2022 MIDWEST UNDERGRADUATE GEOGRAPHY SYMPOSIUM

Saturday
April 23
9 am - 3 pm

GUSTAVUS
GUSTAVUS ADOLPHUS COLLEGE

Welcome to MUGS 2022! We are excited to be hosting this in-person event and to share our knowledge and curiosity about present and future geographies together! Below is a full detailed schedule of the conference including all presentations and abstracts.

Conference Logistics

Sessions I and III contain 6 concurrent rooms of 15 minute presentations. Sessions A-F will each have three to four presentations with time for questions for each presentation.

Session II includes a poster gallery room as well as two rooms with 10 minute presentations. The 10 minute presentations and poster gallery will happen simultaneously.

No presentations or posters are scheduled during the *Future Geographers and Geographies* Panel, which all conference participants are encouraged to attend and engage with.

We are excited to have over 50 presentations and posters at this year's conference! However, we realize there may be multiple presentations you wish to see that may be happening in different rooms during the same session time. We ask that out of respect to the presenters and session attendants that you choose one room to stay in for the duration of that session and limit switching between rooms within a session timeframe.
For professors, if there are multiple student presentations you need to view, we ask that you have your students open a zoom meeting on their device as they present to record their presentation.

Enjoy the day!

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Conference Common Guidelines

➢ MUGS requires participants to wear masks while indoors.

➢ Treat others with kindness and respect to create a supportive and welcoming environment.

  ○ Harassment and targeting others based on immutable characteristics have no place at the conference.

➢ Be respectful during presentations.

  ○ Use your phone responsibly.

  ○ Limit side conversations.

  ○ Listen and appreciate everyone's work and ideas.

➢ Ask constructive and productive questions.

  ○ Make sure that questions are on-topic.

➢ Use appropriate language when engaging with others.

➢ Wear attire that makes you feel comfortable and happy.

Overview Schedule

Session I					
Paper Presentations **Session 1: 9:20am-10:40am**					
Session 1A: **Room: 3104**	**Session 1B:** **Room: 1104 (GIS Lab)**	**Session 1C:** **Room: 2300**	**Session 1D:** **Room: 3302**	**Session 1E:** **Room: 3300**	**Session 1F:** **Room: 2220 (Wallenberg)**
9:20-9:40-- Nethmi Bathige	9:20-9:40-- Joey Bergeron	9:20-9:40-- Amanda Hoffman	9:20-9:40-- Christine McCormick	9:20-9:40-- Marley Kehew	9:20-9:40-- Claire Norman & Carter Anderson
9:40-10:00-- Reese Sander	9:40-10:00-- Tommy Guddal & Morgan Condon	9:40-10:00-- Luke Tift	9:40-10:00-- Gabriel Reynolds	9:40-10:00-- Alex Terpkosh	9:40-10:00-- Auguste Tabie & Ashley Giossi
10:00-10:20-- Celia Johnson	10:00-10:20-- Marcus Wahlert	10:00-10:20-- Lindsey Paulson	10:00-10:20-- Gina Qian	10:00-10:20-- Jack Acomb & Eva Stromgren & Marisa	10:00-10:20-- Nathan Martin & Maggie Duerwachter

				Williamson & Henry Yackel	
10:20-10:40-- Sar Velick	10:20-10:40-- Ethan Smith	10:20-10:40-- Fynn Cofell	10:20-10:40-- Alice Pham	10:20-10:40-- Quinn Garrison	10:20-10:40-- Leah Rumon
Moderator: Tiffany Grobelski	*Moderator: Paul Lorah*	*Moderator: Jeff La Frenierre*	*Moderator: Eric Carter*	*Moderator: Jesse McClelland*	*Moderator: David Kelley*

Session II		
Posters and 10 Minute Presentations **Session 2: 10:50-11:20**		
Session 2 North Atrium Posters (Concurrent) 1. Andrew Gasperlin 2. Tommy Guddal 3. Quinn Garrison	**Session 2B** **Room: 1104 (GIS Lab)** 10:50-11:05-- Tessa Yaeger 11:05-11:20-- Geena Zebrasky	**Session 2C** **Room: 2300** 10:50-11:05-- Jane Slentz-Kesler 11:05-11:20-- Benji Huff & Ronard Pabi
No Moderator needed	*Moderator: Sydney Stumme-Berg*	*Moderator: Tiffany Grobelski*

Panel Session: 11:30-12:30
Wallenberg Auditorium, 2200 (entrances on lower and second floor of Nobel Hall)

Lunch: 12:30-1:30
Pick up lunch in North Atrium and dine al fresco in the Gustavus Arboretum and Nobel Hall

Session III					
Paper Presentations **Session 3: 1:40pm-3:00pm**					
Session 3A:	**Session 3B:**	**Session 3C:**	**Session 3 D:**	**Session 3 E:**	**Session 3F:**

Room:3104	Room:1104 (GIS Lab)	Room: 2300	Room: 3302	Room: 3300	Room: 2220 (Wallenberg)
1:40-2:00-- Brennan Persenaire Hogeterp	1:40-2:00-- Annabel Gregg	1:40-2:00-- Jacob Orser	1:40-2:00-- Addie Engebretson	1:40-2:00-- Samuel Swanson	1:40-2:00-- Josh Mounsey
2:00-2:20-- Emma Pfeifer	2:00-2:20-- Glade Paulson	2:00-2:20-- Laure Briol	2:00-2:20-- Roan Floer-Martinez	2:00-2:20-- Samantha Poeschl	2:00-2:20-- Aiesha Osman, Dylan Monahan and Robert Burke
2:20-2:40-- Cole Potter	2:20-2:40-- Audrey Wuench	2:20-2:40-- Karson Hegrenes	2:20-2:40-- Quinn Frankovsky	2:20-2:40-- Tomas Edmundson	2:20-2:40-- Simon Zamani & Matt Oscanyan
			2:40-3:00-- Augusta Fricke	2:40-3:00-- Isaac Olson	2:40-3:00-- Ariana Porcello
Moderator: Bill Mosely	*Moderator: Tiffany Grobelski*	*Moderator: Jesse McClelland*	*Moderator: Eric Carter*	*Moderator: David Kelley*	*Moderator: Paul Lorah*

Session I

9:20-9:40 am

Food Security and Dietary Diversity among Conventional and Organic Tea-Smallholders in Central and Southern Sri Lanka

Nethmi Bathige, Macalester

Abstract: In Sri Lanka, smallholder tea producers grow 70 percent of the country's tea and bring in significant export earnings. However, when the country moved towards a more liberalized economy in 1977, growing cash crops such as tea for exports increased. As a result, there was a cut-back in subsistence agriculture as farmers made space to grow more commercial crops. This research treats tea smallholder households as a unit of study. It looks at how economic

status (average income and wealth rankings), level of subsistence, and method of tea farming (organic or conventional) have influenced food security and dietary diversity outcomes. I used data collected in the summer of 2021 from 47 organic and 67 conventional tea smallholders in 6 rural communities of Southern and Central Sri Lanka. My findings show that organic farming is associated with greater dietary diversity among tea smallholders than conventional farming, growing a greater variety of cash crops is associated with greater dietary diversity and increasing household incomes through selling crops result in greater levels of dietary diversity. I also examine how the country's recent ban on imports of chemical fertilizers used by conventional tea farmers has impacted their dietary diversity and food security outcomes. Furthermore, I examine how the smallholder tea sector has felt the effects of the COVID-19 pandemic and the looming economic crisis in Sri Lanka.

9:40-10:00 am

Susitna Glacier Discharge Rate and Its Correlation On The Streamflow Of The Susitna River

Reese Sander, Gustavus

Abstract: The Susitna Glacier has been aggressively melting throughout the last couple of decades. The glacier feeds into the Susitna River and with the continued loss of the glacier, the river is bound to be affected as well. The Susitna River is a major river located in Alaska that stretches over 313 miles and with the loss of the Susitna glacier, one of its main water sources, the conditions of the river could worsen. To address this problem, this project will aim to answer the question, what the discharge rate of the Susitna Glacier has been for the past 10 years and how does that correlate with the streamflow of the Susitna River? Data has been gathered from the United States Geological Survey to determine the changes of the river. Data has also been gathered on the discharge rate of the Susitna Glacier along with GIS data collected from the Matanuska-Susitna Borough government website to model the results using the GIS. The preliminary results have shown that the streamflow of the Susitna River has been slowly decreasing throughout the years due to the increased discharge rate of the Susitna Glacier. Throughout the entire world there are thousands of glaciers that share similar characteristics with the Susitna Glacier and how it's a major water source for a river. The information obtained in this study can be used to estimate the effect of other glaciers that flow into different rivers and streams.

