

# Visualizing Connections Between Watershed Health & Neighborhood Wealth

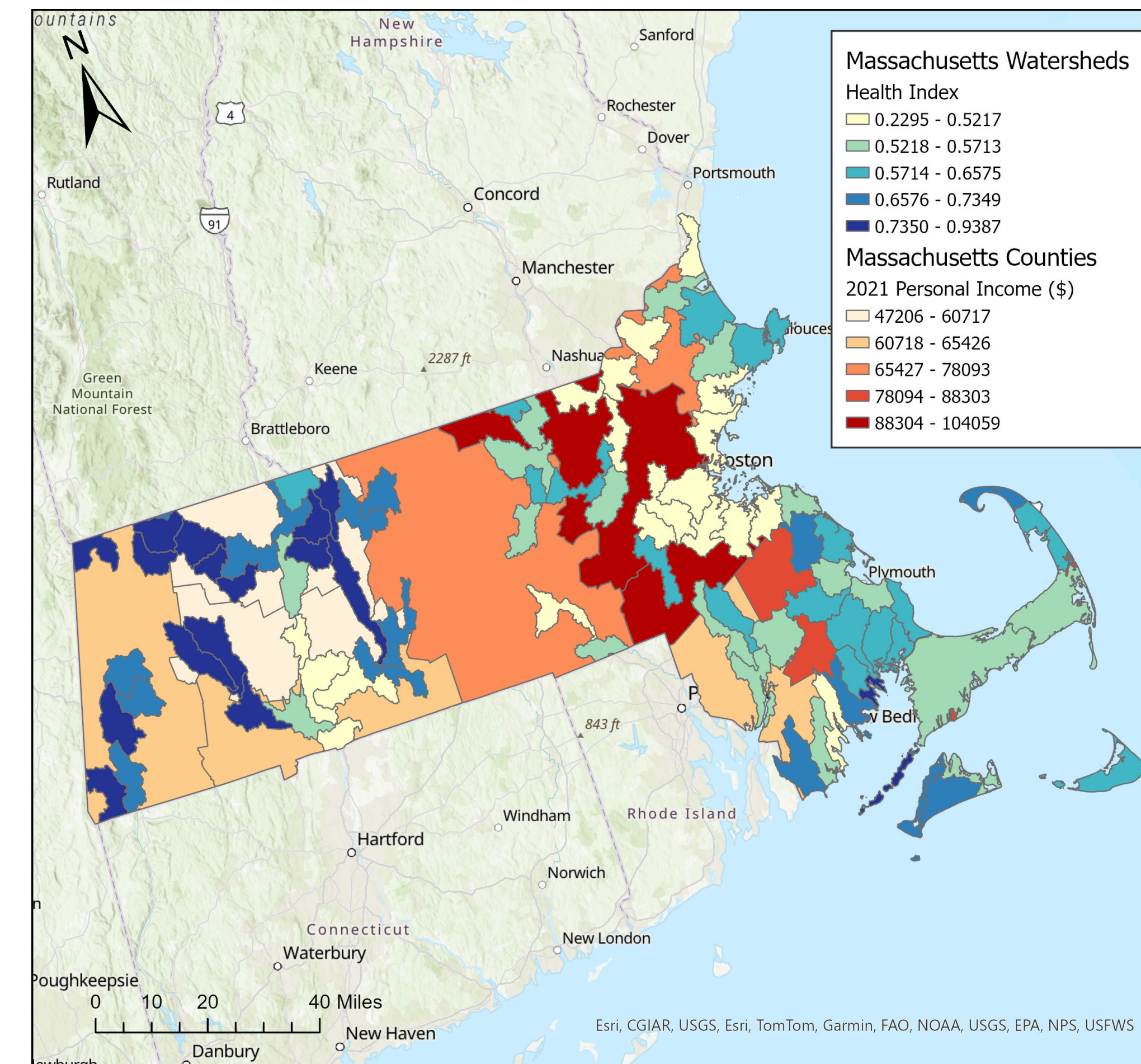
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## Introduction

- Watersheds are areas of land where the water that falls in them all runs to the same place.
- They can be defined at different scales: this project uses HUC12 watersheds, which are about 35 square miles each (EPA, 2024).
- By dividing up large pieces of land into smaller ones, scientists can examine environmental health in an organized way, and track where water is moving, which is especially important because when water flows it can bring pollution with it and impact connected water bodies.
- Additionally, healthy watersheds provide important ecosystem services like clean drinking water, habitat for wildlife, and flood control.
- County wealth was chosen as the second main factor in this project because many environmental problems disproportionately affect less-wealthy communities.
  - For example, in the United States it has been found that people of lower socio-economic statuses are more likely to be exposed to air pollution, which can cause heart and lung problems (Bell and Ebisu, 2012).
- Since watershed health serves to illustrate the integrity of crucial ecosystem services, **it is important to understand if some people get to enjoy these benefits while others don't.**

