MS-GIST Projects Spring 2022
Monday, May 09

**** There will be 5 minute breaks between each back-to-back presentation to facilitate transitions in Zoom.***
***** Zoom links are available on request. Please contact Andrew Grogan - atgrogan@arizona.edu***

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The Northern Chaco Outliers Project: Surface Hydrology of the Lakeview Community

Jeremy Grundvig
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05/09/22, 08:00 - 08:25 AM

Abstract:

Farming was introduced and thrived in the high desert of the four-corners region since ca. A.D. 500. As subsistence patterns shifted from hunting and gathering to a more sedentary lifestyle based on agriculture, access to reliable water sources became increasingly crucial. Utilizing ESRI's ArcGIS Pro, a Geographical Information System (GIS), I look at the surface hydrology of an ancestral Pueblo community in southwest Colorado using Digital Elevation Models (DEMs), to calculate the path and velocity of the community's watershed. Using higher resolutions DEMs which have become available from the United States Geological Survey (USGS), I calculate the watershed using DEMs derived from 30-meters, 10-meters and 1-meter. The results are aiding researchers at Crow Canyon Archaeological Center to better understand ancestral inhabitants' environments by providing models to aid in investigations to include stream flow, historic route changes, possibly water control features, seep spring locations, and agriculture potential. The various DEMs are used to delineate a watershed under 100 square kilometers, focusing on the Lakeview Community. The differing results display how the 30-meter resolution provides insight to prehistoric stream routes while detailed resolutions aid in the investigation of natural springs and the hydrologic impacts of historic irrigation projects. The results are part of a long-term environmental study to better understand how ancestral inhabitants used their terrain and resources and whether a community's location intentionally sought to take advantage of local hydrology, arable soil or other factors.

Keywords: Surface hydrology, digital elevation models, stream routes, stream flow, water control features, ancestral Pueblo, Montezuma County

Analyzing Future Human Exploration Sites in Areas with Hydrated Sulfates on Mars

Melissa Thomas
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05/09/22, 08:30 - 08:55 AM

Abstract:

Human exploration missions to the surface of Mars have been a topic of interest for scientists around the world and determining landing sites for missions such as these is key. A landing site must meet certain requirements including: a large enough area and a smooth surface for a safe landing, the potential for scientific exploration, the presence of resources capable of sustaining a manned mission, etc. In this study, five areas located in different regions of Valles Marineris were analyzed using the aforementioned criteria. These areas were chosen based on data from related literature that shows locations where hydrated sulfates were detected. For each of the five areas, DTMs were found on the HiRISE database and GIS tools were used to measure the area and roughness of flat surfaces and create slope, aspect, and hillshade maps. From these maps, suitability maps were created showing the most ideal landing sites for each area. Based on the statistics of each map, Eos Chasma and Candor Chasma seem to be the most ideal candidate site due to the greater number of suitable landing sites determined by the criteria mentioned above.

Keywords: Mars, landing sites, human exploration, hydrated sulfates, Valles Marineris

GIS Analysis of the Bighorn Fire Evacuation Orders

Katrina Camp
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05/09/22, 10:30 - 10:55 AM

Abstract:

The Bighorn Fire of 2020 burned 119,978 acres of the Santa Catalina Mountains and threatened urban interface five days into a forty-nine-day burn. Arizona's Ready, Set, Go! emergency response evacuation plan was activated to ensure the safety of those residing within the danger zone of the wildfire. Evacuation zones were created specifically for this natural disaster which proved confusing for many residents attempting to determine their location in conjunction with the wildfire. This historical spatial analysis depicts the evacuation orders as they were initiated by the Pima County Office of Emergency Management. For each of the twenty-five Pima County evacuation orders initiated during the Bighorn Fire, ArcGIS Pro was used to map each zone by evacuation order and the correlating evacuation status (Ready, Set, Go!). The evacuation meeting point, as well as the animal sheltering location, have been digitized on each map displaying the distance between the evacuation zones and the meeting points. An ArcGIS StoryMap has been created to narrate the events of the Bighorn Fire. An interactive evacuation map was developed using ArcGIS Web App Builder. Users can enter their address and choose a point on the map to determine the distance, route, and length of time from their house to a safe point outside of the evacuation zones. This project will improve understanding of the events that occurred during this natural disaster and the emergency responses used to ensure the safety of citizens near the urban interface. Additionally, it can be used as a learning tool to improve wildfire evacuation communication with the community as well as community safety education.