10:00-10:20 am

An Epidemiology of Development: Narratives of Epidemiologic Transition, Modernization, and Global Health in the case of Ghana's National Health Insurance Scheme

Celia Johnson, Macalester

Abstract: This paper complicates engaging with theories of disease transition through a case-based critical discourse analysis of health policy documents from the World Health Organization (WHO), Ghana's National Health Insurance Scheme (NHIS), and prominent global health NGOs. Despite its claim to be a pro-poor policy, the Ghana NHIS has been unsuccessful in achieving universal health coverage (UHC), with large portions of the population, particularly rural, low-income, and unmarried individuals not enrolled in the program nearly 20 years after its initiation. Drawing on elements of feminist political ecology and the political ecologies of health and disease, this analysis contributes to a fuller understanding of why the NHIS has not achieved UHC and instead allowed for the continuation of polarized disease profiles. Namely, the narrative of epidemiological transition is instrumentalized by development actors to legitimize a discourse of modernization and technological development in health policy. This led to the proliferation of policies, such as with the NHIS, which prioritize top-down infrastructure development over reflexive and localized risk management strategies. Further engagement with the political ecologies of health and disease may provide alternatives for health system policy that are more equitable, ethical, and community- and patient-driven.

10:20-10:40 am

Domestic Violence Journeys in Minnesota: Comparing Modes of Transportation Using GIS and Qualitative Research

Sar Velick, Macalester

Abstract: Domestic violence is a widespread public health crisis, with nearly ten million victims in the United States every year. Minnesota is no exception; every year, around 65,000 Minnesotans access domestic violence services. However, a huge barrier to accessing domestic violence services is transportation. This study aims to address the gap in research on transportation and domestic violence by comparing three modes of transportation used to access services: personal car, rideshare, and bus/train. Using qualitative research and GIS, this study combines methods to evaluate each mode according to measures of convenience, safety, travel time, and cost. Based on these results, this study concludes that the state of Minnesota can better support the mobility of domestic violence victims by subsidizing personal cars for victims, expanding public transit networks, making agreements with rideshare companies, and building a fleet of on-call drivers that

are trained in trauma response. Ultimately, this research contributes to the study of transportation in Minnesota, specifically for marginalized populations like domestic violence victims.

9:20-9:40 am

The rise of novel ecosystems, agroforestry and paths to sustainable tourism in Puerto Rico

Joey Bergeron, University of St. Thomas

Abstract: Novel ecosystems are in existence all around the world even in some of the world's biggest cities. These novel ecosystems provide habitat for many distinct species, and some of them can be the size of your parking spot. The growth of novel ecosystems provides an opportunity for agroforestry by planting crops such as sustainable shade-grown coffee, fruit and natural spices. This could provide benefits for tourism by refocusing it on healthy local products and cuisine. With these agroforestry fields there would be an increase in produce that could be used on the island that is all completely natural and freshly grown. Tourists could also take the time to go on tours of these areas because these areas can house many distinct species of wildlife and would give the chance to spread awareness of agroforestry and novel ecosystems. GIS software was used to find optimal areas for agroforestry and novel ecosystems that are adjacent to currently protected areas.

9:40-10:00 am

Forest Transition 2.0: The Future of Agricultural Lands in Puerto Rico

Tommy Guddal and Morgan Condon, University of St. Thomas

Abstract: Globally, human activity continues to degrade forest ecosystems. Forests provide ecosystem services by mitigating the effects of climate change, serving as habitat for biodiversity, and providing humans with resources. In Puerto Rico, this trend of deforestation has reversed. Between 1950 and 2000, Puerto Rico's reforestation led to rural agricultural lands reverting to forests as people migrated to urban centers for greater economic opportunities. This reforestation stalled around 2000 as it approached more productive and profitable agricultural lands. If forest recovery continues, current agricultural areas will be most likely to transition next. Using Geographic Information Systems, we reclassified land cover types to generate a study area of agricultural lands. With

fishnet analysis, specific attention was given to one kilometer fishnet cells with a high percentage of agricultural land within each cell. Additional layers such as tree cover, tree gain, percent in poverty, etc. were overlaid to find patterns between datasets. Scatterplot analysis allowed for study of agricultural lands and their characteristics as they changed from 2000 to today. This analysis provided insights to which specific agricultural areas might regrow as forests in the next phase of forest transition in Puerto Rico.

10:00-10:20 am

Furthering Forest Transition: Agricultural Productivity and Tree Cover in Puerto Rico

Marcus Wahlert, University of St. Thomas

Abstract: From 1950 - 2000, Puerto Rico experienced a dramatic recovery of its forests in an largely economically-driven forest transition. This forest transition is thought to have been driven by factors like industrialization, economic growth, and silviculture that has made clearing forests for agriculture or resources less desirable. However, since 2000 forest recovery has slowed and forested area has remained relatively consistent. Forest transition has been heavily connected to land value, and the areas of the island that have been reforested are largely high elevation and not ideal for agriculture. This study will examine the relationship between forested areas, land productivity, and more recent tree gain. Comparing these factors will help review the relationship between agricultural productivity and reforestation, as well as identify possible examples of areas that do not fit this typical relationship. By examining which areas have experienced tree gain since 2000, even on agriculturally productive land, we can hypothesize how forest recovery can be continued into the future. This study will be conducted using GIS data layers and comparing them through a fishnet method to determine the relationships between variables, which will be presented through maps, scatterplots, and other visual aids.

10:20-10:40 am

Puerto Rican Forest Transition Visualized and Explored with Spatial Statistics

Ethan Smith, University of St. Thomas

Abstract: Puerto Rico has seen a dramatic transition in its forests; near completely forested land became deforested cropland by the 1940s and turned once more into lush tropical forests after 1950. This forest transition is believed to have happened because of rural-to-urban migration, land abandonment, and a blend of other factors. Understanding why this phenomenon occurred is critical to assisting future forest restoration efforts, and understanding ecological succession. This research explores underlying processes associated with patterns

of reforestation and afforestation. Spatial statistical analysis at the five-kilometer and one-kilometer scale across Puerto Rico assessed the influence of explanatory variables on the island's forest cover. Moran's I p-value, Hot Spot Analysis, Generalized Linear Regression, and Geographically Weighted Regression were used to determine optimal models and resulting significance. Results have found high Adjusted R-squared values at both the 1-km and 5-km scales implying up to 90% of the local variance can be explained by the applied model. These results should be taken with caution due to a lack of thorough and complete model validation resulting from the available data. At face value, the results suggest a strong influence and predictive potential of the slope, population, soil productivity, precipitation, poverty, and tree loss on the forest cover of Puerto Rico.

Session 1C: 9:20 am - 10:40 am
Room 2300
Moderated by Jeff La Frenierre

9:20-9:40 am

Use of NDVI in a Chronosequence of Vegetation Succession in the Hintereisferner Glacier Valley, Austria

Amanda Hoffman, Gustavus Adolphus College

Abstract: Glaciers cover about 10% of the Earth's land area but they are retreating rapidly, and many will disappear within the next few decades. As these glaciers recede, the land is gradually recolonized by microbes, plants, and animals. Each step of ecological succession builds on the last, transforming the inhospitable environment into a diverse biological ecosystem. It is crucial to understand how plant communities are responding to ongoing glacier recession to project biodiversity dynamics and manage ecosystems sustainably. The goal of this project was to utilizes a chrono sequencing analysis of Normalized Difference Vegetation Index (NDVI) data to predict how ecological biodiversity will progress as glaciers retreat. The glacier terminus position between the Little Ice Age maximum and 2021 was analyzed from historical maps, orthophotos and LiDAR images. NDVI values were then correlated to the amount of time since the Hintereisferner glacier terminus receded from each pixel. The rate of NDVI change over time was also calculated to determine the pattern of plant succession as the Hintereisferner glacier recedes.

