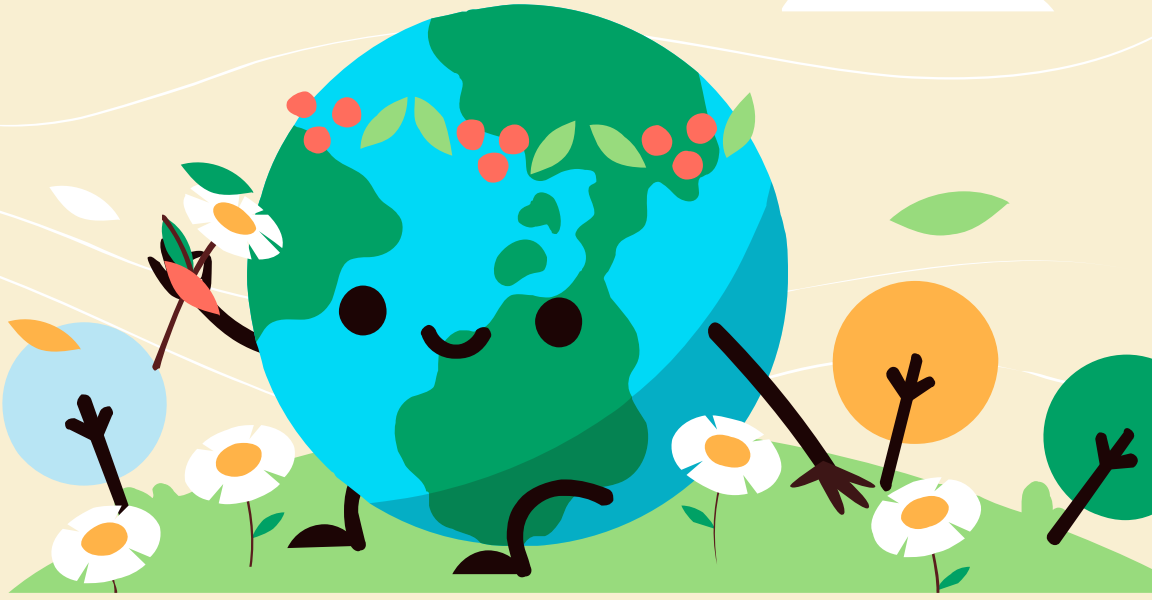
The Footprint

New Jersey State
Science Day
Competition 2022



Environmental Nihilism

The Problem→Climate Nihilism

- Climate nihilism is the belief that no action any person does can mitigate climate change.
- Due to feelings of climate nihilism, people feel discouraged and therefore do not take proactive measures to combat greenhouse gases.

The Community → Bergen County

- 46.7% of Bergen County residents don't believe that climate change will affect them personally.
- Climate nihilism is quite widespread as about 25% of people in this area don't believe that climate change is a worrisome problem.



Strategy → App

- Determine an individual's carbon footprint.
- Identify ways to decrease carbon emissions.
- Demonstrate the positive effects of their efforts upon their immediate community.

Limitations

- All people may not be able to readily adapt to lifestyle suggestions.
- There may be certain individuals who are resistant to make changes in their lifestyle.

Conclusion

- Users of the app will be instilled with a newfound sense of hope and will immediately see the positive results in Bergen County.

Description of Bergen County

Geographic Location

- Bergen County has many hills in a piedmont region.
- Several waterways and rivers pass through the county.
- A varying temperature creates a diverse landscape in the area.

Population Demographics

- Bergen County's residents are of varying identities. 55% are White, 16.6% Hispanic, 16.4% Asian, 5.1% African American, and 2.5% as other.
- Bergen County also has the largest Jewish population in NJ.
- The average age of a Bergen County resident is 41.9 years old.

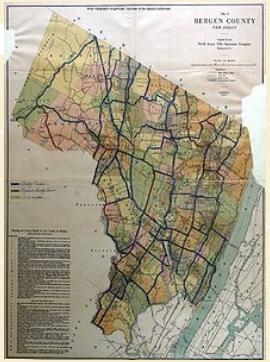
Economic Factors

- Bergen County overall is known to be one of the richest counties in New Jersey. However there is a bit of a disparity as townships such as Hackensack, Paterson, Garfield, and Fairview have median incomes of less than $60,000, making these areas below the poverty level.
- This contrasts with richer parts of this county with average household incomes above $100,000.

