Wind Power on the Big Island of Hawai‘i

Introduction

Currently, the state of Hawai‘i uses imported fossil fuels to meet 90% of its energy needs. In 2008, Governor Linda Lingle signed the Hawai‘i Clean Energy Initiative, presenting the goal to meet 70% of the state energy needs with renewable, efficient sources of alternative energy by the year 2030.

The Hawaiian islands are home to a unique and fragile ecosystem that developed over 70,000 years of isolation. For the sake of the many endangered endemic species, as well the agricultural community and the longevity of the prominent tourist economy, Hawai‘i must invest in multiple alternative energy programs quickly.

This project explores possible sites for wind farms on the Big Island of Hawai‘i. This island was chosen because it is the largest and youngest island of the archipelago and it has the greatest area with high wind energy of any of the eight main islands.

GIS is a necessary tool to combine the multivariate data layers that each play a key role in evaluating the options for locations for the next wind farm.

There is already a wind farm on the southern tip of the Big Island, with 14 1.5-megawatt turbines.

Where should the next farm go?

Methods:

Six factors were chosen for consideration in the analysis process. Each factor answers a question about the practicality or efficiency of a potential wind farm in any given location on the island. This project analyzed the 6 factors in three stages. 1) Datalayers were obtained from the Hawaii GIS Database. 2) The values of the datalayers were reclassified according to the suitability of that value to a wind turbine project. 3) The reclassified datalayers were assigned weights based on their relevance to the overall question and then combined using a raster calculator to show the overall best locations for wind farms on the Big Island.

Results

Two of the layers in this evaluation were especially constritive: the roads and power lines. If we were to look at potential sites on the island based on access to these power lines, there would be very few locations to consider. It is possible that not all of the existing power lines were mapped on the datalayer, which could lead to misinterpretations. To provide a more hopeful picture, the results of the weighted calculations are presented without the layers of roads and power lines.

Conclusion

The best place to consider building a wind farm is the northern most area of the Big Island—Kohala Point. Hawai‘i should also consider expanding its infrastructure of power lines to open up more options for sustainable development in all types of alternative energy.