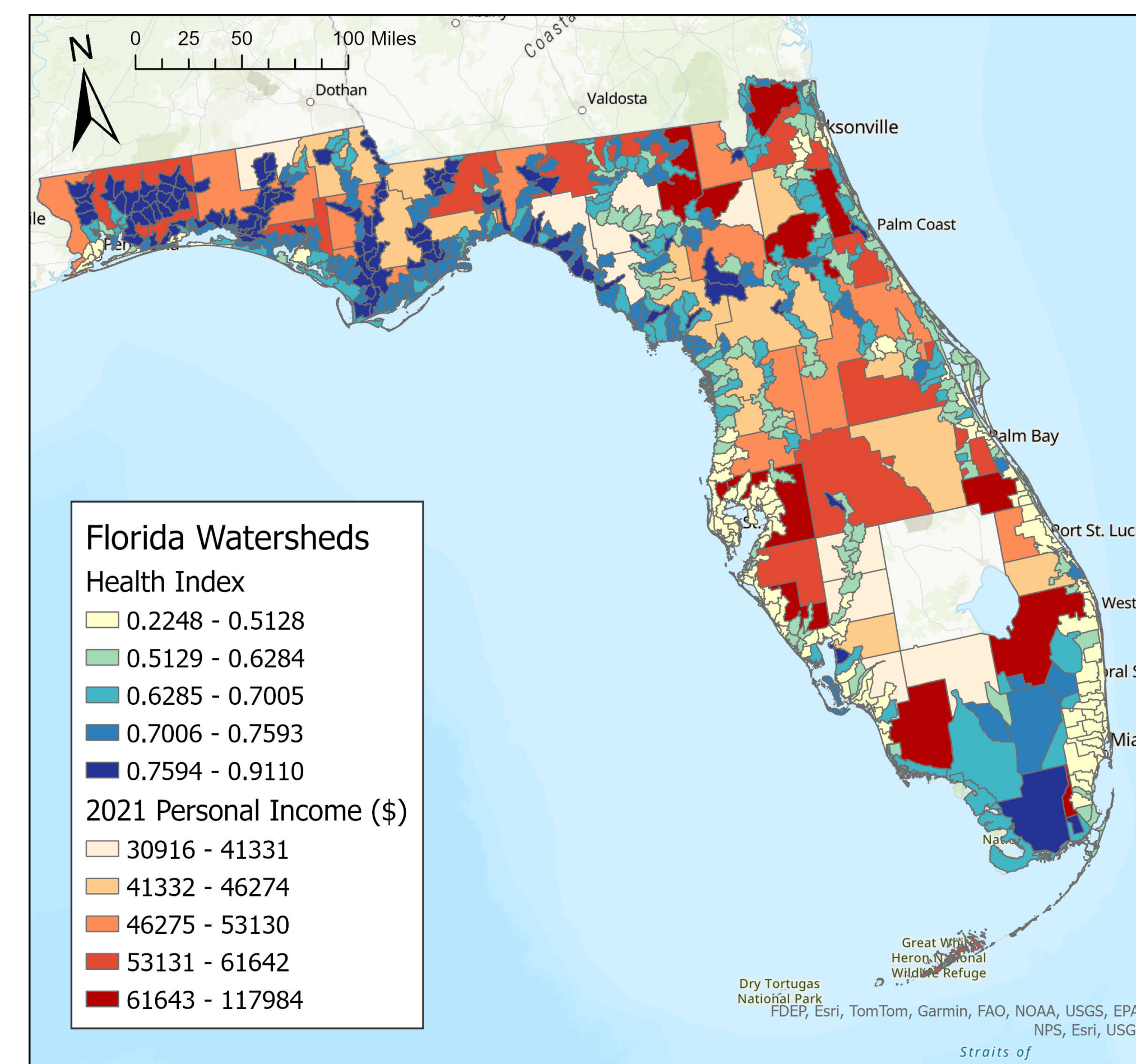
## Methods

- Watershed health has been defined by the EPA's Watershed Health Index, which compares the integrity of watersheds within each state.
- Index scores were made publicly available through the Preliminary Healthy Watersheds Assessment (PHWA), and the scores go from 0 (unhealthiest) to 1 (healthiest).
- These watersheds and counties have been filtered down to watersheds that are either on the coast or overlap with rivers that flow into the Atlantic Ocean and have a flow rate of  $10\text{ m}^3\text{s}^{-1}$ . This creates a focus on areas that have more direct impacts on the Atlantic Ocean and the health of coastal waters (EPA, 2024).
- The data for average income per county was downloaded from the U.S. Bureau of Economic Analysis website.