Land Use and Population Distribution

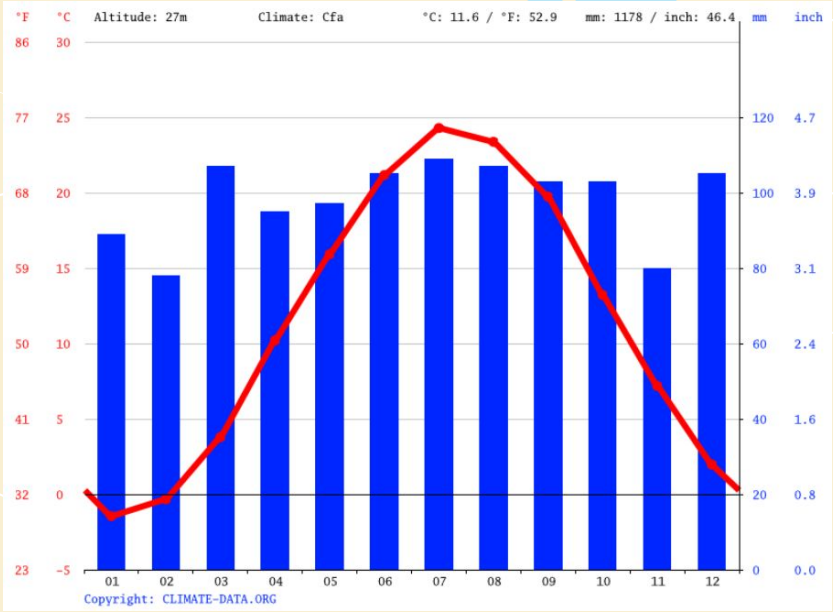
- Bergen County is mostly a suburban area with a location adjacent to New York City.
- Bergen County has a mix of residential, rural and urban as well.

Figure 1: Bergen County Map



Current Climate in Bergen County

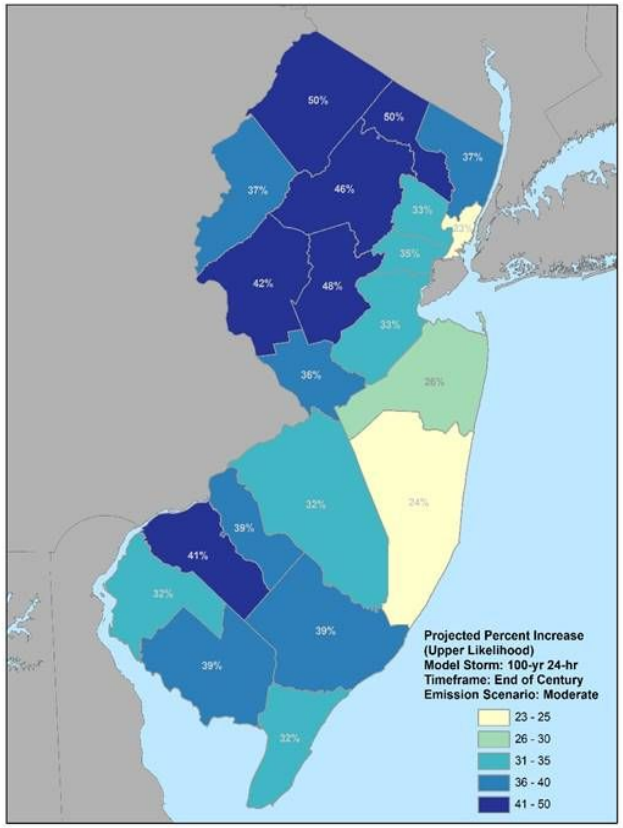
- Bergen County falls in the humid subtropical climate zone and experiences temperatures ranging from 34 degrees fahrenheit in the winter time to 87 degrees fahrenheit during the summers.
- Average rainfall in Bergen County is 51 inches per year. (Pic 1: Climate Graph Bergen County)
- The New Jersey weather patterns are influenced by the strong wind flows from west to east bringing hot, wet and dry air to the citizens of Bergen County.
- These "westerlies" bring varying weather including thunderstorms and heavy rains at times.
- In addition to the strong winds, the mountains also affect the weather patterns.
- The Atlantic Ocean is adjacent to Bergen County leading to strong precipitation.



