

Using GIS to address climate change

It is time to take action! Use your voice to discuss how GIS can support actions to address climate change

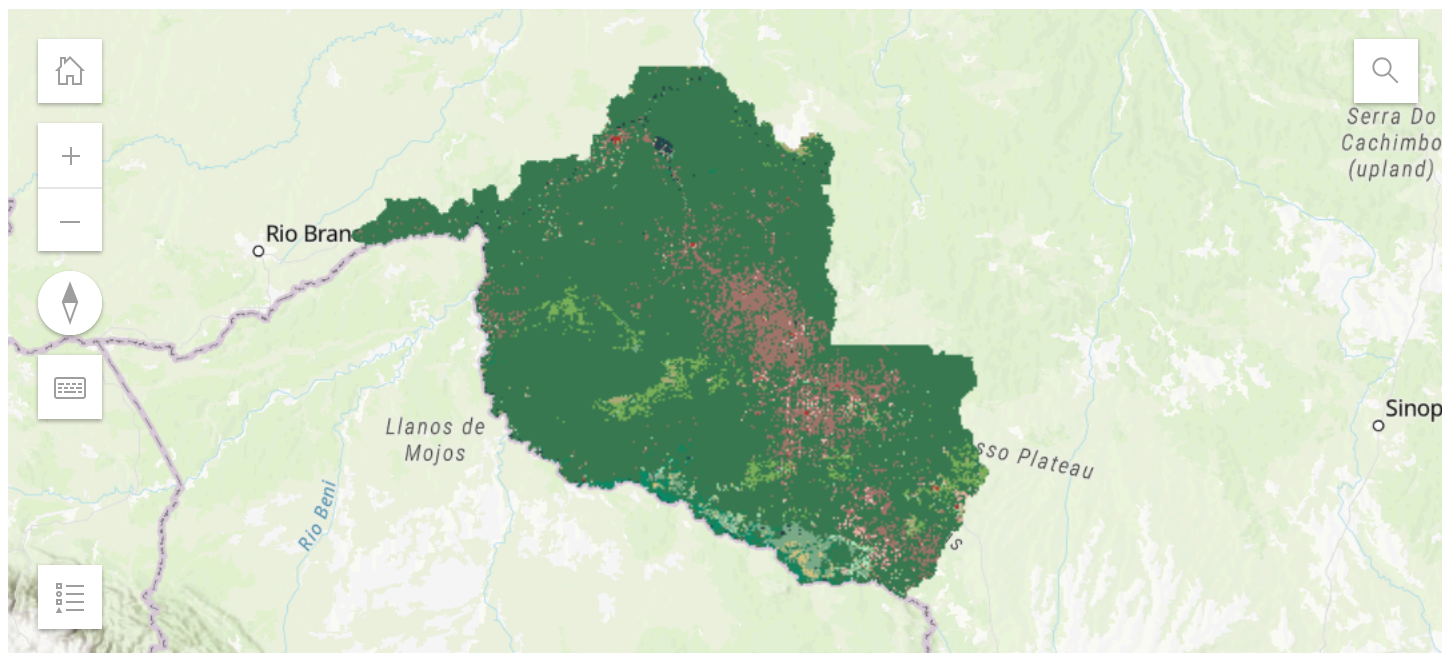
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Ways to address climate change

Climate change can be addressed in the following ways:

- Visualizing climate change data
- Mitigating greenhouse gases
- Understanding exposure to climate-related hazards
- Assessing vulnerability and risk
- Investigating risk reduction options and planning
- Taking action

