrated threat and should be taken as a joke. The millions of ecosystems, lifeforms, and habitats that are dying are all disinformation. Despite being untrue, these statements have been made many times by people with and without access to reliable climate information.

Whether or not disinformation is spread for publicity or due to simple ignorance, climate change education should be strengthened and properly communicated to keep our planet safe, not only for today but for future generations. Globally and within the United States, there are a large number of people who are uneducated about climate change. In comparison, there are very few learning spaces for climate change information. Even with a surplus of climate-focused educational environments, without proper strategies and techniques to teach properly, climate awareness will not be raised to where it needs to be.

However, if there were unique spaces that people of all geographic regions, ages, and political affiliations could reach, those spaces would be national parks. But in these parks, to what extent is it possible to make learning about climate change available and effective for younger and older generations? To address this challenge, national parks may be used as a learning environment to further climate change action. These natural habitats can provide a space where many different types of people can learn about climate change due to the wide variety of attractions available to all ages.

In 2021, Yellowstone National Park, located in the northwest region of the United States, received around 5 million visitors. The number of visitors to the 63 national parks in the United States is an estimated 297 million each year. Even during the COVID-19 pandemic, many citizens decided to escape their cramped homes in order to view scenic routes and vibrant nature.

Educating the millions of people who visit national parks about climate change will increase public awareness of the issue, as well as motivate them to take appropriate action.

Problem Statement and Significance

This research focuses on education initiatives regarding climate change in the unique space of national parks. Global warming raises the Earth's temperatures and sea levels each year. From 1900 to 2018, sea levels have risen an average of 1.6 millimeters each year. From glaciers slowly receding to unbearable heat waves, harmful effects will continuously rise in occurrence each year until further action is taken.

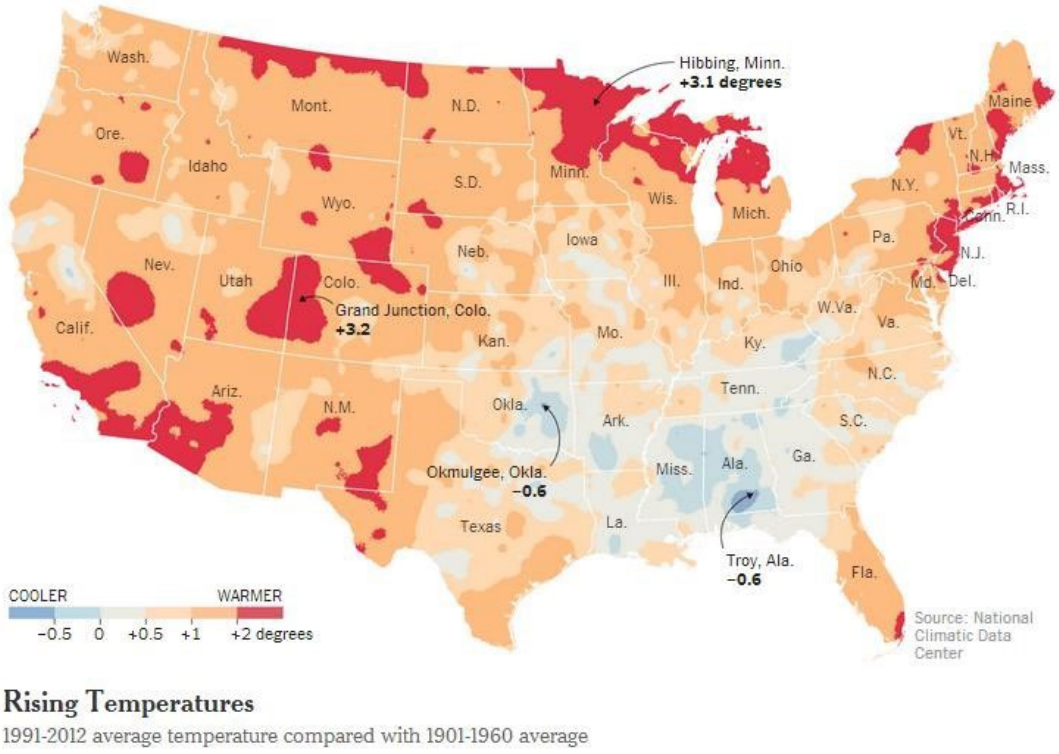


Figure 1. A map detailing the temperature (C) rise in each state.

In 2008, researchers categorized 18% of Americans as being alarmed about climate change. The number dropped to 13% in 2010 (Moritz, 2008). Moreover, "48% of Americans believed that new technologies would 'solve global warming 'without requiring substantial lifestyle change" (Brownlee, 2013, pg 1135). Of course, the number of civilians concerned about climate change should have risen since then due to the sheer number of recorded pollution effects and climate change stories.