Graph 1: Bergen County Climate Graph

Evidence of Climate Change in Bergen County

Figure 1: Projected Percent Increase in Rainfall



- Current precipitation is 2.5% to 10% higher in Bergen County as compared to that of 1999.
- The precipitation expectations that presently guide state policy, planning and development criteria rely upon older data from 1999. Using outdated information will lead to faulty predictions about State sponsored construction such as bridges and roads.
- Precipitation may increase as much as 20% by the year 2100.
- Bergen County may be one of the most hard hit area in the state of New Jersey as some estimates predict a 50% increase in precipitation.
- The projected increase in rainfall is shown in Figure 1.
- Recently, during the hurricane Ida storm of 2021 that passed through Bergen County, I saw numerous cars submerged as well as inundated homes in low lying areas.
- The continued increases in rainfall will lead to further death and destruction in Bergen County.

Impact of Climate Change on Bergen County

- Although 46.7% of Bergen County residents don't believe climate change will affect them personally, this assertion is inaccurate as Bergen County becomes more dangerous to live in year after year.
- Many waterways pass through Bergen County, which means flooding is an imminent threat.
- As the climate changes, increased rainfall causes these waterways to contain more water and overflow.
- In the attached figure, we can see that numerous areas in Bergen County are heavily affected by rising water levels. The areas shown in turquoise and pink are flood prone areas.
- These areas have experienced numerous floods over the past 100 years.

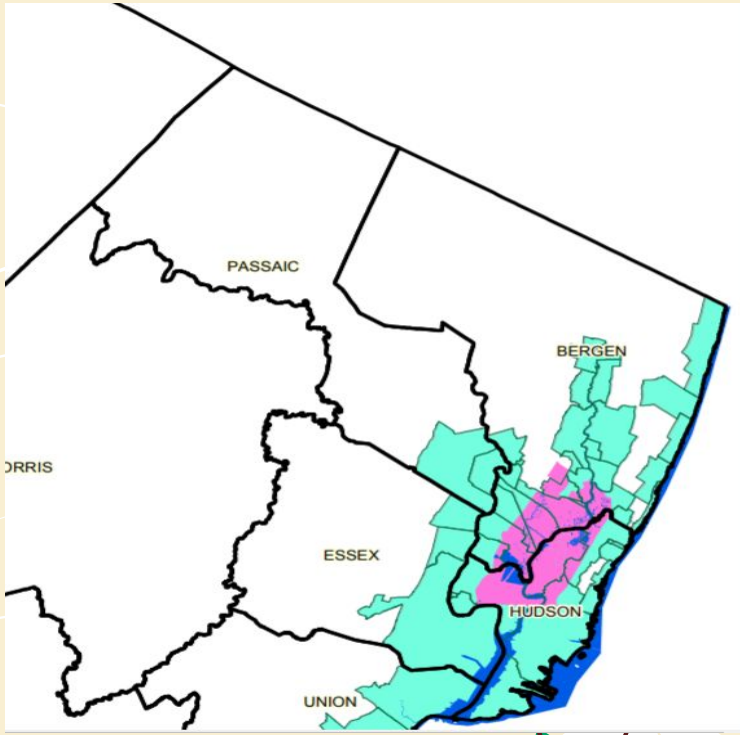


Figure 1: Bergen County Flood Areas

Flooding in Bergen County



Figure 1: Recent flooding

- Bergen County is a hilly region and as a result low lying areas are more prone to flooding.
- People in areas of low elevations are most disadvantaged. They are often poorer as compared to those living in mountainous regions.
- Floods can be very dangerous as they have many consequences. They can cost people their lives and damage property.
- Every year the cost of floods totals greater than $500 million dollars.
- This cost estimate will continue to increase as flooding worsens.
- Current estimates are greater than $2 billion dollars for 2022.

