Identifying Suitable Areas for Solar Power Generating Facilities while Reducing Conflicts with Sensitive Habitats and Wildlife Populations

Abstract

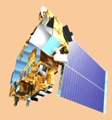
Solar energy is a rapidly growing industry in the state of Georgia. The increasing popularity of solar farms has encouraged decision-makers and developers to incorporate a sustainable plan for utility-scale solar developments. However, the construction and siting of solar farms could have a threatening impact on environmentally sensitive habitats and associated species. NASA DEVELOP partnered with The Nature Conservancy and the Georgia Department of Natural Resources to conduct an analysis to inform solar site planning and to communicate with key stakeholders. The team analyzed land cover trends from Landsat 8 Operational Land Imager (OLI), in addition to solar insolation data sets from Terra's Clouds and the Earth's Radiant Energy Systems (CERES) sensor. These Earth observations were combined to classify and extract data layers for a solar site suitability and conflict identification model following the Land Use Conflict Identification Strategy (LUCIS). Additionally, the DEVELOP team utilized habitat layers of the endangered gopher tortoise (*Gopherus polyphemus*) primarily due to its role as a keystone species in these sensitive areas. These data were used to generate end products that depict potential conflicts between ideal solar energy sites and endangered species habitats, and prioritize development areas outside of these conflicts. The team examined potential conflicts in Decatur and Taylor counties with additional datasets on existing solar utility infrastructure and parcel data to provide a local-level analysis. The results of this project will be utilized by The Nature Conservancy and Georgia Department of Natural Resources to recommend suitable sites for environmentally conscious solar farm construction.

Study Area

Objectives

- **Conduct** in-depth solar site suitability analysis on Decatur and Taylor counties
- **Analyze** land cover change in selected counties with regards to solar development
- **Integrate** data on environmental sensitivity and infrastructural site suitability to map ideal locations for utility-scale solar development within Georgia
- **Provide** decision-makers with tools to assist in selecting solar development sites

Earth Observations

Platform	Instrument	
Terra (1999)	Clouds and the Earth's Radiant Energy System (CERES)	
Landsat 8 (2013)	Operational Land Imager/Thermal Infrared Sensor (OLI/TRIS)	

Methodology

Stakeholder Needs: Environmental and Solar Developer

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Develop Goals, Objectives, and Criteria for Land-Use Conflict Identification Strategy (LUCIS) Model

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Acquire and Input Data into Land-Use Scenarios

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Environmental Sensitivity
- Gopher Tortoise Habitat (UGA)
- Protected Lands (GADNR)
- Granite Rock Outcrops (NRCS)
- Land-Use (CropScape)
- Prime Farmland (NRCS)
- Streams (NWI)

Solar Development Potential
- Solar Insolation (CERES)
- Slope (DEM)
- Land-Use (CropScape)
- Aspect (DEM)
- Roads (GA)
- Parcels (GA)
- Transmission Lines (TNC)
- Floodplains (FEMA)

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Product: Map Indicating Environmentally Sensitive Areas

Product: Suitability Map for Solar Development Potential

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Product: Bivariate Map

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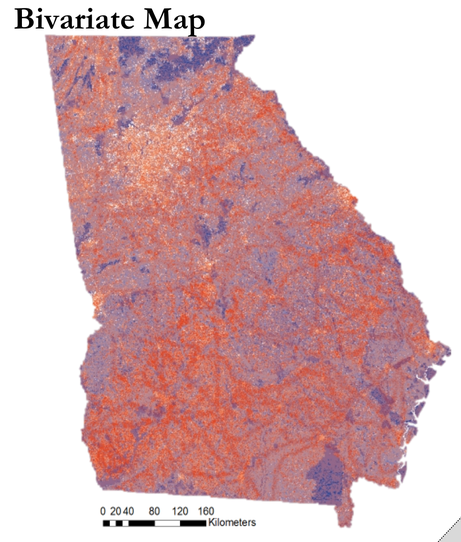
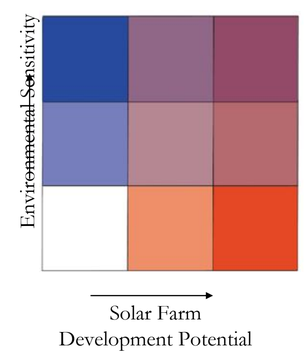
Product: Suitability Map

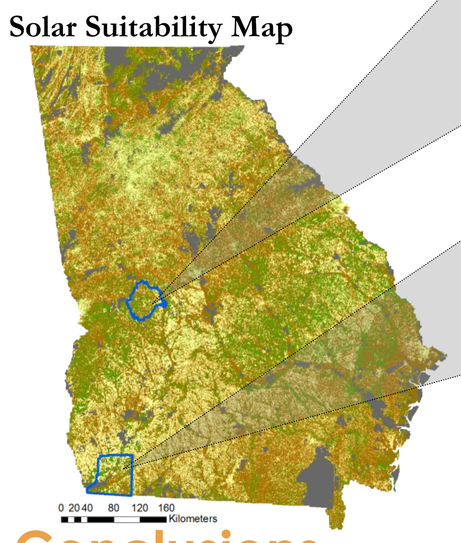
Results

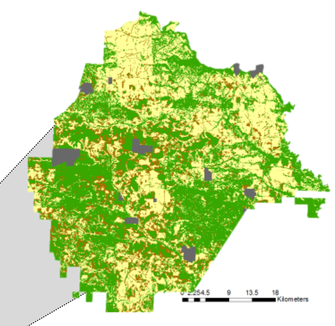
Bivariate Map



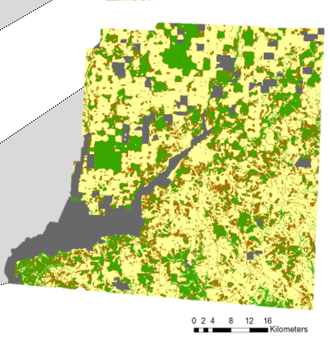


Solar Suitability Map





Taylor County



Decatur County

Low Suitability
Moderate Suitability
High Suitability
Protected Areas
Counties

Conclusions

- Higher suitability for solar development was found in southern regions of the state and areas in proximity to transmission lines.
- A majority of the existing solar farms in the counties showed areas of high potential for solar development and low environmental sensitivity.
- According to the analysis, Decatur county showed more suitable sites for solar farm development than Taylor county.

Project Partners

- The Nature Conservancy
- Georgia Department of Natural Resources

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Georgia Energy II