9:40-10:00 am

Melting glaciers and effects on water storage for hydroelectric power in the North Cascades, Washington

Luke Tift, Gustavus Adolphus College

Abstract: Glaciers around the world are melting due to climate change and results in a loss in water storage, which also affects the stream flow and amount of water stored in a watershed. As a result, this limits the energy production of hydroelectric power plants that rely on glacial flow to supplement their water supply. In order to aid hydropower that is endangered by this loss, it is important to estimate the amount of stored water being lost and model what kind of water storage should be created to protect future renewable energy generation. I studied the Skagit River Hydroelectric Project in Washington and the surrounding glaciers which feed into the plants, as well as the size and number of current reservoirs near the dams. I am conducting geospatial analysis through DEM differencing using aerial photos and data collected by the North Cascades Glacier Climate Project. The status of glacial mass balance, and amount of water storage lost, is being assessed based on elevation change measurements. The information that will be obtained in this research can be used to improve current water storage developments for hydroelectric power projects.

10:00-10:20am

Saving Salmon: Effects of Glaciers on Stream Temperatures

Lindsey Paulson, Gustavus Adolphus College

Abstract: Stream temperatures are rising due to global warming, which threatens salmon populations by killing eggs and preventing upstream migration for spawning. In the past decade, Alaskan fisheries have seen significant declines in salmon populations, potentially due to temperature changes. However, glacial meltwater, which carries cool water and fine sediments to streams, could temporarily buffer these increasing stream temperatures. Global warming is also increasing the rate of glacial melt, and these cooler glacial inputs will eventually begin to slow or disappear. My research aims to quantify potential significant differences in temperature and sediment content between glacial and non-glacial streams in coastal Alaska. I will compare temperatures between glacial and non-glacial watersheds through remote sensing surface temperature data and instream water gauges. Stream habitats will also be compared to glacier area through glacier inventory outlines. Environmental results will be compared to previous literature on salmon presence in differing temperatures and sediment concentrations. The results obtained will demonstrate how salmon populations may fluctuate with differing glacial inputs and inform salmon fisheries on best management practices as global temperatures continue to rise. Predicting the

effects of glacial meltwater is important in areas like Alaska that rely on the fishing industry for jobs, income and cultural services.

10:20-10:40 am

Awareness and Opinion of Glacial Recession in U.S. Tourism Hotspots on Social Media

Fynn Cofell, Gustavus Adolphus College

Abstract: Glacial recession has recently become the subject of intensive study, yet there is still a lack of information on how people view the subject. The question of how people are interacting with glacial recession, through social media in particular, has not been fully explored. Many studies conducted on this topic have been within the physical sciences, and the social-science studies have been limited with little attention given to social media. Given that social media platforms are a mainstay of communication between members of younger generations, mining these platforms may give indispensable insight into how these groups are reacting to glacial loss. The question asked in this research is what are the social reactions and attitudes of people interacting with and living around glacial tourism hotspots as seen through the lens of social media? To study this question, analysis of posts from the last year and their content in relevant groups and hashtags is analyzed through keywords analysis. Preliminary results show a strong level of awareness of the effects of climate change on the regions in question, but little discussion of specifically glacial recession. These results help advance the study of glacial recession by broadening our understanding of the conversations occurring around the subject. These results are also valuable to the scientific community and tourism industry as they are informative of what sorts of discourse and awareness need to be encouraged in the public sphere.

> **Session 1D: 9:20 am - 10:40 pm**
> **Room 3302**
> Moderated by Eric Carter

9:20-9:40 am

Inhaling Health Inequities: The Association Between Pollution and Asthma Prevalence in California

Christine McCormick, Macalester

Abstract: Health geographers have utilized GIS for spatial analysis for about as long as the software has been prevalent. But, spatial analysis of Asthma where case occurrences were thought to be determined by internal factors wasn't published until 2006. Drawing on the research of Juliana Maantay, I examine the

association between asthma prevalence and external factors such as pollution producing facilities or proximity to roadways. My project analyzes this association in California using the EPA's Greenhouse Gas data set, as well as data from Cal Enviro Screen 4.0. Using statistical analysis and the buffer tool in ArcGIS pro, I hypothesize that asthma rates are higher the closer in proximity a person is to pollution producing facilities. Utilizing roots established by the Environmental Justice movement, I analyze patterns of these facilities being disproportionately impacting marginalized communities.

9:40-10:00 am

Fowl Symptoms: Modeling Spatial Risk of Future Avian Influenza Outbreaks on MN Poultry Feedlots

Gabriel Reynolds, Macalester

Abstract: The emergence and spread of highly pathogenic avian influenza (HPAI) remains an ongoing possibility, if not a likelihood, in our global human-animal interface. Indicated by recent outbreaks, the rapid and continuous emergence and spread of HPAI necessitates effective and accurate mapping of current and future risk of infection. In this project, I discuss the complex, and often unseen, stepwise processes that inform avian flu emergence, and I evaluate the vulnerability of Minnesota feedlots for future outbreaks of avian influenza. Using the characteristics of avian flu disease transmission, I identified points on which risk-mapping can focus. Further informed by existing literature and other risk-mapping efforts, this risk mapping employs GIS/spatial analytical methods and is based on 1) feedlot distribution, 2) poultry density, 3) waterfowl distribution, and 4) feedlot proximity to population centers. Risk maps highlight feedlot sites in Minnesota with predicted increased risk of avian flu outbreak, and they provide an entry point for further risk modeling of avian flu in Minnesota feedlots.

10:00-10:20 am

Bike-share Safety in Los Angeles: a Wheely Local Analysis on Traffic Accidents Before and After the Installation of Docking Stations

Gina Qian, Macalester

Abstract: In the recent decade, bike-share programs have bloomed in many metropolitan areas, especially in New York City, Los Angeles, and Chicago. Nevertheless, city planning in the United States caters towards automobiles, where sharing roads with vehicles means the cyclists have to fight against America's car culture. Especially in cities like Los Angeles, the transportation system has heavily gravitated towards highways and automobiles since the 1920s. On the other hand, traffic accidents are the leading cause of non-natural death

for Americans. There has been a steady increase in fatal injuries among male bikers compared to the data in the 1970s. Moreover, studies have also shown that bikeshare users are less likely to wear a helmet, and they are more likely to commit traffic violations. This project aims to compare if the introduction of bike share docking locations increase the rate of traffic accidents locally before and after. The analysis incorporates 3-year traffic crash data from 2013 to 2015 before the LA Bikeshare gains its momentum towards the end of 2016 to gauge the traffic accident hotspots. By overlapping the accident kernel density with the biking docks, another set of crash data from 2017 to 2019 captures the change of local pattern of areas with high collision frequencies.

10:20-10:40 am

Investigating the Spatial Relationships between Opioid Overdose and Race in Ohio from 2011 to 2019

Alice Pham, Macalester

Abstract: The misuse of and addiction to opioids, including prescription pain relievers, heroin, and fentanyl is a national crisis in the United States. In 2019, about 50,000 Americans have died from opioid-related overdoses. Though the most dramatic increase in opioid-related deaths has occurred in white Americans, the opioid epidemic has also greatly impacted communities of color. Recent studies are finding that Black Americans are now dying from drug overdoses at a higher rate than whites. Overdose death rates per 100,000 white individuals (15.8%) were double compared of Black individuals (7.9%) in 2010. Preliminary data shows that overdose death rates per 100,000 Black individuals increased from 24.7 in 2019 to 36.8 in 2020, which is 16.3% higher than that for white individuals (31.6%) in 2020.

This research focuses on the temporal changes in the distribution of opioid overdose mortality rates among African Americans and whites in Ohio counties and the associations between opioid overdose deaths and race from 2011 to 2019. Global and local Moran's I test for spatial autocorrelation examined clusters of counties with high and low rates of overdose mortality. LISA was performed for local tests of spatial dependence to identify and visualize clusters of counties with high and low rates as well as spatial outliers.