Addressing Climate Change in Bergen County

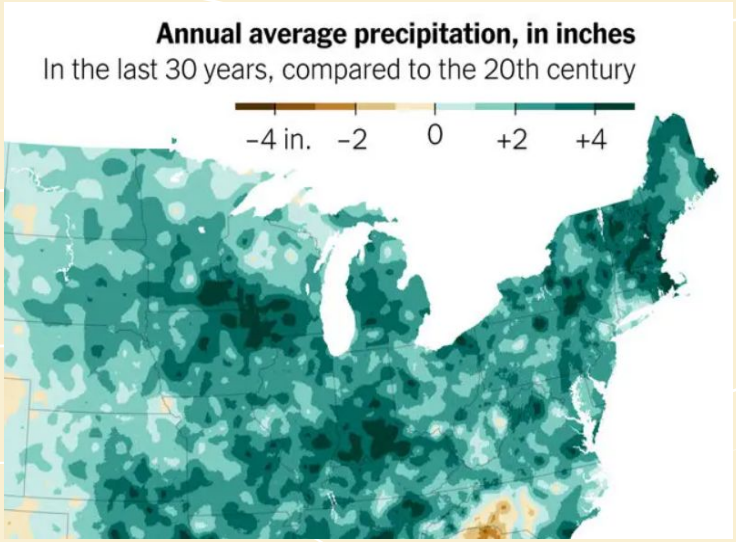


Figure 1: Current Rainfall in Bergen County, NJ Compared to Past Rainfall (1900s)

- I would like to reduce carbon emissions in order to tackle the problem of increasing precipitation.
- “The Footprint” will be an app that will provide information about an individual’s carbon footprint.
- By collecting some basic information about personal habits regarding driving, meals and housing, it will give detailed information about carbon emissions.
- Then, the app will give tips and insights into methods of curbing greenhouse emissions.
- Finally, this app will show the effects of a person’s efforts on the immediate community where they live.
- This app would also show people how changes in their carbon footprint will affect the precipitation over the next year.
- The potential future weather will be based upon changes being made today to reduce greenhouse gasses.
- In the attached figure, we see that rainfall totals have been steadily increasing in Bergen County (Figure 1).

Action Plan: “The Footprint” App

- Ignoring the catastrophic process of climate change is no longer acceptable.
- We must act to ensure that citizens of Bergen County accept the science around this topic to show them that their efforts are meaningful in the war against climate change.
- “The Footprint” will motivate individuals to take action as they become more aware of their individual impact on the environment in their communities.
- We recommend this app for all residents of Bergen County.
- To promote this app among residents of Bergen County, we will work hand in hand with political climate change organizations such as “Sunrise Movement.”
- Pranav Hooda is an active member of this organization and advocates for the Sunrise Movement in Bergen County. We plan to work with him in advocating our app.
- We will also inform local high schools, universities, and other community centers to raise awareness about the topics of climate nihilism and environmental changes in Bergen County.
- Our launch day will be April 22, 2022 which is Earth Day. We plan to promote our app around Bergen County until this day and will continue to do so afterwards.

Figure 1: Sunrise Bergen Logo

“The Footprint” in Action

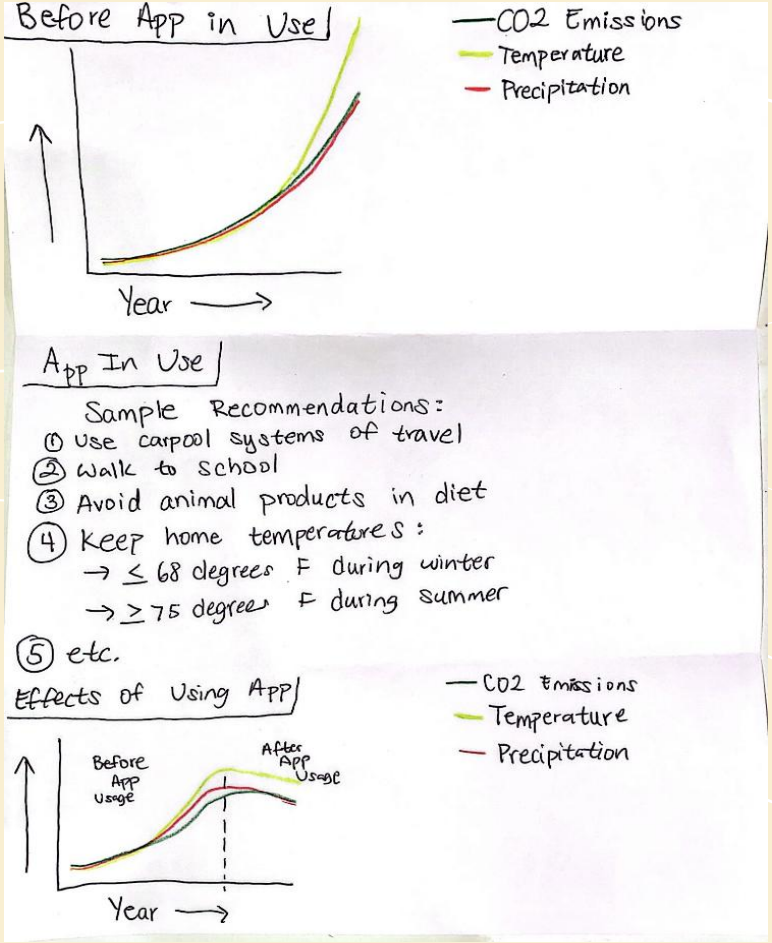
- Users of this app will begin by entering basic information about their home, travel, food consumption, and shopping expenditures.
- Once an individual enters their address, the software will connect to the local electric utility and download exact electricity usage by the user(s).
- Car or truck mileage information along with the make and model of the car/truck will be used to calculate the estimated gasoline usage. This will provide carbon emission data to the software.
- The Footprint will collect information about what types of foods and the amount of food that the user eats. This will provide the approximate energy required to produce the food and transport the food to the consumers for consumption.
- The app will need to collect information about shopping habits and expenses for the consumer. The consumer will gain information about the pollution created from factories and other consumer goods manufacturers.
- This information will calculate an individual’s estimated greenhouse gas production for the entire year.
- Further, the users address and economic status will be obtained to give more personalized recommendations about ways to reduce the greenhouse gases.
- For example, in certain areas of Bergen County there are no sidewalks for pedestrians, forcing residents to travel by motor vehicle in turn increasing carbon emissions. The app may recommend users to use a carpool system to travel.
- The app will then calculate what the change in carbon emissions will be for individuals and how over a period of time using the recommendations made by the app, there will be an overall decrease in carbon dioxide emissions in Bergen County.
- Using this trajectory of decreased carbon emissions, the app will then show possible impacts on weather in the future.