However, people still fail to act, which is why implementing or creating new solutions is essential. This idea brings us to the topic of educational programs in national parks. The wide variety of visitors of all ages that come to these parks often come for one or two reasons: to explore and appreciate nature or to research and study different animals or habitats. Both of these reasons allow each guest to not only view the effects of climate change up close but also gain a new perspective. For example, if national parks were to make an example out of trash left on hiking trails, citizens would become much more compelled to relocate their garbage in the

correct bins in the future. The educational lesson of climate change and how regular civilians can adjust their lifestyles becomes much more apparent after witnessing these detrimental effects.

Methods

This research was conducted from the summer of 2022 to the spring of 2023. First, I conducted a review of all 63 U.S. national park websites to explore educational initiatives focused on climate education. I gathered available outlines detailing the curriculum. When information was available, I also tracked each educational program's efficiency and proficiency in teaching through the use of statistics and personal reviews.

In order to understand first-hand experience in national parks, I interviewed park rangers as well as educational specialists by contacting them via the NPS website. On the National Park Service website, I also found information about existing educational programs, as well as updates on new implementations and curricula. I sent emails to each park detailing how the interview would be, the format of each question, how long the interview would take
(approximately 40 minutes), as well as what questions they could expect. I messaged 40 out of the 63 different national parks, from Yosemite National in California to Kenai Fjords National in Alaska, making sure to diversify the parks chosen based on specific factors such as location, environment, and theme of curriculum.

In total, I completed eleven interviews, all of which helped me understand more about the positive and negative effects of different climate educational strategies. The eleven questions asked within each interview varied in specificity and length, and all information received was immediately noted. Additionally, permission-granted video recordings of responses were also saved for later use and were both audio and video recorded via Zoom.

Along with the national park ranger interviews, I scouted for professors knowledgeable about place-based education, which led me to Antioch University's website, "The Center for PlaceBased Education." Two professors were listed, David Sobel and Paul Blocko, whom I emailed to ask for an online meeting to discuss their experiences within the field of place-based education. However, I was only able to have a meeting with Professor Blocko due to scheduling complications with Professor Sobel. During this meeting, similar questions to my past national park ranger interviews were asked, but more time was spent discussing place-based education as a concept at the university level. This meeting was similarly recorded via Zoom after getting permission.

Additionally, I conducted a literature review focused on climate change education initiatives and programs that have been successful and unsuccessful within national parks specifically and in education generally. In total, 20 sources were taken and summarized from Google Scholar, ranging from the idea of climate change education as a whole to smaller points, such as opportunities within national parks. Among the sources summarized, research was included from national parks across the U.S. to parks within Malaysia. Personal stories, as well as useful strategies, were also documented. After going through each source, I created a list of the most and least useful sources to prioritize those that would have been helpful to the framework of this paper.

List of Questions Asked to Park Rangers

1. Could you tell me your name, position, favorite part of a national park, and experience working there?
2. How is climate change affecting your national park?
3. Tell me about your experience with people's level of information about climate change when they come to national parks.

4. Please tell me about any educational programs or initiatives taking place in the national park related to climate change.
5. For each of the programs you mentioned, what is the approach to educating?
6. What do you find most successful about these programs?
7. What do you find most challenging about these programs?
8. If you had full power and resources to design the perfect educational program related to climate change in your national park, what would you keep the same?
9. If you were helping someone at another national park design their education initiative around climate change, what would you advise?
10. As it stands, are there any national park climate change programs occurring? Are there any educational opportunities being provided about climate change?
11. What percentage of people would you say are informed about climate change when coming to national parks?
12. Is there anything else that you find important? Stories or experiences? Anything I should've asked?

Findings

Throughout all interviews taken, the primary focus revolved around different strategies each National Park had, as well as current initiatives and educational programs.

Each park ranger/educational specialist, or PRES for short, had a variety of experiences and strategies used for teaching. However, almost all had a most important point: to take care of the climate. Of course, a form of this idea is standard to many, yet instead of simply raising awareness online, the act of joining educational programs in person and helping clean up the community will be exponentially more helpful toward fixing the Earth.

Along with the important ideas each PRES highlighted, a common technique used to spread awareness is to send educators to teach at local parks, schools, or communities. Many rangers stated that most parks offer their own educational programs within the park as well. Thus, the opportunity to receive climate education while exploring beautiful nature is easily accessible.

In fact, there are many teaching strategies and tactics used in such educational programs to keep students engaged and educated whilst keeping lessons fun. A notable example is how an educational specialist from Kings Canyon National Park used song and dance when teaching young children but made the lessons more advanced yet interactive for high school students. Other specialists taught by either bringing in animals for students to interact with or having student audiences volunteer to play games. Additionally, teaching with stories related to each park's highlights—glaciers, redwood trees, or unique animals—proved to be efficient in catching the audience's attention, further supporting the benefits of place-based education.