9:20-9:40 am

Resilience in Responders: Improving Access to Emergency Medical Services in Rural and Frontier Communities

Marley Kehew, Macalester

Abstract: For the past decade, a silent public health crisis has swept across the country. One by one, rural hospitals, emergency departments, and ambulance services are closing. The issue? An aging volunteer workforce, shortage of career professionals in rural areas, and complete lack of funding to maintain operations. This study ultimately aims to contribute to discussions on the frontier, remote, and rural (FARR) EMS crisis by highlighting solutions that build community resilience and maintain rural identity. Using a case study of Montana EMS services, this study: characterizes current ambulatory EMS coverage in rural and frontier communities in Montana based on travel time from existing facilities; evaluates commonly proposed solutions to improving EMS access in FARR communities based on socioeconomic and demographic characteristics of identified underserved areas; and proposes solutions to improving FARR EMS that prioritize rural identity and community resilience. Findings suggest that strategies to improve FARR EMS should strike a balance between traditional infrastructure or resource development-based solutions and approaches that target community resilience. Community-based approaches could include developing community first responder schemes, increasing access to EMS education, or implementing community paramedicine. This study highlights how new strategies to promote equitable access to EMS across the country can be discovered by utilizing a combination of geospatial technology and novel approaches to medical geography such as the concepts of "sense of place" and "place identity".

9:40-10:00 am

Glacial 'dead-ice' predictions based on individual glacial volume in Montana's Glacier National Park.

Alex Terpkosh, Gustavus

Abstract: Due to an increase in temperature of $1°C$ since 1880 from climate change, there has been a direct correlation relating to the decrease in glacial ice. By predicting when each glacier in Montana's Glacier National Park will be pronounced dead ice, the volume is less than .1km2, a timeline depicting the

impacts and severity of climate change in Glacier National Park will hopefully lead to more government funding in support of climate mitigation efforts. By using surface area data previously collected on 37 glaciers in Glacier National Park, I converted each value to the relative volume before creating an equation based on the regression. The equation was then used to extrapolate the volume of each glacier into the future. Nevertheless, due to uncertain geography under glaciers, there is no simple way to get a precise volume for each one. An analysis is still underway but there is a chance that this data is too uncertain to lead to increased government awareness and funding. However, it is clear that all 37 glaciers have a negative slope. In addition, a general timeline can give the public a final opportunity to see certain glaciers in Glacier National Park before they are pronounced dead ice.

10:00-10:20 am

The Forgotten Institution: A Public Geography of the Poor Farm

Jack Acomb and Eva Stromgren & Marisa Williamson & Henry Yackel, Macalester

Abstract: Poor Farms were county-run welfare institutions in the United States in the 19th and 20th centuries, designed to support local impoverished populations via their own agricultural labor. Founded prior to Minnesota statehood, the Poor Farm was situated in the broader context of the white settler colonial project in the Minnesota territory. Our team conducted novel historical research in local archives on the Ramsey County, Minnesota Poor Farm in order to create a public-facing website that explores the identities, experiences, and geographies of the institution. This project serves to bring attention to the legacy of the Poor Farm and contextualize modern institutions varying from elder care to the carceral system.

10:20-10:40 am

Racial Disparities among Police Stops in St. Paul

Quinn Garrison, University of St. Thomas

Abstract: Minnesota police departments are under pressure from the community following George Floyd's murder. A wide number of studies indicate that people of color are disproportionately more likely to be stopped by police. These disparities could stem from institutional racism, individual racial bias, and the enforcement of discriminatory policies. This research uses a database with over 650,000 police stops in St. Paul from 2000 to 2016. A model was constructed in ArcGIS Pro to analyze racial disparities in police stops using the tool Space-Time Cubes to create hotspots and visualize trends in Saint Paul where frisking occurs. Additionally, Pivot Tables were used to help analyze racial disparities among police stops. This research finds that people of color are disproportionately likely

to get pulled over and when pulled over more likely to get frisked. This allows for a better understanding of discrimination among police stops.

9:20-9:40 am

Post-Forest Transition Puerto Rico: Analyzing Patterns of Anthropogenic Deforestation

Claire Norman and Carter Anderson, University of St. Thomas

Abstract: From 1940 to 2000, the island of Puerto Rico experienced a forest transition. Farmers abandoned their land in search of higher quality jobs in urban areas and the mainland United States. Abandoned farmland afforested but reforestation rates stalled by 2000. This project analyzes areas in Puerto Rico that are either experiencing reforestation or anthropogenic deforestation since 2000. Tree gain and tree loss data is compared to friction to distance, settlement, and soil productivity data via scatterplots. Results indicate that most anthropogenically deforested lands have a low friction to distance and are near settlements. These lands are being deforested for agricultural purposes, counteracting Puerto Rico's original forest transition. A buffer was created to measure the distance between deforested areas and protected areas, with the aim of purchasing land adjacent to protected areas. Prospective purchase areas are then further evaluated via air photos to determine the reason for deforestation and viability of land purchase. To remediate further deforestation, we recommend the purchase of our target land areas to create larger islands of habitat, strengthening Puerto Rican ecosystems and minimizing deforestation. However, the economic pressures causing a rise in agriculture must be addressed to remediate future deforestation while promoting a stronger Puerto Rican economy.

9:40-10:00 am

Novel Ecosystems and Urban areas in Puerto Rico

Auguste Tabie and Ashley Giossi, University of St. Thomas

Abstract: Puerto Rico's landscape and ecosystem has overgone a massive shift over the last century, massive regrowth is happening across the island over previously cleared forests. These forests are populated by historical, endemic and most significantly, invasive species. The introduction of invasive species causes Novel Ecosystems by creating a unique combination of species that now inhabit

them. Although many believe that these invasive species should be eradicated, we believe that they can bring tremendous value and are instrumental for conservation in the Anthropocene. Rural Puerto Rico has seen a massive amount of regrowth to the point that tree gain is slowing down, which begs the question what's next for conservation in Puerto Rico?

We think urban areas are massively overlooked for potential conservation projects. Urbanized regions can play a key role in conserving plant and animal species by creating green spaces that wouldn't otherwise be there. Urbanized areas' suitability in tropical habitats is demonstrated by populations of native species that stay in the region; however, not all native species can survive in the city making green spaces scarce. Novel ecosystems enable the growth of suitable habitats for natural areas within cities. Areas with lots of green space provide benefits to the population's mental health, increased air quality, and more opportunities for environmental education. We encourage Puerto Rico to adopt practices that enable growth of novel ecosystems as they provide benefits to cities' populations' well-being.

10:00-10:20 am

The Relationship Between Novel Ecosystems and Protected Areas in Puerto Rico

Nathan Martin and Maggie Duerwachter, University of St. Thomas

Abstract: Extensive data and research about forests and reforestation patterns in Puerto Rico have created a unique opportunity to explore novel ecosystems in forested areas. Both novel and native forests play a crucial role in providing habitat for species and suppling ecosystem services for people. This project aims to explore the distribution of native and invasive species in two study areas, protected areas and a surrounding buffer zone, to understand the impact of forest protection in Puerto Rico. Zonal statistics were utilized to compare species composition within protected areas versus the 2-kilometer buffer zone. This comparative analysis employed data showing the location and number of native and invasive species. In general, protected areas contain high numbers of native species and few invasive species; however, on a local scale this pattern does not always hold true. Furthermore, larger protected areas tend to have greater numbers of native species than smaller protected areas. Non-protected buffer zones tend to contain high numbers of both native and invasive species, suggesting that these ecosystems are more novel than the protected areas they surround. We conclude that Puerto Rico's protection policies have been relatively successful, and that non-protected areas have valuable novel ecosystems which should also be considered for protected status.

10:20-10:40 am

Redefining Regions in the Anthropocene

Leah Rumon, University of St. Thomas

Abstract: Human modification of landscape has forever changed the world: the boom of agriculture, industrialization and globalization has made the world more connected while destroying ecosystems. Defining regions has been a traditional challenge in geography. Different land uses like agriculture, national parks/spiritual value of land, cities, and residential areas have helped to define different regions, but without consistency. Erle C. Ellis initialized the idea of ecology in the Anthropocene, the redefinition of ecosystems that have all be altered by humans, termed: Anthromes. Puerto Rico has been altered by human modification, much of the islands natural rainforests had been removed for agricultural use, and later grown back to novel ecosystems. Using the variables of: Precipitation, Soil Productivity, Settlement Forest Cover (2000), Protected Areas, Elevation, Friction, and Percent Poverty with the tool multivariate clustering allows for redefinition of Puerto Rico into Anthromes to better define land use regions in Puerto Rico. Multivariate clustering facilitates regionalization utilizing set variables and finds natural clusters of like variables. Utilizing multivariate clustering with a defined set of human and natural variables creates a new vision of regional geography that provides context for decisions made in the Anthropocene.