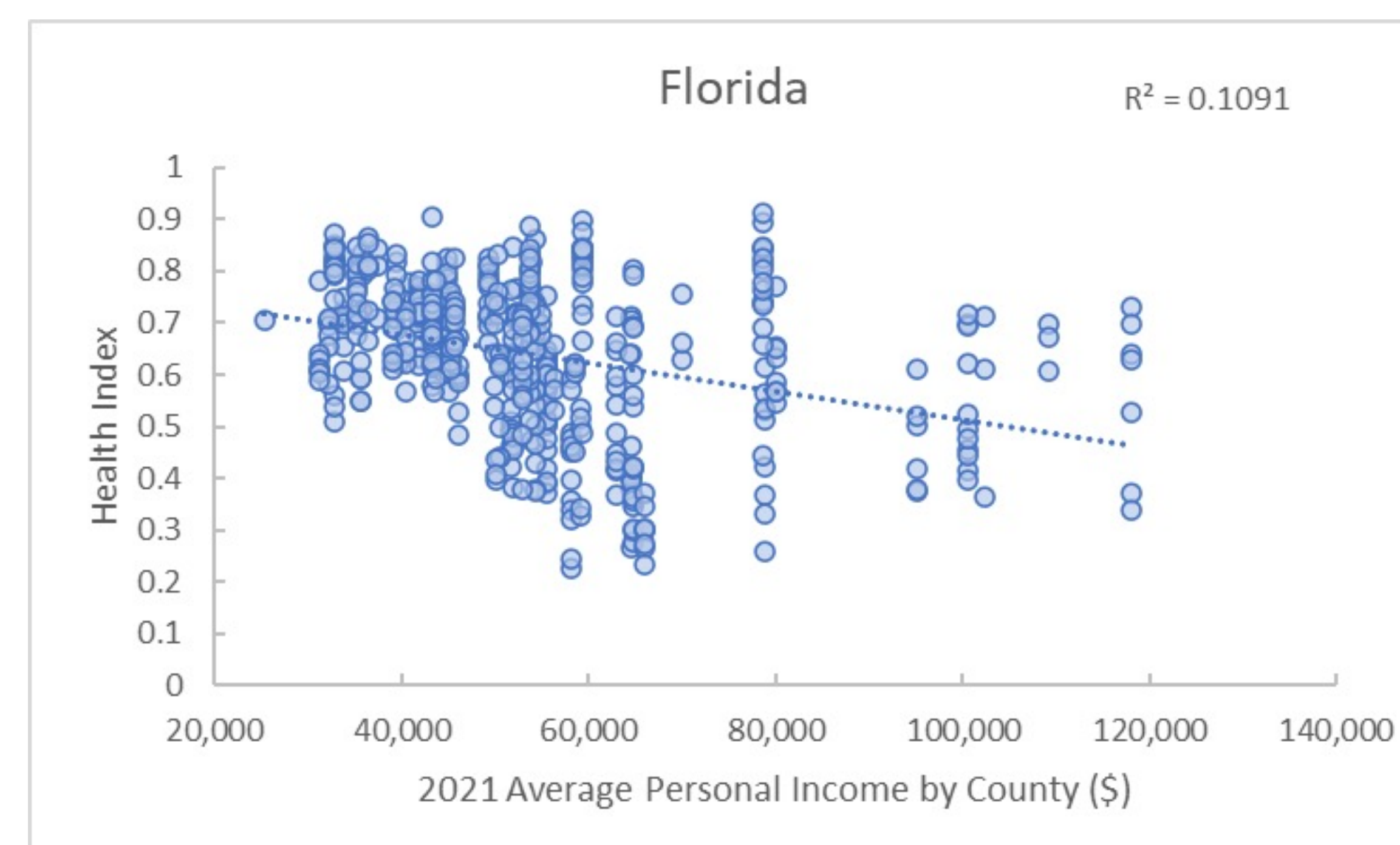


**Figure 1. (left):** A map of the selected watersheds and counties in Massachusetts. Lower average income counties and unhealthier watersheds are in lighter colors, and vice versa.

**Figure 2. (right):** Watershed health and average per capita income in Florida.



**Figure 3. (below):** A scatterplot for Florida showing the negative relationship between the health index scores and average personal income.



## Results & Discussion

- The first main finding is that **watershed health index scores and average income per county in 2021 have a negative relationship** in almost every state.
- This relationship tends to be slight, but still significant. The negative trend is especially interesting because it means that wealthier areas tend to have unhealthier watersheds, unlike many environmental issues, where less wealthy areas usually suffer from a degraded environment (Johnston and Cushing, 2020).
- The second main take-away is the pattern of where unhealthier watersheds are often clustered. In states like Florida, Maryland, and New York, **there are notable groups of unhealthier watersheds around large cities.**
- Based on the indicators of health that the EPA used, the effects of urbanization may be reflected so strongly in the final index because of cities' negative impacts on landscape condition (EPA, 2021).

## Public Action Points

- In addition to the work that organizations and governments are doing to improve watershed health across the United States, **there are also ways for ordinary citizens to help improve the watersheds we live in.**
- Examples include disposing of household chemicals by taking them to a hazardous waste center instead of pouring them down the drain, using plants in gardens, yards, and other green spaces that require little or no watering, pesticides, or fertilizers, and even just picking up after your dog and disposing of the waste properly (The Nature Conservancy, n.d.).
- It is also important for people to teach themselves about watersheds, such as by exploring the EPA's Watershed Academy page, which compiles watershed management resources and watershed learning modules, or by joining their Healthy Watersheds listserv (EPA, 2024).
- Searching for watershed conservation volunteer opportunities near you can also provide ways to join with other community members to improve your environment, home, and life.