However, each PRES also made sure to underscore challenges and problems discovered when teaching. As one example, an audience might have become bored or uninterested in a lecture if it was inappropriate for their age bracket. A national park educator from Yellowstone National Park remembered an instance in

which, no matter what he did, he was not able to get an elderly group engaged at all. From whispered conversations to bored glances across the room, the disengaged atmosphere in the room emitted a sense of boredom. In order to prevent such problems from occurring in the future, he brainstormed ways to keep his audience entertained, such as blending facts about Yellowstone with a personal story. Like many other rangers, he made sure to develop a bond between the audience and the experience at the park to create a shared sense of fear or urgency.

The interviewees also expressed problems with the educational programs themselves, including a lack of funding, staff, and support—all of which seemed to be more acute in less well-known parks. When asked what they would change if given enough money, many explained that they would solve problems or implement ideas relating to their education programs. For example, at Joshua Tree National Park, a PRES explained, "As it stands right now, the vehicles that we use to travel throughout the park unfortunately contribute heavily to the global warming situation." By adding funds and monetary support, gas-free vehicles could be driven instead, further adding to their educational programs 'message on how electric cars are exponentially safer for the environment. Additionally, a ranger from Kings Canyon had a similar statement in that although conventional forms of awareness, such as posters and displays, were effective, a lack of budget toward advertising, unfortunately, proved to be a corresponding lack of awareness as well. He explained that the majority of students learned about offered educational programs through advertisements online or huge billboard displays—all of which are inaccessible or extremely expensive to smaller national parks and even bigger ones.

Literature Review

Climate Awareness

Numerous sources have documented climate change as one of humanity's greatest challenges, and many writers have brought up solutions to counter the ecological obstacle and the disasters involved. However, in any type of global problem, awareness is the most fundamental basis for coming up with a solution. Yet, climate change, in particular, seems to lack such awareness. For example, in a study conducted near the freezing rain crisis in Montreal and the disastrous flooding caused by the melting of ice flows in Moncton, 158 teenagers, ages 14-15, found that many of these children had "little to no awareness on climate change" (Pruneau, 2001). In fact, some refused to believe it, and others felt that warmer temperatures were a benefit to society due to comfortability.

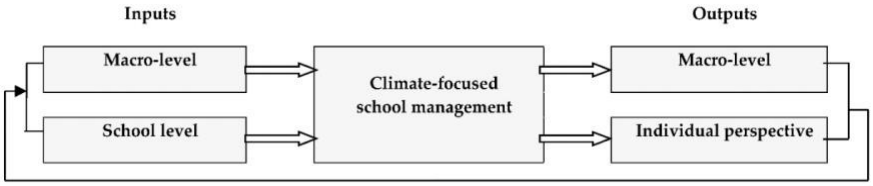
As climate change has increased in recent years, awareness has as well, and a contemporary study performed by Keller (2019) demonstrates that before any type of climate change curriculum is learned, 50% of young children, on average, feel knowledgeable about climate change. From 2012–2014, 343 students, ranging in age from 13-15, participated in the project. More surprisingly, 71% of these children stated they felt much more confident about climate change knowledge after being taught about the subject. This number demonstrates huge strides in realizing that climate change exists and the power of education in transforming mindsets about climate change, even though there may be a lack of confidence on the subject initially.

Additionally, since Keller's study, climate change awareness has increased slowly. This increase in awareness of climate change was also demonstrated by an experiment conducted by Schweizer et al. (2013), which found that climate education is viewed as a top priority within urban parks and refuges that are easily accessible by public transportation and frequently used for field trips with local urban youth (Fg. 1). In this measurement, surveys across 16 different national parks and wildlife refugees were recorded, and when a total of 4,181 participants were surveyed on a seven-point scale (1 = "extremely sure climate change is happening" and 7 = "extremely sure climate change is not happening"), the average number was a 2.5. The target demographic was extremely wide, with half of participating parks/refugees located in urban locations, and the surveys, which took an average of fifteen minutes to complete, were presented at differing locations within parks,

such as at popular trails or viewpoints. This study shows how much climate change awareness has improved. However, making sure everyone gets as close to a score of 1 as possible is a crucial priority to focus on.

While we know awareness of climate change has increased, we are still looking to better understand the methods and solutions that educate and raise awareness efficiently and effectively. One example would be Szczepankiewicz et al.'s figure below, in which two varieties of inputs are shown, one for macro-level inputs and the latter for school-level inputs. The macrolevel input is described as the education system as a whole, which is provided and organized at the regional or national level. Conversely, school-level inputs are relative to specific schools, creating a curriculum based solely on one location. This framework is extremely thorough as it highlights "climate-focused school management", which is described as teachers coming up with extensive education programs to teach based on the effects of climate change in their local area. Additionally, the findings of such programs get recycled to form new curriculums based on past strategies, and climate-engaged speakers educating children can also be included to raise awareness of climate change.

