2023 Midwest Undergraduate Geography Symposium

Saturday, April 29th
9:00 am -3:00 pm

Second floor
Anderson Student Center
2115 Summit Avenue
Saint Paul, MN

Keynote by Dr. Kurt Kipfmueller, Associate Professor of Geography, Environment and Society at the University of Minnesota

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St.Thomas

Earth, Environment, and Society

All events take place in the [Anderson Student Center](#)
2115 Summit Avenue, Saint Paul

9:00 – 9:15 –   Welcome and Introductions
Second floor atrium

9:20 – 10:35 –   Concurrent Sessions I
Second floor classrooms

10:45 – 12:00 –   Concurrent sessions II
Second floor classrooms

12:05 – 1:05 –   Lunch and Keynote Address
Basement - LL07 Dance Room

1:05 – 1:20 –   Poster Session
Second floor atrium

1:25 – 2:40 –   Concurrent sessions III
Second floor classrooms

All presenters should remain in their session. Viewers are free to move between sessions. Presenters should upload their presentations before their session starts. Each room will have a PC and an overhead projector.

Paper Presentations are 12 minutes, followed by 3 minutes for Q & A. As a result, each presenter will have a 15 minute time slot.

The **Lightning Session** consists of a series of 5 minute presentations. After these presentations, there will be a Q & A session.

Please limit phone use and side conversations during presentations.

Session One Paper Presentations 9:20 -10:35			
Session 1A Room # ASC 202	**Session 1B** Room #ASC 234	**Session 1C** Room #ASC 233	**Session 1D** Room # ASC 238
9:20-9:35 Reece Mckee	9:20-9:35 M. Haas, L. Prinz, M. Trager	9:20-9:35 Kendra Smaby	9:20-9:35 Matt Oscanyan
9:35-9:50 Zoe Frank	9:35-9:50 Cecelia Kaufman	9:35-9:50 Jacob Orser	9:35-9:50 James Hunt
9:50-10:05 Else Gerber	9:50-10:05 Marcus Hansen	9:50-10:05 Katherine Koehler	9:50-10:05 Connor Ritter
10:05- 10:20 Eli Ivanov	10:05- 10:20 Auguste Tadie	10:05- 10:20 Cheyenne Williams	10:05- 10:20 Anna Curtler
10:20-10:35 Cassandra DeVries	10:20-10:35 B. Persenaire-Hogeterp	10:20-10:35 Maisie Van Rossum	10:20-10:35 Cecilia Wallace
Moderator	**Moderator**	**Moderator**	**Moderator**
Holly Barcus	Jesse McClelland	Xavier Haro-Carrion	Mikhail Blinnikov

Session Two Paper Presentations 10:45-Noon			
Session 2A Room # ASC 202	**Session 2B** Room #ASC 234	**Session 2C** Room #ASC 233	**Session 2D** Room # ASC 238
10:45 - 11:00 Lauren Scheppmann	10:45 - 11:00 Claire Knopf	10:45 - 11:00 Carmen Quintos	10:45 - 11:00 Mark Neuman
11:00- 11:15 Brandon Sparrow	11:00- 11:15 Milosz Fernandez-Kepka	11:00- 11:15 George Wojcicki	11:00- 11:15 David Gallagher
11:15 - 11:30 Ulrik Bakken	11:15 - 11:30 Aidan Reynolds	11:15 - 11:30 Emmett Clancy	11:15 - 11:30 Emma Dorn
11:30 - 11:45 Rafi Kellman	11:30 - 11:45 North Carpenter	11:30 - 11:45 Geena Zebrasky	11:30 - 11:45 Morgan Smith
11:45 - Noon	11:45 - noon Joel Sadofsky	11:45 - noon Benji Huff	11:45 - noon Hallie Vick
Moderator	**Moderator**	**Moderator**	**Moderator**
Paul Lorah	Kelsey McDonald	Xavier Haro-Carrion	Tiffany Grobelski