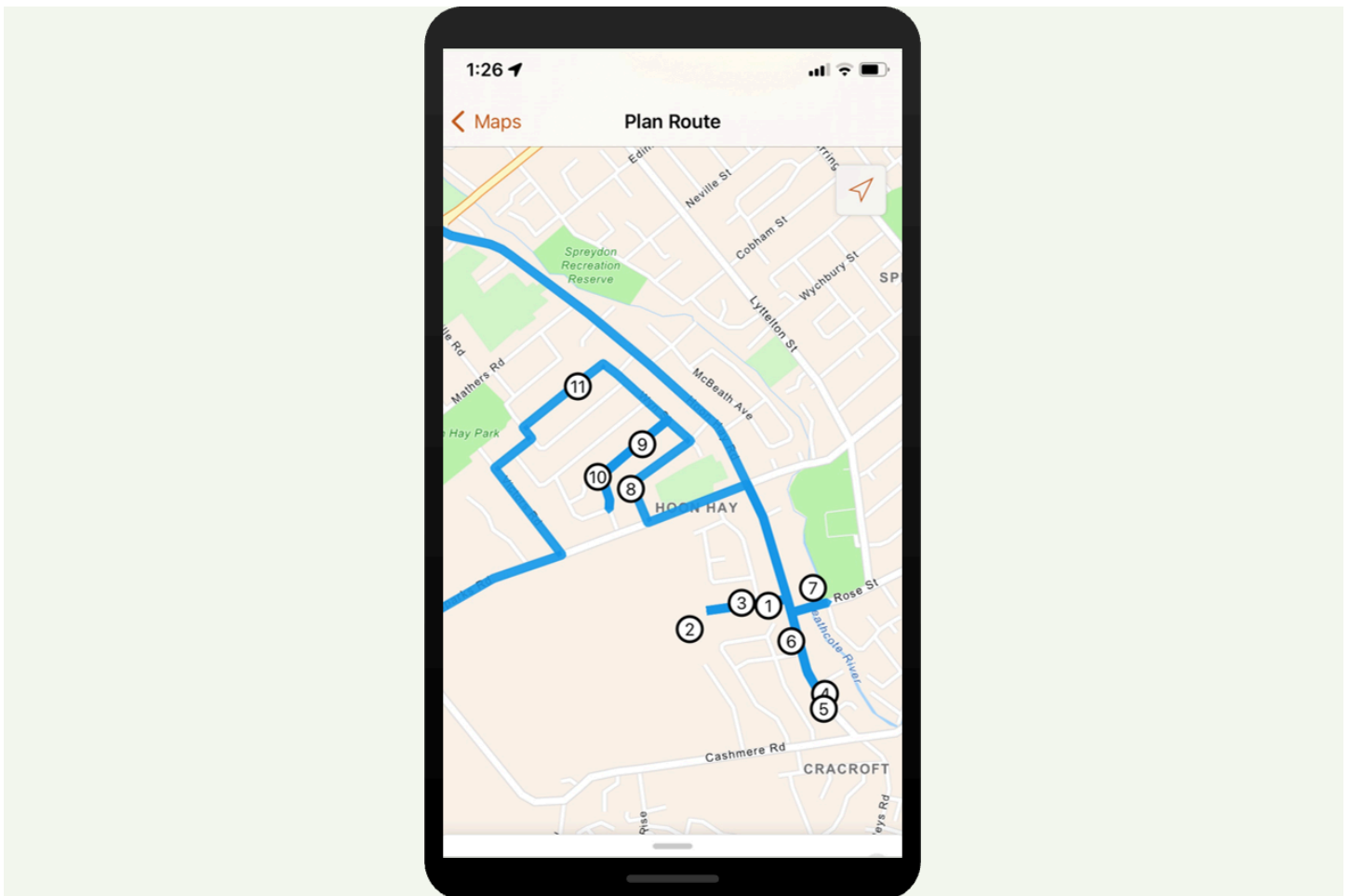


Esri | TomTom | Garmin | USGS | FAO | NOAA | Defourny, P., Lamarche, C., Bontemps, S., De Maet, T., Van Bo... Powered by Esri

Visualizing climate change data

Scientists have been measuring weather variables like temperature and precipitation for more than a century. This historical data has allowed the creation of climate models that can be combined with GIS to visualize and plan for the future impacts of climate change.

For example, GIS can be used to map, visualize, and calculate land cover changes over time to determine where deforestation is occurring. It is important to understand the scope of deforestation because forests create a cooling effect on our planet and act as carbon sinks. These maps show the land cover change that occurred in Rondônia, Brazil, between 1992 and 2020.