Session II: 10:50 am - 11:20 am

Poster Session: 10:50 am - 11:20 am
Nobel Hall North Atrium

Highlighting the Disconnect between Physically Disabled Individuals and Urban Designers

Andrew Gasperlin

Abstract: Accessibility to public transportation is vital to many individuals' daily lives when attempting to navigate the built environment around them. When transportation systems are designed in a way that neglects the needs of individuals with mobility limitations and physical disabilities it severely impacts

their ability to participate in urban life, unlike their able-bodied counterparts. The Light Rail Transit system, Blue and Green Lines serve over 75,000 individuals each day getting to and from activities, doctors' appointments, leisure, work, etc. Ridership is projected to increase substantially due to both a steady Twin Cities population increase of 11% in the last decade and train line additions being planned and constructed in the coming five years. With a high ridership volume, this system needs to serve all who wish to utilize it when trying to move about the Twin Cities metro no matter their physical ability. Historically individuals with physical disabilities have been left behind when it comes to urban development (Bezyak, 2017). In 1990 the American Disabilities Act was passed to give people with physical mobility restrictions better access to transportation systems and buildings around the country, later revised in 2015 (2015, ADA Title III Public Accommodations). While the passing of this legislation was monumental for getting society closer to a level playing field in terms of accessibility there are still many ways in which transportation systems are built to ideally serve able-bodied individuals. Through this research physical obstacles present on the Light Rail Transit system will be identified and outlined, then used to show the current relationship between physically disabled individuals and urban designers.

Modeling Wind Power Suitability for the State of Minnesota
Tommy Guddal

Abstract: In 2022, the Intergovernmental Panel on Climate Change stated, "human-induced climate change is causing dangerous and widespread disruption in nature and affecting the lives of billions of people around the world". This statement calls to action to limit our reliance on fossil fuels in exchange for alternative renewable energy sources. Minnesota plans to reduce carbon emissions by 45% by 2030 and to be carbon free by 2050. To achieve these goals, the state must expand its ability to produce energy through cleaner renewable sources. The state already produces around 18% of its electricity with wind energy, however, greater investment must occur. Using the suitability modeler in ArcGIS Pro, this research aims to target optimal areas in Minnesota for wind power generation. Variables contributing to this suitability model include, 100-meter wind speeds and proximity to protected areas, airports, bodies of water, electrical substations, population centers, and demand for energy. The resulting suitability map provides a comprehensive view of the most and least suitable areas in Minnesota for expanding wind power, serving as a guide to target areas for future investment.

Friction of Distance within Puerto Rico
Quinn Garrison

Abstract: It was discovered that many areas in Puerto Rico that are rich in biodiversity, were cut down and farmed for profit in the early days of Puerto Rico. In these rural areas, the farmers left the land and moved to the city as farming could not provide all their needs as the city could. This mass migration of people across Puerto Rico caused spontaneous reforestation in pockets around the country enriching biodiversity. Approaching Puerto Rico through the lens of the Forest Transition Theory (FTT) a model was made in ArcGIS to predict the friction of distance using slope, Puerto Rican infrastructure, water, and other variables. Through examining Puerto Rico's Forest Cover 2000, Soil Productivity, Precipitation, Friction of Distance, and Settlement. This model predicts the difficulty of reaching certain areas in Puerto Rico. In those areas, we find a bolstering novel ecosystem. This research finds the interconnectivity between Friction of Distance within Puerto Rico and their novel forests, allowing a better understanding of the Forest Transition Theory in Puerto Rico and how that can be applied to other countries.

Session 2B: 10:50 am - 11:20 am
Room 1104 (GIS Lab)
Moderated by Sydney Stumme-Berg

10:50-11:05 am

The Commodity Changing the World: Tracking the COVID-19 mRNA Vaccine

Tessa Yeager, Gustavus Adolphus College

Abstract: Since the beginning of the COVID-19 pandemic, the topic of vaccines has been incredibly present in modern discourse. The presentation tracks the COVID-19 mRNA vaccine all over the world, starting with the research phase and ending with the disposal. Although mRNA vaccines will be the focus, other variations of COVID-19 vaccines are mentioned as well. This presentation covers the physical geography of locations, but also the human geography of how people are directly affected by the COVID-19 vaccine - whether it be by unethical distribution or potential environmental acts.

11:05-11:20 am

Paseo Verde: Community Focused Construction

Geena Zebrasky, Gustavus Adolphus College

Abstract: This presentation explores an "energy geography best practice", a practice that goes beyond the belief that green technologies will solve our energy

problems and needs during a time of global climate crisis. The energy best practice I cover in this paper is the Paseo Verde complex, a housing development built in 2013 in Philadelphia. While this development does utilize green technologies, it goes beyond these, centering the pedestrian and resident in order to practice energy conservation. By learning about the design of this development, we can begin to understand how we can approach new urban developments in a way that make our cities more human-orientated. Throughout the paper, in order to explore how this development is a best practice, I draw upon concepts and energy practices explored within Ozzie Zehner's book Green Illusions: The Dirty Secrets of Clean Energy.

Session 2C: 10:50 am - 11:20 am
Room 2300
Moderated by Tiffany Grobelski

10:50-11:05 am

Protecting Biodiversity in Madagascar: A Site Suitability StoryMap

Jane Slentz-Kesler, Macalester College

Abstract: This StoryMap addresses the issue of biodiversity conservation in Madagascar, a worldwide "hotspot" for endangered species. From incredible lemurs to chameleons to the small fossa carnivores, the island-continent's library of life is breath-taking, but experiencing concerning population declines. Protected areas are a primary method of preserving wildlife, and this StoryMap details our group's analysis of three different variables to determine the ideal placement for new protected areas. First, we analyzed the distribution of endangered fauna to determine where the highest concentrations were located. Second, we examined human footprint, to place protected areas away from highly human-dense areas. Finally, we considered the locations of baobab trees, which are extremely culturally important, to prioritize this aspect of Malagasy culture in creating protected areas. Combining these three factors, we propose new protected areas to be in Tsaratanana Massif, Tsingy de Namoroka, and the Upper Mania River. We also aim to highlight the importance of prioritizing local needs and leadership and discontinuing the colonial practice of exclusionary park creation. The future of Malagasy conservation needs too be Malagasy focused and led, and this analysis is created in hopes of furthering that vision.

11:05-11:20 am

Staying Charged

Benji Huff and Ronard Pabi, Gustavus Adolphus College

Abstract: By tracing a single element from a daily use object we are able to understand how commodity chains affect the systems and people of third world mineral extraction, factory workers, the environment, and commodity politics. But how do we fit in?

Lithium-ion batteries are an important commodity in today's world. They are found in phones, laptops, and electric vehicles. A key component of these batteries is cobalt. Cobalt has a high electric charge density and makes these batteries more efficient. This presentation involves following the thing: extraction of cobalt from mines in the Democratic Republic of Congo to produced batteries being distributed to tech companies. We also discuss implications of this commodity chain on people, economies, and the world.

Panel Session: Future Geographers and Geographies: 11:30 am -12:30 pm
Nobel Hall 2220 (Wallenberg Auditorium)
Moderated by Joaquin Villanueva

Panelist Biographies

During his time at Gustavus, Elliot was immediately drawn to courses focusing on urban geographies, social justice, and environmental sustainability. After graduating from Gustavus in 2018 with a Bachelor's degree in Geography and Environmental Studies, Elliot pursued his Masters in Urban and Regional Planning at the University of Minnesota's Humphrey School of Public Affairs. While there, he worked on student-led projects related to community impact statements, the development of cultural corridors in St. Paul, and envisioning the role of autonomous vehicles in urban, suburban, and rural

landscapes. Elliot is now employed as a Planner for Olmsted County where he works on a wide breadth of projects. Some of his recent accomplishments have included starting the process of developing a county-wide parks and open space plan, updating the general land use plan, and collaborating on a free and fair redistricting process for county commissioner districts.