By effectively utilizing locally relevant education, students are able to learn more based on their own community, which helps due to the bond that exists between them. For instance, when this strategy was applied in a real-world scenario, Szczepankiewicz underlines that the same green improvements implemented in school buildings had positive impacts on student performance. In fact, the technologies introduced have the potential not only to increase the educational impact regarding sustainability but also are able to impact the quality of education as a whole, which thus fortifies the argument that climate education provides many synergies to the current system of education and by no means should be treated as an additional burden (Szczepankiewicz, p. 3).



National Park Solutions

As discussed in Schweizer et al.'s (2013) framework, place-based education, defined as "the process of using the local community and environment as a starting point to teach concepts" (Antioch), is an excellent way of educating individuals of all ages using their surroundings. By immersing students in their local heritage, cultures, landscapes, and opportunities, the foundation for teaching all kinds of subjects, especially climate change, can be placed and utilized effectively. For national parks in particular, Szczepankiewicz et al.'s framework works excellently due to the wide range of expertise in parks that are already familiar with educating climate change, as well as visible environments to learn from. Field trips within the park can easily be hosted as well due to parks already being open to the public, and educational specialists or park rangers can host group tours/lectures accommodating a wide variety of classes. As for those visiting from distant locations, parks can similarly accommodate teaching strategies based on their local environment. To elaborate, by connecting people to the land around them through applied learning and experiences in the field, "people will remember lessons and adopt behaviors when they feel a sense of responsibility and have knowledge of consequences" (p. 46). In fact, Jacobson and Padua (1992) demonstrated the effectiveness of one national park, the Kinabalu Park in Malaysia, in educating about climate change by targeting students aged 10 to 13 in their curriculum. This module was made from and included school resources, teacher inputs, and student interests. Although the initial goal was to simply introduce children to such a park, which previously had very few local students, by the end

of each education program, "students [were] able to… 1) list benefits of the park, 2) explain several ecological principles and 3) identify several common plants and animal and their adaptations to the environment" (291).

All of these traits highlight the success of national parks, and "it was important to involve school systems and students, as well as their families" (219). However, Jacobson and Padua also demonstrate another key component: implementing after-program activities for students to increase their exposure during their visit. By allowing more education to result even after visiting, students were able to practice concepts learned and comprehended significantly more.

In fact, allowing students to learn even after park visits seems to be a crucial concept across many different national parks in the U.S. as well. In 2012, Denali National Park Ranger Andrew Keller presented a talk focused entirely on climate change, warning visitors about glaciers that could disappear in the next 30-40 years. However, after discussing such imminent landscape changes, "Keller handed out a pamphlet describing ten ways that park visitors can reduce their environmental impact once they return home. For visitors missing such a directed talk, two books [were] available" (pg. 442). The success of including after-program education was shown when the park observed 250 optional surveys recorded throughout the span of 10 days (June 2012). "The survey consisted of open-ended and closed-ended questions, multiplechoice questions, and agree–disagree rating scales," and the results were all positive, with 93% of people agreeing that national parks should teach sustainability.

The current National Park literature available online is large, with a surplus of examples of climate education all over the world, yet it is insignificant compared to the rising challenge of climate change. With additional focus and more knowledge on place-based education and similar teaching strategies, perhaps more students and learners, young and old, will be able to be educated more efficiently and effectively. This study fills that gap by highlighting the importance of such educational concepts and providing a strong foundation for climate initiatives both in national parks and in other learning environments.

Conclusion

Climate change has been and will continue to be humanity's greatest obstacle as time goes on. Unawareness persists, harmful policies remain unchanged, and countermeasures for contributing factors are ignored. However, with a change in mindset, education strategies, and climate implementations, such as using public environments for learning, climate change may be slowed down and even stopped.

Implementation of place-based education not only within national parks but within all types of green spaces will bring awareness to climate discourse as a whole. The general public will also be able to see environmental issues as problems that humanity as a whole must resolve, not as ones that do not affect them and others in first-world countries.

Throughout the entirety of this research process, each PRES serving the national park community stressed one simple idea: Take care of the planet. It seems foolish to simply blame companies, governments, and other countries for global issues, especially when other animal and plant species are affected as well. Thus, to raise more awareness and combat humanity's greatest obstacle, effective climate change education should be implemented everywhere—in schools, community gardens, and public spaces around the world, and place-based education should be emphasized in order to achieve the best results.

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