MS-GIST
Master Projects Fall 2020
Thursday December 10th (Livestream via Zoom)

*** There will be 5 minute breaks between each presentation to facilitate transitions in Zoom.**

**** Zoom links available on a per request basis. Contact: atgrogan@email.arizona.edu**

Date/Time	Title	Person *
12/10/2020 **10:30 – 11:00 am**	**A New Map Series for the Sonoita-Elgin Fire District in Santa Cruz County, Arizona**	**Paul Keidel**
12/10/2020 **11:00 – 11:30 am**	**A Spatial Rationality Evaluation of Accessibility and Equity of Urban Parks Using GIS-based Network Analysis--Case Study in Tucson, AZ, USA**	**Pengying Li**
12/10/2020 **11:30 – 12:00 am**	**Landslide Susceptibility Analysis of the 2020 Walbridge Fire, California, USA**	**Lincoln James Chapman**
12/10/2020 **12:00 – 12:30 pm**	**Modeling Monarch Butterfly Migratory Pathways in Iowa**	**Lizbeth Murillo**

A New Map Series for the Sonoita-Elgin Fire District in Santa Cruz County, Arizona

Paul R Keidel

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Abstract:

Imagine protecting a 100 mi^2 fire district, a 300 mi^2 fire response area, and a 600 mi^2 ambulance service area, all using one fire station. And cell phone coverage is spotty, there are no fire hydrants, and the paper maps carried by fire station vehicles are out of date! This is the reality faced today by the Sonoita-Elgin Fire District in Santa Cruz County, Arizona. This goal of this project was to create a new geodatabase for the fire district. The fire district needed the latest roads and parcels and structures data. They also needed the public land survey details, forest service road details, as well as homeowner and landowner personal details like gate codes and nearest sources of water. The Santa Cruz County GIS office was engaged to supply the latest data files. This GIS office also recognized an opportunity to focus the work of this project along County gridding standards. This project can now be used as a template to improve mapping for their remaining fire districts. Three products were created in this project: new paper maps for the emergency vehicles, network analysis maps for times to nearest hospitals, and PDF maps for their mobile phones and tablets.

Keywords:

Fire District, Map Series

A Spatial Rationality Evaluation of Accessibility and Equity of Urban Parks Using GIS-based Network Analysis--Case Study in Tucson, AZ, USA

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Abstract:

Tucson is the second most-populated city in Arizona after Phoenix. There are 127 parks with a total area of 2,658 acres (10.76 km^2), with an average of 5.44 park acres per thousand residents. Although this is above the median for managed park acres, it is not practical for local citizens to access the urban parks with the same frequency. The aim of this study is to analyze and evaluate the spatial distribution and equity of urban parks in Tucson. The accessibility ratio and park area per population in service areas at block scales are calculated using a GIS-based Network Analysis method, which offers more accurate results by calculating service areas of the urban parks. The accessibility ratio of gender, age, and racial groups are also compared and discussed. The results showed that the city center has higher park accessibility but lower park acres per population in service areas; the districts far away from the downtown have lower accessibility and the western part has the highest park area per population in the service areas due to the presence of more regional parks. There is no gender bias in accessibility; kids and adults have slightly higher accessibility than older age group; American Indian and African American have slightly higher accessibility than the White, Asian, and Native Hawaiian populations. In conclusion, the urban parks in central and suburb districts, except the western part in Tucson, need to add more parks to meet the local citizen's recreational demand; different groups of people have equitable opportunities to access urban parks.

Keywords:

Network Analysis, Urban Park, Service Area, Accessibility, Equity, Tucson

Landslide Susceptibility Analysis of the 2020 Walbridge Fire, California 2020

Lincoln James Chapman

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Abstract:

The Walbridge Fire occurred in the north central Sonoma County, California, USA and spanned approximately 55,209 acres of steep sloping hillside terrain before it was contained. The burned area was just one of the eight fires included in what is now rereferred to as the LNU Lightning Complex. The purpose of this project is to evaluate the susceptibility of landslide to occur within the area that has experienced an unconventional loss of vegetation. A combination of dense dry vegetation, strong winds and difficult topographic conditions allowed the burn area to reach an unusually large size. The subject area has lost much of the vegetation that aided in the slope stability of the region. Furthermore, the Walbridge fire region is located in an area known to be extremely susceptible to landslides. Multispectral imagery, terrain and rainfall data were imported, classified into indices and weighted to produce an analysis map of the region. The results of the study have indicated a significant increase in vulnerability within the burn scar boundary as compared to the surrounding terrain. The areas of highest susceptibility are within the western margin of the burn scar. Identifying areas of greater risk of landslides is essential for the safety of residents within the burn scar and can be used to identify zones where preventative measures may be necessary.

Keywords:

Sonoma County, Walbridge Fire Area, LNU Lightning Complex, Wildfire, Landslide Susceptibility, Scar Zone, Normalized Difference Vegetation Index (NDVI), Multispectral Imagery, Normalized Burn Ratio (NBR)

Modeling Monarch Butterfly Migratory Pathways in Iowa

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Abstract:

Each year the Eastern migratory monarch butterfly, *Danaus plexippus*, travels over 4 kilometers from Canada to its overwintering sites in Central Mexico. In the Midwestern United States, milkweed species constitute breeding grounds as the primary source of food for monarch larvae. However, popular agricultural use of herbicide-resistant crops is on the rise despite its toxicity to milkweed plants, thus hindering the overall monarch butterfly population. Using GIS tools, a model was created to build a corridor throughout Iowa with vital factors, such as milkweed abundance and agricultural land. Specific inputs in the model are weighted according to the impact on monarch larval. The model identifies suitable habitats as an exemplary environment for monarch butterfly breeding grounds to successfully migrate through the state. Ultimately, it brings attention to key areas in need of conservation. Results from citizen science data in a Monarch Larva Monitoring project identifies monarch butterflies and milkweed plants predominantly in central areas of Iowa. This research project sheds light on zones throughout the state in order to promote further conservation efforts for flourishing breeding grounds to increase monarch butterfly survival.

Keywords:

Monarch Butterfly, Migration, Iowa, ArcGIS Pro, Habitat Conservation