Rachel graduated summa cum laude from Gustavus Adolphus College with a BA in Geography and Environmental Studies in 2020. Rachel cherished her time at Gustavus where she learned "the why of where" (thanks, Joaquin), developed leadership and critical thinking skills, and built meaningful relationships with friends, faculty, and staff. After graduating, Rachel joined the Origination team at US Solar, a developer, owner, and operator of solar generation and storage projects based in Minneapolis. She oversees communications with community solar subscribers and collaborates with the Asset Management team to execute solar garden allocations and billing. As an environmental justice advocate and farmer's granddaughter, she is passionate about promoting energy resources that diversify rural economies, speed the transition to a renewable energy future, and provide the environmental and health benefits of clean, local energy to all.

Quincy is a proud Hmong American who graduated from Gustavus Adolphus College last spring (2021). He considers himself a budding human geographer who is interested in environmental ethics, politics, and justice. As an undergrad, he was a Doris Duke Conservation Scholar at the University of Washington-Seattle where he worked on conservation projects across the Pacific Northwest. Additionally, he spent a semester studying climate change, geopolitics, and migration in Nepal and India. Since graduating, he has worked with The Trust for Public Land in Seattle, WA and The Southeast Diaspora Project in Minneapolis, MN.

This fall, Quincy is attending Yale University to pursue a Masters of Environmental Management. He is excited to join the community of geographers and environmental justice leaders at Yale who are linking scholarship with on-the-ground initiatives to achieve global sustainability.

Shauna Capron is a Water Resources Specialist at the Prior Lake-Spring Lake Watershed District in Prior Lake, MN. She graduated from Gustavus Adolphus College with a B.A. in Geography and Environmental Studies in 2020.

Shauna's interest in natural water resources emerged from a number of formative experiences during her time at Gustavus, beginning with a program in Beijing, China. In this program, she explored the outlook for sustainability amidst the environmental and human impacts of rapid global development and population growth. Upon returning to Minnesota, she conducted water quality research in the Seven Mile Creek watershed, and she participated in hydrological research in glacial watersheds of the Ecuadorian Andes.

Lunch Break 12:30 pm - 1:30 pm
Pick up lunches in the North Atrium and dine al fresco in the Gustavus Arboretum and Nobel Hall

Session III

1:40-2:00 pm

Sahelian Desertification and The Great Green Wall: A Political Ecology Assessment of Desertification Narratives and a Wooden Bullet

Brennan Persenaire Hogeterp, Macalester College

Abstract: Stretching from Nouakchoutt on the Atlantic to the shores of the Red Sea, and defined by its scrubby shrubland and grassland savannas, the African Sahel is home to 135 million people. It is also an area where experts are concerned about the threat of desertification and its implications for agricultural and pastoral productivity of local people. To address this enormous problem, the humanitarian community has coalesced around an equally massive solution; the Great Green Wall (GGW). The GGW aims to halt desertification in its tracks and increase resilience to climate change, famine, and drought with a silver bullet solution; a "wooden bullet" made of a wall of forest 8,000 km long and 15 km wide. This paper assesses the effectiveness of the GGW as a solution to desertification through a post-structuralist political ecology analysis of desertification narratives and a case study of the GGW and desertification in Niger. I uncover a complex story of desertification and reforestation in the Sahel creating multifaceted impacts on the people of Niger. The GGW will need to be radically reimagined if it is to fully address these complex impacts and address dryland degradation in the Sahel.

2:00-2:20 pm

Determining Influences of Glacial Velocity around Chugach National Park, Alaska

Emma Pfeifer, Gustavus Adolphus College

Abstract: Glacial velocity is the key factor in determining the state of a glacier because a glacier's velocity can help establish discern how close to demise it is. Understanding what controls play a part in a glacier's velocity is essential to being able to maintain a glacier's velocity. Using Glacier Image Velocimetry programming, GIS analysis, and the elevations of glaciers can help identify if

hypsometry, aspect, and the termination area of the glaciers are influential variables in the control of the glacier's velocities in this specific system. In this study, I utilize Glacier Image Velocimetry software, a software designed to calculate the velocities of glaciers based on remote sensing data over time, to gather the velocities for each of eleven glaciers chosen within the Chugach Mountains. I then compare the velocities to the three possible variables of each of the glaciers to come up with a visual result of correlation between the velocities and each specific variable. Concentrating on this specific area in Alaska allows for a more diverse understanding of each of the variables as they are most commonly studied in the Himalayas. The results from this study can help conservationists and those located in areas around the glaciers make decisions for how to best mitigate a glacier's change in velocity and which glaciers should be focused on in maintenance practices.

2:20-2:40 pm

Human movement barriers' effect on forest cover in Puerto Rico

Cole Potter, University of St. Thomas

Abstract: The goal of this investigation is to determine the nature of the relationship between areas of forest regrowth in Puerto Rico and the biological, environmental, and social factors that drove forest transition. Discovery of strong relationships between factors can help us determine additional targets for forest transition globally to maximize habitat for biodiversity, as well as increasing our natural carbon sequestering abilities by increasing overall tree cover. This research project is an observational study. The core methodology was the analysis of available map data for Puerto Rico, including the use of statistical tools to calculate factor regressions. An association was found between the areas restrictive to human movement due to distance from road systems, extreme slope, and elevation. Areas located further from highways and a robust transportation network were more likely to contain dense tree coverage than nearer areas. One conclusion one could draw from this observation is that those areas were more likely to remain undisturbed than converted into urban or agricultural land. Elevation was one of the stronger variables in this relationship, indicating that urban developers and farmers were less likely to convert land high in the mountains regardless of its distance from road networks, likely due to both the difficulties farming at high elevation and the poor soil quality found in the mountains of Puerto Rico.

1:40-2:00 pm

Rural Resiliency: The Cause and Effect of Minnesota's Maternal Health Crisis
Annabel Gregg, Macalester College

Abstract: The United States is experiencing a maternal health crisis that disproportionately affects those who give birth in rural communities. Rural birthing people have higher maternal mortality rates, increased risk of postpartum hemorrhage, non-indicated cesarean sections, and other adverse health outcomes. Despite the enhanced risk of rural birth, rural communities are losing access to hospital-based obstetric care at an unprecedented rate. Minnesota has vast rural territory, with one-fourth of its population living outside the urban sphere – making it a strategic area of study. As of July 2021, 31% of Minnesota's 91 rural hospitals were at risk of closing. The repercussions of obstetric loss reverberate through rural communities, leaving indelible physical, emotional, and economic impacts. This paper seeks to identify why American rural communities are experiencing the loss of hospital-based obstetric services and how local communities in rural Minnesota respond to the lack of maternal healthcare. Using a mixed-methods approach, this paper compares findings from a systematic literature review to survey responses and ethnographic interviews with birth workers and birthing people across Greater Minnesota. This research intentionally seeks out and uplifts rural knowledge to highlight the resiliency of Greater Minnesota. Findings from interviews suggest that communities identify macro-level issues as barriers to equitable, high-quality care. Minnesota's rural communities respond to the maternal health crisis with place-based and community-specific public health measures. This study highlights the lived experiences and local knowledge collectively held by rural communities and provides critical insights into the reality of rural birthing across Minnesota.

2:00-2:20 pm

Making Every Community Intentional: Informal Urbanism, Degrowth, and the Everyday
Glade Paulson, Gustavus Adolphus College

Abstract: In our current social climate, it is unthinkable that communities can cohesively work together to build a better future for themselves without relying on state aid and intervention, and often the state is directly at odds with the aims of

community social reproduction. At the same time, in the face of climate change it is more important than ever for communities to make their own decisions about what policies to implement for themselves. To address this I propose applying a feminist degrowth perspective to community planning in order to necessitate the conditions that lead to healthy and sustained self-governance toward the end of ecological sustainability.

2:20-2:40 pm

"Hillbillies", Country Legends, and God's Green Earth: Understanding the Sister Tourism Meccas of Branson, Missouri and Pigeon Forge, Tennessee

Audrey Wuench, Macalester College

Abstract: One reason people engage in tourism is to "escape" from their normal life. As the United States urbanized in the twentieth century, many sought out experiences that evoked the "simpler" rural past. Branson, Missouri and Pigeon Forge, Tennessee serve as case studies for this phenomenon in Ozarkian and Appalachian tourism. As modern tourism in these two places took shape in the 1960s, American country music was starting to align more with the New Right. While country music is a broader geographical phenomenon, country music paints these tourism landscapes with its perceived themes of patriotism, conservative Christianity, family and tradition, and thus plays a significant role in the marketing and appeal of these places to tourists. When country music occupies these tourist spaces, it carries a weight that can exclude certain groups of tourists, which prevents the expansion of tourist bases. Through the application of tourism geography concepts and textual analysis of promotional tourism materials, this thesis will show how this narrow targeted focus can hinder places like Branson and Pigeon Forge from practicing sustainable tourism.