Mitigating greenhouse gases

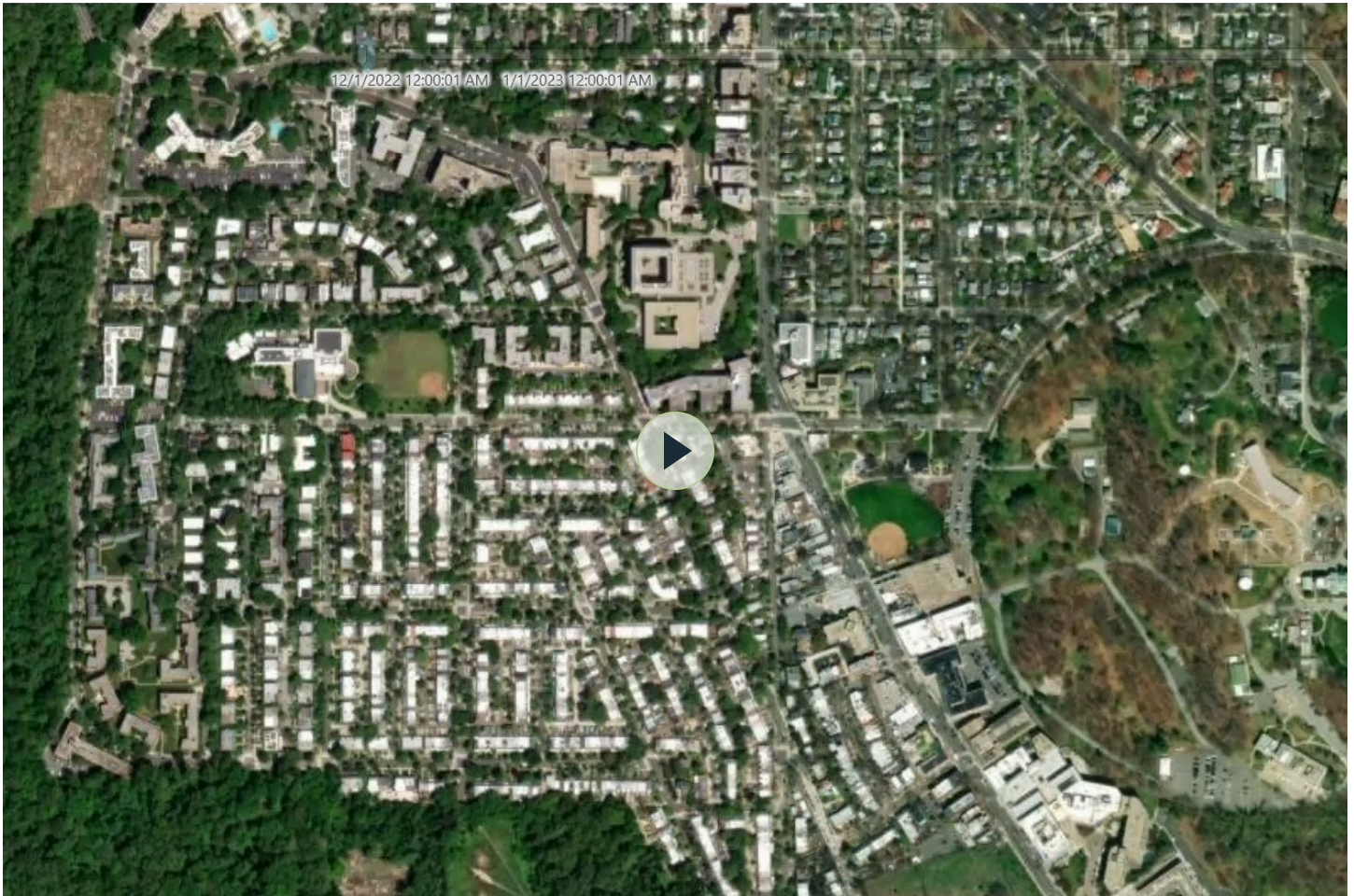
Spatial data is the key to mitigating greenhouse gases. Using location and data allows us to integrate, analyze, and understand our data in new, visual ways. Although climate change is a global issue, GIS can be used to plan and model the most impactful solutions at a local level.