Keywords: Bighorn Fire, evacuation, Santa Catalina Mountains, safety education

Rising Property Values

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05/09/22, 11:00 - 11:25 AM

Abstract:

Over the last decade, Arizona has seen an increase of property values that resulted in an increase in cost of living. Reports of housing units shows there has been a steady rise in housing units in the most populated cities in Arizona. This study allows for a homeowner or investor to become aware of the best time to purchase property or home as the market rise and fall. This study also provides the reader to understand the root cause of the rising costs of living. Climate change has been a major issue in California as there has been an increase of wildfires over the last decade. Data is used to show the amount of damage caused by wildfires throughout the state. By using Arizona and California population, an assessment of population disparity over the last decade provides fidelity of population to housing unit growth. This data is compared to average cost of the housing market in the respective counties. The implications of this study for homeowners or investors would be anticipated losses if the current housing bubble burst. The result of this event would be a loss in equity of a homeowner that purchased property during the time of inflated costs. The result of this study provides data to make sound purchases as the prices fluctuate due to inflation. This study shows that there was a steady increase of 1% year to year in housing units since 2016. This does not seem like a significant amount but it's an increase of 100,000 units in five years, with over a 200,000 increase of population, for one county in Arizona. The total number of population increase is direct reflection of the most populated counties in Arizona. Even though there isn't a direct correlation between the two states populations the counties surrounding Phoenix and Tucson have similar lifestyles as the populated counties in California. As the study focuses on the root causes of the inflated prices, the outside influences that are migrating to Arizona, due to the lower cost of living, will cause a housing crisis when the economy bounces back.

Keywords: Arizona Population, California Population, Property Value, Cost of Living, Inflation

Geologic Map of Arizona

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Rescheduled (TBD)

Abstract:

The mission of the Arizona Geological Survey is to provide geologic information to enhance public understanding of the state's geologic character, geologic hazards and limitations, and mineral resources. The maps published by the Arizona Geologic Survey are used by the public and state authorities to assess natural hazards, evaluate construction suitability, and discover mineral and energy resources. The Arizona Geological Survey has been providing geology maps for more than one-hundred years, with its first state-wide geologic map of Arizona published in 1924. The Arizona Geological Survey provides an interactive geologic map of Arizona online, but the website has not been updated in over eight years. The goal of this project is to update the data and software behind the geologic map of Arizona using modern software and software development practices. The final product uses open-source software including Leaflet.js and can be used as a reference for creating future online maps.

Keywords: Web-development, Arizona, Geology, Strata, Faults

Immigration Centers of Virginia

Neil Reyes
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05/09/22, 02:00 - 02:25 PM

Abstract:

As the foreign-born population continues to grow in the United States, analyzing migration factors is crucial for continued growth. Immigration can be integral to the overall economy of an area as it leads to an increase of workers, business owners, taxpayers, and consumers. Virginia, in particularly the Northern Virginia metropolitan region, is prime example of this correlation between a high foreign-born population and a bolstering economy. To ensure the large foreign-born population is maintained in Virginia, this study focuses on the significance and causes of migration. Several socioeconomic demographics were examined through regression and suitability analyses to understand the relationship between immigrants and an economy and migration. Based on the knowledge of push and pull migration factors, various demographics were chosen to represent these factors. The regression analysis assessed the relationship between the high foreign-born population and economic demographics, while the location suitability analysis mapped potential sites for immigration based on established migration criteria. The regression analysis proved an overall positive relationship between a large-foreign born population and an area's overall economy, highlighting the importance of migration. The location suitability analysis demonstrated the draw, in conjunction with current immigrant population demographics, to those large urban centers with higher levels of socioeconomic advancement. The final cartographic products will demonstrate the importance of immigration to stimulate an area's economy and produce recommendations for immigration centers.

Keywords: immigration, Virginia, migration factors, suitability analysis, regression analysis

A Site Suitability Analysis for the Creation of New Green Space in Maricopa County

Heather Barnard
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05/09/22, 06:00 - 06:25 PM

Abstract:

Green space is an area of vegetated land (grass, trees, shrubs, etc.) within an urban context. Green spaces can be community gardens, parks, common land, playing fields, green corridors like exercise paths, rivers, and canals. Green spaces play an important role in an urban 'ecosystem' by providing a place for physical activity, relaxation, social interaction, community events, and so on. In high-density urban areas, green spaces can provide a place relatively free from air and noise pollution. Green spaces with water features can play a critical role in cooling cities. Maricopa County added more new residents than any county in the nation from April 1, 2020, to July 1, 2021, according to the Census Bureau. With the growth of the population and many new developments, it is important to determine the best placement for new green spaces. This analysis uses GIS processes to perform a site suitability analysis that locates potential sites for new green spaces within Maricopa County. The first part of this analysis performs a Boolean Suitability Modeling which identify areas best suitable for new green spaces based on different criteria. The criteria making a new green space are more suitable areas further away from existing parks, unused/undeveloped land, higher populated areas, lower income areas, and areas closer to public transportation routes. The second part of the analysis preforms weighted suitability analysis. The outcome of this project will provide a roadmap for the county to determine areas best for new green spaces and to meet the community needs.

Keywords: Green Space, Maricopa County, Suitability Analysis, a Boolean Suitability, Weighted Suitability