Consequences and Limitations

- The users of this app may be reluctant to provide sensitive information such as home address and financial information.
- In order to protect the privacy and security of all users, the developers of this app will put into place robust security measures such as encryption and password protection.
- Additionally, the recommendations provided by the app may be difficult to implement and maintain in daily life. For example, the app may suggest the users to buy a new automobile that provides better gasoline efficiency. This may not be feasible for many individuals due to cost constraints.
- Other ways to overcome the infeasible recommendations will be to provide additional methods of decreasing carbon emissions.
- The benefits of using this app will be increased self empowerment and motivation to improve the environment.



Explanatory Model



- As carbon dioxide emissions increase, the trends show that temperatures and precipitation are rising in Bergen County.
- The Footprint will provide information to users about simple and direct ways to reduce carbon emissions.
    - Common suggestions include using carpool for short travel such as school or work.
    - Walking to school or church when possible.
    - Avoiding excessive heating during winter months and excessive air conditioner usage during summer months.
- The reduced greenhouse emissions will lead to declines in global temperatures and precipitation.
- This will prevent soil erosion and flooding in Bergen County.

Making Footprints

- In a survey I asked 50 people in this area to respond to several questions. I received 26 responses.
- I provided definitions for the terms “climate nihilism” and “carbon footprint.”
- The following questions were on the survey.

  Do you feel a sense of nihilism in your feelings towards climate change? YES or NO
  Are you aware of your personal carbon footprint? YES or NO
  Do you think you can change your footprint? YES or NO
  Are you willing to learn ways to decrease your personal carbon footprint? YES or NO

- The responses showed that 12 persons (46.2%) had feelings of nihilism.
- The responses showed that only 2 persons (7.6%) had information about their personal footprint.
- The responses showed that 16 persons (61.5%) thought that their footprint could be changed.
- The responses showed that 15 persons (57.6%) were willing to make changes to decrease their footprint.

- The survey responses provided detailed information about local residents of Bergen County.
- In order to further improve the problem, social media and news outlets will be essential to persuade residents of Bergen County to implement these changes

Social, Economic and Environmental Equity

1. How “The Footprint” Impacts Equity in Bergen County:
    a. This community is largely affluent. However, those who are affected most by climate change in this county are those who are placed in less advantaged geographical locations near waterways and not on hills, and these such communities often have lower incomes. To promote equity in these communities, I will give suggestions in my app that will minimize changes to people’s lifestyles. The economic status and environment of individuals will be a factor in the suggestions given.

1. How “The Footprint” Impacts Equity in Other Communities:
    a. People most affected by climate change are those who are economically and socially disadvantaged. To promote the equity of these communities, we will promote this app to those who can afford to make lifestyle changes and therefore improve the climate for all citizens.



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