Vehicular sources

Studies have shown that optimizing vehicle routes can reduce fuel consumption and greenhouse gas emissions by 10 to 30 percent. An optimal vehicle route considers several factors, such as destinations, streets, barriers, and greenhouse gases.

For example, this screenshot of ArcGIS Navigator shows the most fuel efficient route for delivering produce based on a network analysis in ArcGIS Pro. Delivery drivers can use ArcGIS Navigator to

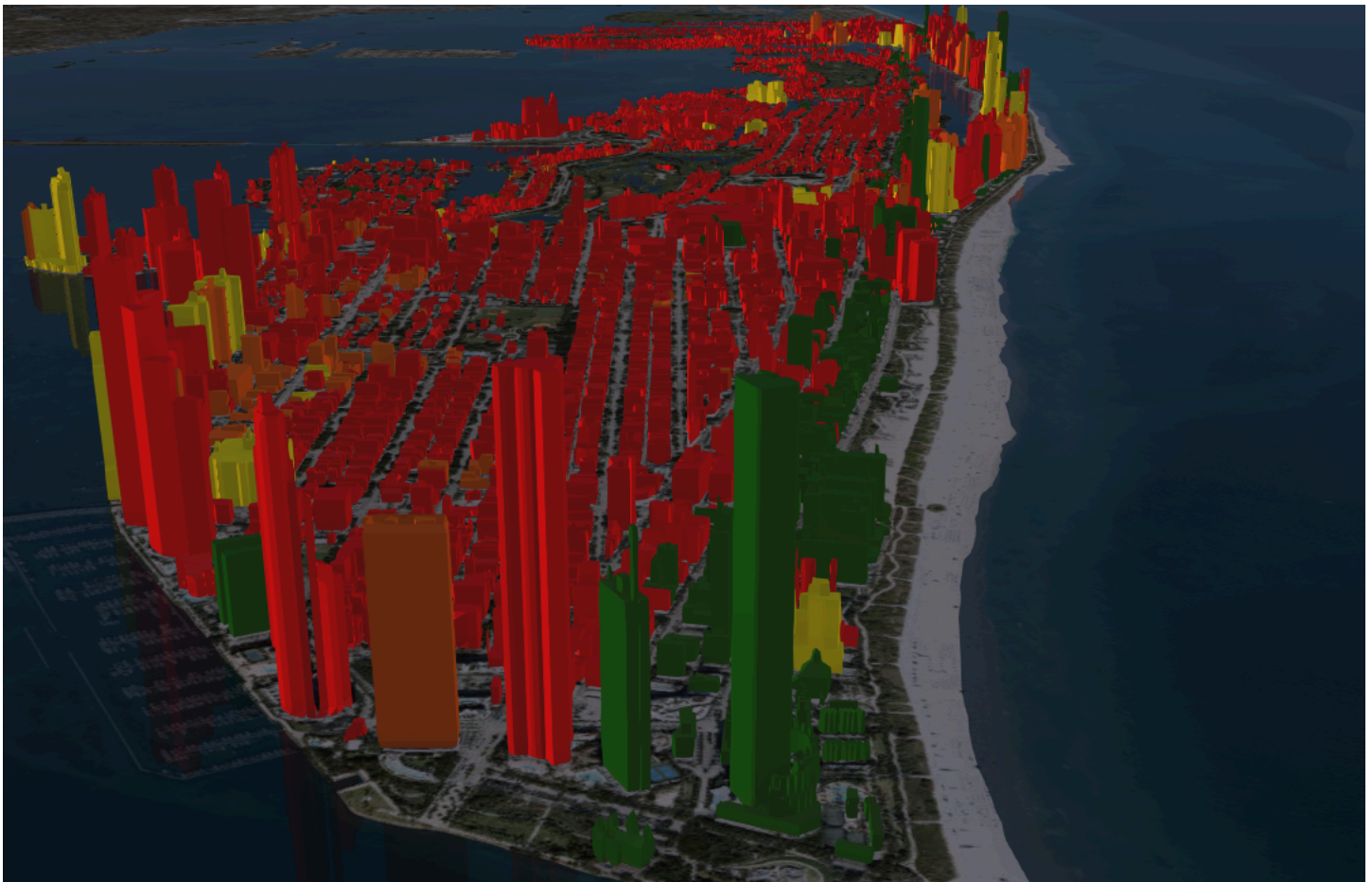
get driving directions along optimized routes that were created in ArcGIS Pro.