Session 3C: 1:40 pm - 3:00 pm
Room 2300
Moderated by Jesse McClelland

1:40-2:00 pm

Change Detection Analysis of Line 3 Oil Pipeline

Jacob Orser, Macalester College

Abstract: Since the Line 3 oil spill on March 3, 1991, in which 1.3 million gallons of crude oil spilled into the surrounding area, pipelines have been a topic of environmental conversation in the Midwest. Thus, it stood as a surprise that in 2017 Enbridge, an oil company, signed a deal with the United States Federal

Government to construct a new pipeline. This pipeline promised to bring oil to the Midwest from the oil shores on the western coast of Canada. Although the pipeline proposes lower oil costs and emissions from transportation, the proposal has met resistance from environmental advocates. The Line 3 Oil Pipeline runs through 338 miles of Minnesota's natural landscape. In 2015 Enbridge released an environmental impact statement detailing the extent of the impact of construction. They outlined a zone of 120 feet as the standard construction area. This impact statement has been denied, rewritten, and found in violation many times. This paper uses remote sensing to determine the changes in vegetation within this 120-foot boundary and beyond to determine the true environmental impact.

2:00-2:20 pm

The Age of Last Chance Glacial Tourism

Laure Briol, Gustavus Adolphus College

Abstract: There is growing concern for the future of glacial landscapes, due to glacial retreat caused by climate change. Climate change is caused by human activity, but at the same time creates the question on whether this phenomenon is a motivator for tourists to see glaciers for the last time. Most research surrounding glaciers and the human impact of these landscapes exclude the effects of tourism and digital actors, such as social media. To maximize conservation efforts around environmental policies and adaptation measures at these tourist destinations, there is great importance around understanding the responsibility of why tourists visit these sites. In the age of climate change, the climate movement, and social media, last chance glacial tourism frequently appears within social media and constitutes a motivator for visiting glacial landscapes. The main method for the study will consist of two discrete searches on the Instagram platform, where 250 records with the hashtag glacier, from a ten year span, will be directly compared, based on the following criteria: the amount of posts overall; average amount of likes in the posts; average amount of comments in agreement in each post; overall what percentage makes up last chance tourism and what percentage does not do so based on the time scale. The preliminary results indicate that there is an increase in glacial tourism within the past decade. This result suggests that tourists care more about these landscapes and are aware of the need for more aggressive climate change prevention tactics.

2:20-2:40 pm

Analyzing Tensions Surrounding the Hennepin Avenue Redesign Project in Minneapolis

Karson Hegrenes, Macalester

Abstract: After decades of dependence on the personal automobile, American cities are pushing for overarching visions of the city that center alternative modes of transportation. Achieving these visions involves reconstructing car-oriented streets to accommodate pedestrians, transit, and cyclists. However, cities often face fierce pushback from stakeholders that drastically alters, delays, or even prevents reconstructions from moving forward. The city of Minneapolis, Minnesota, is experiencing this problem as the city hopes to reconstruct a portion of Hennepin Avenue, a car-centric arterial roadway. This paper seeks to interrogate the tensions surrounding the Hennepin Avenue reconstruction project. To do this, I used ATLAS.ti software to conduct a thematic analysis on a representative sample of a total of 821 comments from a set of six digitally-available StarTribune and MinnPost articles. I found that the most common themes in comments were parking; biking and bike lanes; driving and cars; businesses and commercial activity; and public transportation. Comments revealed diverging philosophies or conceptions on topics such as who local businesses should cater to; what cities should prioritize through design; mobility, especially for those with mobility concerns; and who is "responsible" for reconstruction projects. Analyzing comments also revealed an apparent lack of self-awareness or perception of privilege among commenters in favor of car-centric design. These results are important in the greater context of street redesign projects across North America as they shed light on specific tensions that underlie similar reconstructions and could potentially delay, alter, or halt them.

> **Session 3D: 1:40 pm - 3:00 pm**
> **Room 3302**
> Moderated by Eric Carter

1:40-2:00 pm

Mapping Maternal Health in Quito, Ecuador

Addie Engebretson, Gustavus Adolphus College

Abstract: Low birth weight is considered to be a serious adverse maternal health outcome. This study seeks to explore how low birth weight occurrences within the context of Quito, Ecuador and its neighboring parishes could be influenced by the specific geography of the city as well as socioeconomic factors such as poverty. Quito is a city surrounded on two sides by volcanoes and it has such an intense traffic problem that there are restrictions on what days a car can be driven. I will investigate how access to public hospitals, which are the main safety net for those who can not afford paying for medical care themselves, may be impacted by drive times in this narrow city and additional factors.

2:00-2:20 pm

Understanding the Syndemic Effects of the Zika Epidemic in Colombia, 2015-2017

Roan Floer-Martinez, Macalester College

Abstract: Zika and its vector, the Aedes Aegypti mosquito, have likely been in the Americas for centuries. However, in 2015, a more virulent strain appeared which could cause Guillen-Barre syndrome and microcephaly in a small number of patients. Using data on the number of cases from Dr. Kelly Charniga, as well as data from the Colombian census bureau on poverty and other factors, I aim to explore the syndemic effects of Zika. Syndemics are taken to mean any interactions between pathogens and upstream determinants, including underlying health conditions, socioeconomic and environmental factors, and coinfection by multiple diseases. Initial research and literary review suggest that Zika is strongly linked to the unavailability of clean water, as well as poverty. This study aims to use several GIS techniques such as univariate and multivariate spatial modeling, local Moran's I, and others to investigate this link. This study is highly significant because, as climate change continues to progress, the A Aegypti mosquito will soon be able to inhabit much of the continental United States. Preparedness for Zika is a necessity.

2:20-2:40 pm

Risky Factors: Identifying and Assessing Socioeconomic and Demographic Variables to Explain Breast Cancer Incidence Rate in North Carolina

Quinn Frankosky, Macalester College

Abstract: Besides skin cancer, breast cancer is the most common type of cancer for women in the United States. Race, ethnicity, and SES greatly influence chances of early detection, which subsequently influence chances of surviving the cancer. The objective of this study is to analyze the association between four risk factors (socioeconomic status, vehicle availability, race, and health insurance coverage) and breast cancer incidence at the county level in North Carolina between 2014 and 2018. Data for the risk factors was collected from the 2016

ACS and breast cancer incidence data was collected from the NIH State Cancer Profiles. Using ArcGIS Online, I identify counties in North Carolina that have an above average value in each of the four factors identified above. Then, I compared my results to the actual breast cancer incidence rate to see potential overlap between the counties that I predicted to have high incidence rates and those that actually did. A regression analysis is also conducted to test how well these factors explain breast cancer incidence rates. The factors of poverty and health insurance help explain spatial differences in breast cancer incidence rate, but race and vehicle are not as good in this instance. This influenced the predictive model's performance when compared to actual breast cancer incidence rates.

2:40-3:00 pm

Medicaid's Role in Reducing Opioid Overdose Mortality Rates in Appalachian States

Augusta Fricke, Macalester College

Abstract: Medicaid expansion within states in the US has been proven to reduce opioid overdose rates. Medicaid is an important service for vulnerable populations unable to afford other forms of healthcare because it includes substance use disorder services and mental health services for populations otherwise isolated from treatment strategies.

Over the course of 1990 to present, the trends in opioid overdose mortality have been deemed an epidemic. The Appalachian region has had some of the highest rates of opioid overdose mortality in the nation. This study examined the role that Medicaid expansion had on six Appalachian states, half of which have expanded Medicaid and half which have not. I hypothesize that the states which have expanded Medicaid will have lower rates of overdose mortality compared to the states which have not. Visually representing these policy changes over time, shows the importance of visualizing different dimensions of the epidemic for public outreach.

