Notes from Geospatial/GIS Meetup
May 9, 2023

Rivera Library, Room 140 and Zoom

Attendees: Janet Reyes, facilitator;

In person: Hector Zumbado-Ulate, Siddharth Kishore
Via Zoom: Alexyss Morales, Ali Baba Shehu, Clay Noss, Grecia Perez, Janet Chavez, Jay Spencer, Lynn Sweet, Mary A, Mike Cohen

<u>Announcements</u>

This meeting was recorded; video is available here. The passcode to view is bd6!KLgA

The University of Miami Special Collections "Conversations on Cartography" series is hosting a webinar on **persuasive cartography** on Thursday, May 11 at 10:00 am PDT.

Janet will offer an **Introduction to Google Earth** workshop on Tuesday, May 16 at 2:00 pm.

On Monday, May 22, a **Precision Agriculture Workshop** will be held at the UCR Alumni Center from 12:00 - 6:10 pm. Some of the content will relate to geospatial analysis and remote sensing applications.

On May 23 and 24 NV5 Geospatial will host two free half-day virtual sessions related to **synthetic aperture radar (SAR)**. Find more information about the SAR Sessions here.

Two months to go until the **Esri Education Summit** and the **User Conference**!

Janet received information regarding Gabriel Moss, a **cartographer for hire**. His services may be of interest to faculty who need maps to include in their publications.

<u>Shared links</u>

Janet shared that through the library, UCR affiliates have access to scanned documents from the **Royal Geographical Society**, including maps, photographs and documents from notable expeditions: https://app.wileydigitalarchives.com/rgs

Would you really end up in China if you dug a hole **through the center of the earth**? Find out with this tool: https://www.freemaptools.com/tunnel-to-other-side-of-the-earth.htm

An organization called the **GeoTech Center** is hosting a virtual GeoEd'23 conference on June 6 and 7. The center's website includes an interactive map of Geospatial Education Programs. For UCR, it currently shows the (dormant) UCR Extension program, but nothing about geospatial course offerings at UCR itself.

Dr. Hector Zumbado-Ulate, with UCR's Department of Entomology and the Center for Conservation Biology, gave a presentation titled **Using species distribution models and GIS methods to assess the risk of invasion by a vineyard moth pest guild in the West Coast of the USA**.

Before the formal presentation, Hector invited anyone interested in species distribution models (SDM) to join an SDM discussion group held every other week, in person and virtually, on Mondays or Tuesdays at 4 pm. For more information, reach out to Clay Noss clayn@ucr.edu or Hector hectorz@ucr.edu.

SDMs, also known by other names, are "[a]lgorithms for predicting the distribution of species in geographic space on the basis of a mathematical representation of their known distribution in environmental space." The most commonly used SDMs are correlative models, which involve data on occurrences, environmental variables, and an algorithm. Once created, correlative models can be extrapolated to other regions and times. Among the many applications of SDMs are in establishing protected lands and corridors, and in assessing suitable habitats for invasive species.

Hector discussed the differences between a species' fundamental niche, realized niche, and potential niche. His research focuses on the latter two, which deal with where the species actually does occur or is likely to occur. The type of algorithm selected depends on the objectives of the study, the sample size, and the extent to which absences of occurrence are accounted for in the data. With the type of presence data that is usually available, running the algorithm results in a mapped raster display of *suitability* (rather than *occurrence*) rating values ranging from 0 to 1.

Invasive species (such as insects) often promote the spread of pathogens, which cause damage to desirable species. While management of these effects is costly, early detection reduces costs. In California, studies show that of the 8-10 exotics that are introduced annually, about 20% of them develop into pests.

Hector's research involves the European Grape Vine Moth (EGVM), as well as similar moth species. An invasion of EGVM in California between 2009-2016 was successfully managed by using eradication techniques based on scientific knowledge. Among the most effective approaches were placing restrictions on plant and equipment movement out of infested areas (creating an 8km buffer), and conducting insecticide treatments in a 500m radius around detections. Data collected from traps during this effort, plus climate, landscape, and anthropogenic variables, were used in creating an ensemble habitat suitability model. The model showed that human-assisted spread was likely an important component of this invasion.

Hector set out to assess the risk of reinvasion of EGVM and of other moth pest species that were native to Europe. He used another SDM and another approach (calibrating the model to conditions in the moths' native ranges). The objectives were to predict habitat suitability for each pest and to identify potential areas of co-occurrence. The study region included Washington and Oregon in addition to California.

Hector obtained thousands of occurrence data records and did extensive data cleaning to create a high-quality dataset. In the presentation he shared information about the environmental datasets and the modeling framework that he used.

The outcomes reinforced previous findings that the non-inland vineyard areas of the West Coast (low elevation, high precipitation) provide high habitat suitability for EGVM. Moderate habitat suitability was found for two of the other pest species in the study - one favoring Oregon and Washington, and the other Central and Southern California. Low suitability was found for two other species.

Co-occurrence is important to understand in terms of management strategies such as multilure traps. Hector found that more than half of the study area was suitable for only one species. Co-occurrence of two or three species was fairly common; in those areas, combined pest eradication strategies would be warranted.

Discussion

Janet asked if the method that Hector followed is applicable to other crops and other pest species. Hector said yes, correlative models work well in a variety of situations, but it is important to have a high-quality occurrence dataset. Also, if one were modeling for plant invasive species, a different set of environmental variables would need to be employed. Different objectives would also drive which techniques are selected.

Siddarth asked how vineyard growers respond to a pest invasion. Hector said they use techniques such as pesticide application and minimizing inadvertent anthropogenic movement of the pests from one vineyard to another. Usually there was no permanent damage to a vineyard that had been invaded.

Contact information:

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