Electricity sources

Switching to a clean energy source, such as solar, is a powerful solution for mitigating greenhouse gas emissions. While solar is a great alternative energy source, this option is the most viable in locations with a high potential for solar radiation throughout the year.

For example, this animation shows the results of a solar radiation analysis in ArcGIS Pro. It shows the change in solar energy potential for the buildings in the study area over the course of a year. Shades of blue show lower energy potential while shades of yellow, orange, and red show higher energy potential.

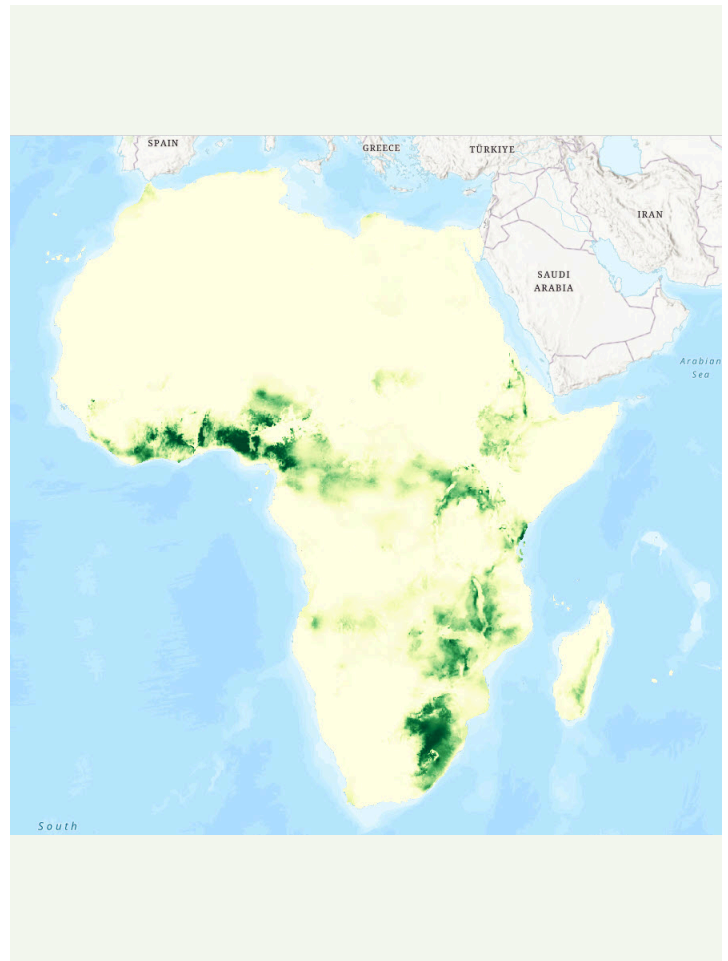
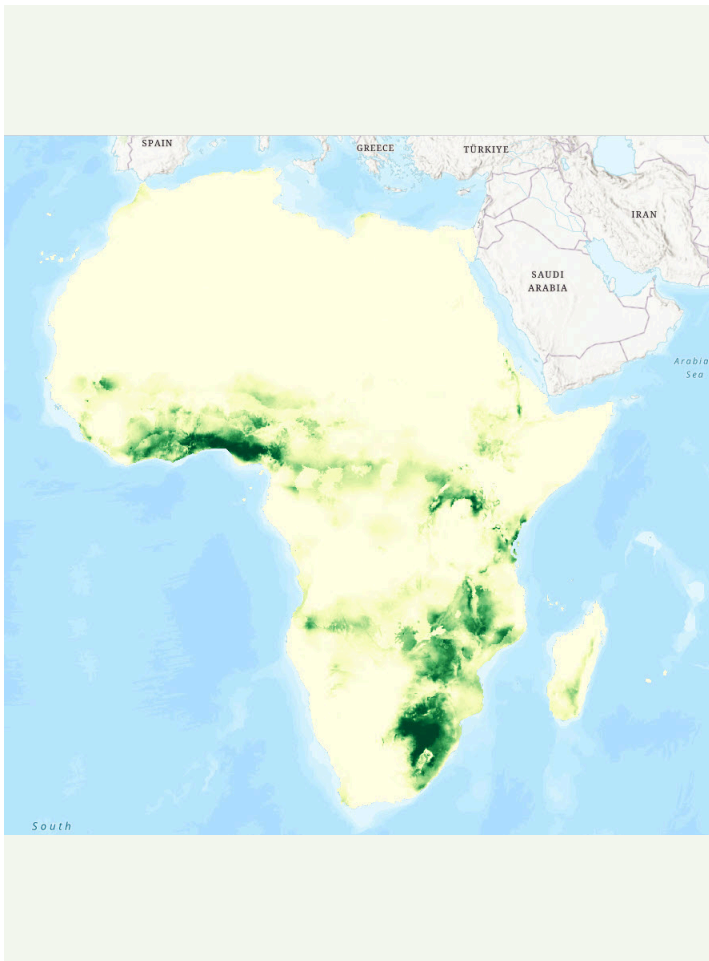