Session 3A: 1:40 pm - 3:00 pm
Room 3300
Moderated by David Kelley

1:40-2:00 pm

Child Care Crisis in Minnesota - Is it a shortage of Child Care Centers or Money?
Samuel Swanson, University of St. Thomas

Abstract: Child Care is a concern that is always on the minds of parents. Married and single parents alike want to be able to work while giving their child the best opportunity to learn and grow. COVID has made an already competitive market worse with laws limiting the number of children, staffing shortages and rising cost. This project aims to find the distribution of children under 5 in comparison to the locations of Child Care Centers in the seven-county metro. Using ArcGIS Pro this project finds hot spots, outliers, and the distribution of children (estimated using inverse distance weighting). Drive times are then created around all 9543 Child Care Centers. Finally, a map is generated using zonal statistics to display the estimate number of children within 5 minutes of each Child Care Center. Results show that Child Care centers are clustered near downtowns. Conversely the areas with the highest concentrations of children are in the suburbs. This apparent spatial mismatch may not be a problem, given the preferred commuting patterns of parents.

2:00-2:20 pm

Applying 3D techniques to analyze Recent Global Earthquakes and their Implications

Samantha Poeschl, University of St. Thomas

Abstract: This study focuses on how to use 3D techniques to show recent earthquake data, depth, and magnitude from a new perspective. It explores new applications for these techniques, and how it is relevant to showing a different way to analyze geologic data sets. The significance of this project is that using these techniques will allow for a greater understanding of numerous data sets that have been brought to life through 3D applications. This is important to others because people will be able to apply these tools to numerous applications and draw meaningful conclusions from them. This study is conducted by collecting data from the Living Atlas and the USGS. Recent earthquake data layers are used, including information on magnitude and depth of each earthquake. After extruding these points, the depth was correlated with the extrusion, and the color of each data point to the magnitude. The select layer by attribute tool and narrowed down the earthquake with the greatest depth, and the earthquake with the greatest magnitude. The study area is Japan, containing the greatest magnitude earthquake as of March 16th, 2022 (7.3). This study allows the user to focus in on a specific area of the world to model and apply 3D techniques.

2:20-2:40 pm

Proposal for an Extension of the San Francisco Rail Line

Tomas Edmundson, University of St. Thomas

Abstract: Means of motorized transportation is essentially an inevitable aspect of modern-day society which is used across the United States. With a constant growth in population, transportation by car is starting to take more time as more people are on the road. This is especially evident in large cities, which is partially the reason why we see more use of public transportation in these high-density areas. The city of San Francisco, California, is a city that continues to grow in population and is where the use of public transportation is becoming more desired. This project looks at the existing public rail lines and analyzes population growth and census data to determine the best areas for extension of the current public rail system. Using the data of a current proposal for the extension and the use of ArcGIS Pro, this project depicts the projected growth of different areas of the city, along with census information on how many people say they would use/benefit from the extension. Based on these results the proposed extension is shown. Finally, the next focus was to determine the walking distance from both existing and the proposed future transit stops in 5, 10, and 15 minute increments to show the distance from the areas of growth and those who said they would benefit from an extension.

2:40-3:00 pm

Does Travel Time to Schools Impact Test Scores and Graduation Rates?

Isaac Olson, University of St. Thomas

Abstract: Does the size of school districts and population density affect test scores and graduation rates? I will be taking the largest 15 and the smallest 15 of school district area in South Dakota and comparing their test scores and graduation rates. There is a vast difference in size of school districts as you travel across the state. This all boils down to would the distance being traveled to school have an impact on your kid's education. I believe the answer is yes.

There would be many challenges for kids that would have to travel 30 minutes to school and those that must travel 10 minutes. The kids closer to school could do extra curriculars, get the right amount of sleep, and focus more on schoolwork at night. This could all be done if they were not traveling such a great distance. The data layers I will be using are derived from the South Dakota Geodata base and Esri Living Atlas. I will be finding the distance of how far kids must travel to the closest high school regardless of school districts using the ArcGIS Pro.

1:40-2:00 pm

Forest Transition in the Caribbean and sustainable tourism close to El Yunque National Rainforest

Josh Mounsey, University of St. Thomas

Abstract: The Caribbean has a long history of migration which has sparked the intensification of agriculture which led to the removal of trees. Many Caribbean countries adopted neoliberal policies which encouraged development in the cities and globalization has made the access to goods cheaper. These socio-economic conditions fostered an environment where it became too expensive to farm and as a result, many people left their farms in search of new opportunities.

This project reveals the effects of tourist hotspots in Puerto Rico. The project focuses on the history of land use and how it has influenced the preservation and restorative efforts of the El Yunque National Rainforest in Río Grande. Approximately 900,000 tourists visit the National Forest for hiking, camping, and picnicking in the forest.

Moreover, the forest transition at the El Yunque Forest resulted in the sustainable development around the forest. This sustainable transition and preservation of the forest has increased the number of tourists that visited the forest. The conservation of natural resources is an indicator that attracts more tourist, and many Caribbean islands should replicate that model.

Finally, this research is important because it gives an idea of the multi-faceted effects of tourism on the forest. It aids in the developmental process of a country through the preservation of natural resource.

2:00-2:20 pm

Evaluating Forest Transition Theory in Puerto Rico: Percent Poverty and Isolated Regions

Aiesha Osman, Dylan Monahan, and Robert Burke, University of St. Thomas

Abstract: Forest transition theory predicts reforestation in poor and isolated areas. Puerto Rico has gone through dramatic economic and demographic changes during the period 1940-2000, that are associated with rapid

reforestation. This study aims to improve the understanding of the relationship between friction of distance, poverty, and changes in forest cover to then analyze the influence on reforestation and forest transition theory within Puerto Rico. To conduct this analysis, several data layers were created, the most important being friction of distance. This layer is based on transportation data, slope, and barriers including water. Other variables include poverty, slope, elevation, and above ground biomass. The underlying goal is to look at areas that are isolated and poor to assess to the degree to which they have reforested. We find Puerto Rico has entered a new stage of forest transition theory. On this island, reforestation is occurring everywhere, regardless of socioeconomic status or primary industry in a given region.

2:20-2:40 pm

Landscape of hope: reforestation, creation care, and carbon neutrality

Simon Zamani and Matt Oscanyan, University of St. Thomas

Abstract: The significance of these values assesses multiple topics used to explore Puerto Rico and its forest transition. Nature belongs to us and for us through God, and we must find a way to sustain it and give hope to future generations. In recent times we have seen the Popes make comments about conserving the habitat and Pope Francis himself in his encyclical titled "Laudato si" referred to the environment as our mother and that we must take care of her. The church, especially the catholic church realizes the value and importance of conserving the ecosystem and has encouraged a movement of hope for everyone. There are several issues needing to be resolved, including forest exploitation, poor biodiversity, poor economic situations, and the wellbeing of the local communities. The approach is to use GIS by comparing forest cover to poverty, protected areas, settlement, friction of distance, and proximity to churches. There is also a need to consider the affects of Nature Deficit Disorder, and the importance of creation care. The outcome of this research explains how Puerto Rico was able to navigate its forest transition, as well as its spiritual, natural, and conservation problems. The ability of Puerto Rico to reforest raises the question of why other countries aren't pursuing a similar goal. Puerto Rico is becoming a new leader for other countries to follow in their forestry ambitions, and looking at their methodology, we can see how reforestation can be effective.

2:40-3:00 pm

Sustainable Agroforestry and the Protection of Puerto Rico's Novel Ecosystems

Ariana Porcello, University of St. Thomas

Abstract: This project focuses on the history of forest transition theory in Puerto Rico and the formation of novel ecosystems with the potential to support rural

employment and tourism. The provided approach attempts to balance environmental protection and human needs by finding optimal locations for agroforestry projects that minimize damage to novel ecosystems while meeting agricultural targets in Puerto Rico and providing authentic, local food for the tourism industry. The final analysis includes soil productivity and crop productivity indexes, friction of distance, and tree cover 2000. Additionally, this analysis provides insight into the native and nonnative species inhabiting the island to target the most novel ecosystems to locate the best areas for agroforestry. The relationships between these variables, their proposed locations and the potential uses for agroforestry in Puerto Rico are analyzed using GIS. This research is followed by a proposed business model that includes the adoption of sustainable agroforestry projects including their proposed locations, expected benefits and long-term impacts on both reforestation and the health of the Puerto Rican economy. This results in a conservation plan demonstrating how agroforestry can buffer the perimeter of protected areas and promote continued reforestation.