State of Florida | Vantor | Sources: Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, GEBCO, N Robinson, NC... Powered by [Esri](#)

Understanding exposure to climate-related hazards

More frequent and intense climate-related hazards, such as drought, coastal flooding, and extreme heat, are a clear effect of climate change. Exposure to worsening climate-related hazards requires us to prepare for how these hazards will affect our communities now and in the future.

For example, communities and organizations can model sea level rise to identify infrastructure that will be affected by coastal inundation and to make informed decisions. This web scene provides a 3D visualization of sea level rise to support local planners and decision makers.

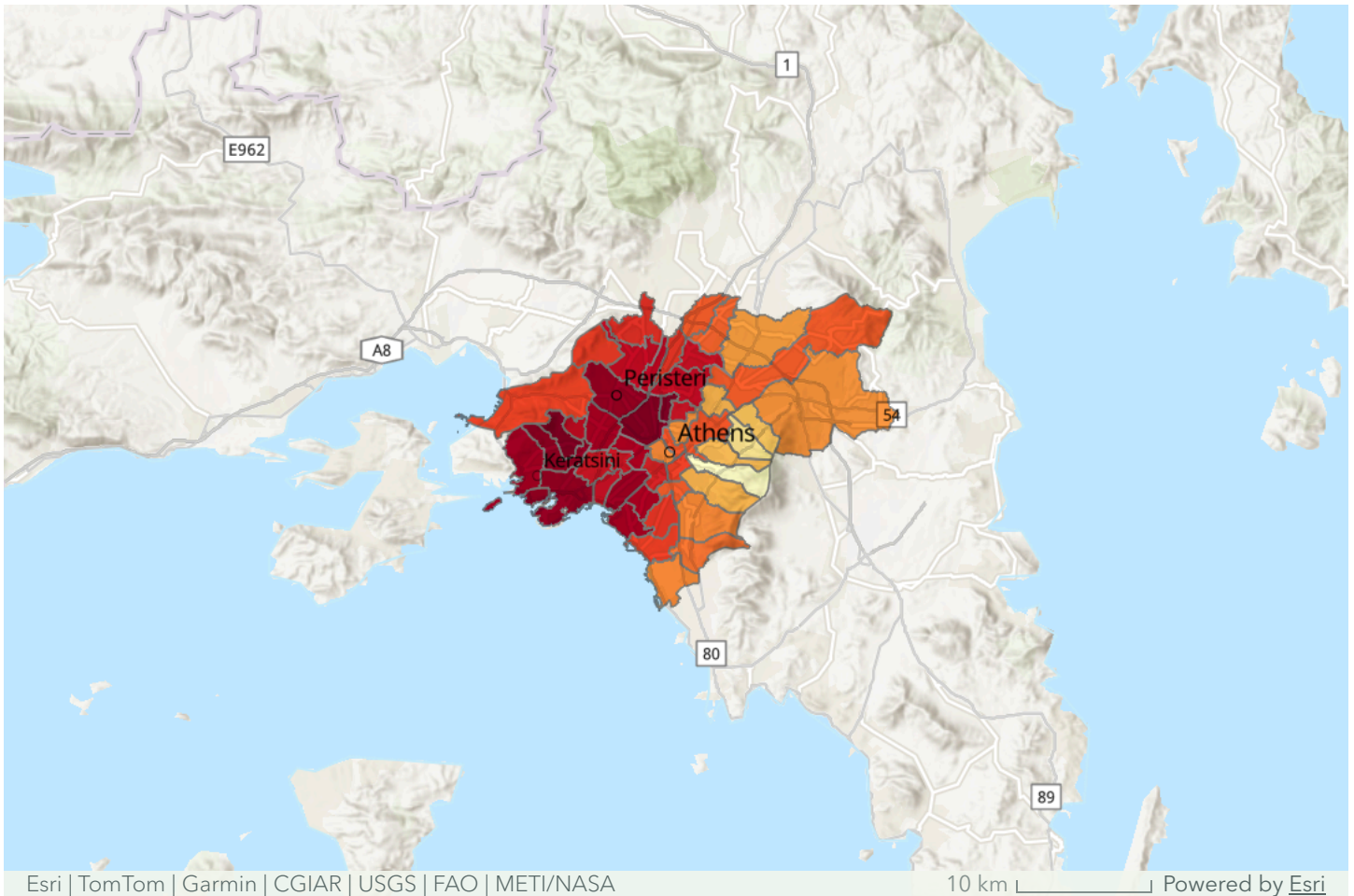


Assessing vulnerability and risk

Climate change is a global issue that is creating risks across the globe. However, we can also use GIS to identify localized risk to climate change, like identifying where and how vulnerable populations are affected. Around the world, certain population groups disproportionately experience climate change, making them more vulnerable to the related effects of climate change. By identifying vulnerable populations, we can use GIS to create equitable climate solutions.

For example, viable locations for growing an agricultural crop can be modeled using current and future climate conditions. These images show the results of an analysis that was performed in ArcGIS Pro using the Presence-Only Prediction (MaxEnt) tool. The image on the left shows suitable locations for maize for baseline climate conditions and the image on the right shows suitable locations for the mid-century period of 2041-2070. Locations that

are symbolized in shades of green represent suitable locations for growing maize.

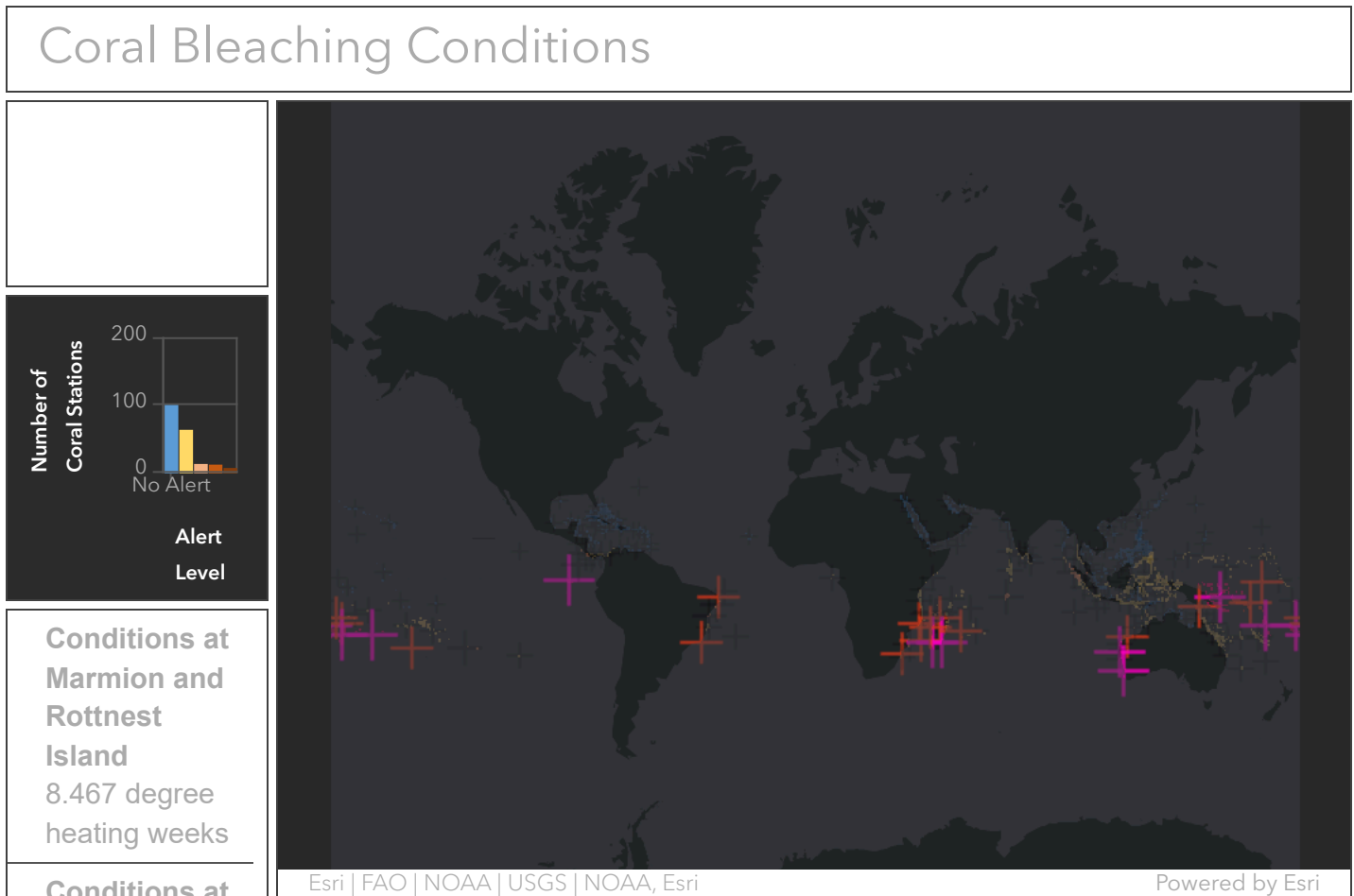


Investigating risk reduction options and planning

Adaptation plans play a key role in helping communities become more resilient to the effects of climate change. We can use GIS to help us create adaptation plans through spatial data analysis, like prediction modeling, visualization, and decision support for communities.

For example, localized adaptation plans can be developed for extreme heat. The web map shows a heat resilience index (HRI) that was created for Athens, Greece, in ArcGIS Pro. This HRI prioritizes areas for tree planting as an adaptation plan for cooling the city. Postcodes with higher HRI values are symbolized in darker shades of red and would benefit the most from trees. Postcodes with lower

HRI values are symbolized in lighter shades of yellow and orange and are at less risk.



Taking action

GIS can help us all take action against climate change and move toward a more sustainable future for our planet. With GIS, you can analyze, plan, and prepare for future climate change impacts and find ways to mitigate greenhouse gas emissions. Taking action comes in many forms and everyone is capable of taking action against climate change.

For example, dashboards can be created to monitor the health of natural resources in our communities, like coral reefs. Coral reefs protect coastlines from storms and erosion, provide a source of income for local communities, and are a source of food. This dashboard presents location-analytics for coral reefs to help communities identify the coral reefs that are at risk of bleaching.

Continue the climate conversation!

To address climate change, it is important to continue the dialog. Incorporating climate data and considerations in your projects is one way to contribute to the climate conversation.

The GIS for Climate hub is a great place to start when looking for data.

GIS for Climate