Session Three Paper Presentations 1:25-2:40		
Session 3A	**Session 3B**	**Session 3C**
Room # ASC 202	Room # ASC 234	Room # ASC 233
1:25 - 1:40 Ellie Romfoe	1:25 - 1:40 Csanad Hegyi	1:25 - 1:40 Sangay Sherpa
1:40 - 1:55 Shakira Mwakitawa	1:40 - 1:55 Christian Gustin	1:40 - 1:55 Ellen Hofstede
1:55 - 2:10 Nathan Borsch	1:55 - 2:10 Felicia Winfrey	1:55 - 2:00 Emily Gerencer
2:10 - 2:25 Katie McGinnis	2:10 - 2:25 Sonat Taydas	2:10 - 2:25
2:25 - 2:40 Cooper Anderson	2:25 - 2:40 Bennet Christensen	2:25 - 2:40
Moderator - Paul Lorah	**Moderator - Kelsey McDonald**	**Moderator -William Moseley**

Poster Session 1:05 – 1:20 Second Floor Atrium (Full Abstracts appear on last page)

Understanding the impacts of wildland fires on ecosystem habitats using geospatial analysis
Victor Araya, Saint Cloud State University

Tree ring analysis of growth dynamics and climate response for Pinus resinosa and Quercus montana in the Allegheny Plateau, Central Pennsylvania
Rachel de Sobrino, University of Minnesota

(In)Equitable Water Allocation During Drought: Water Use Reduction Actions and Minority Communities in the Twin Cities Metropolitan Area
Marit Isaacson, Gustavus Adolphus College

Evaluating the Effectiveness of Water Stress Measures as Indicators of Wildfire Severity in Northern Minnesota
Georgia Gayle Kretz, Macalester

Energy Sprawl: Land Use efficiency for Suitable Renewable locations in Minnesota
Mumtas Mohamed, University of St. Thomas

Does access to transit in Redlined and Green Lined neighborhoods vary in the Twin Cities?
Mumtas Mohamed, University of St. Thomas

Climatological Relationships of False Rings in Pinus resinosa in North-Central Minnesota
Kjersten Peterson, University of Minnesota

A Broader Urban Transport Picture: A comparative analysis of Brazilian BRT and informal transportation sectors
Connery Ritter, Macalester

Protected Public Lands and the Composition of Surrounding Rural West Economies
Ethan Smith, University of St. Thomas

Accessibility of Public Transportation in Saint Cloud, Minnesota
Abigail Uselman, Saint Cloud State University

Detailed Schedule
Concurrent Sessions 1 (9:20 – 10:35)

Session 1A   -- ASC Room 202
Moderated by Holly Barcus, Ph.D., Macalester College

9:20-9:35

Big-Box Stores and Biodiversity: Conventional and Alternative Community Revitalization Strategies in Grundy, Virginia

Reece Mckee, Macalester

> In 2011, a massive civil engineering project was completed in Grundy, Virginia, a former coal mining town, which replaced the old, flood-prone downtown with a large Walmart Supercenter. Employing a critical literature review, as well as news and social media from Grundy, this mainly qualitative project compares conventional economic revitalization attempts in Appalachia, as exemplified by Grundy's Walmart, and community-based agriculture as an alternative, grassroots model. My research found that Grundy's Walmart mega-project failed to escape from the unsustainable and exploitative capitalism which characterized the coal era. Small-scale, community-based agriculture represents a more effective and sustainable solution to food insecurity and other related problems in Grundy as it takes advantage of the region's biodiversity, ecological knowledge and social capital. Future development efforts in Appalachia should focus on the region's frequently ignored natural, social, and cultural assets, rather than solely looking to outside corporate investment as the solution.

9:35-9:50

Fearsome Critters of the Great Lakes Region: From Myth to Marketing

Zoe Frank, Macalester

> Fantasy and folklore are rooted deeply in communities across the globe and are perhaps one of the most useful accounts used to discern the cultural identity of those who tell their tales. For example, there would be no such thing as Bigfoot without people traversing a forest in the first place, and Nessie would not be the feared sea-creature she is today had there not been fishermen on Loch Ness. Humans are born to tell stories, and stories are shaped by surroundings. This essay will examine the origins and development of tall tales in the Great Lakes region of North America, particularly those dubbed 'fearsome critters'– tall tale animals said to inhabit the wilderness in, or around, logging camps by the lakes. From these stories' origins to their usage in capitalist marketing today, I hope to trace the path of the Great Lakes' folktales.

9:50-10:05

The role of rurality in the creation of summer camp culture

Else Gerber, Macalester

> Most sleepaway camps in the United States exist in rural spaces. Why is this, and how do camps' locations impact the creation of camp culture and tradition? It is hypothesized that rurality is essential to the formation of a camp's identity. This topic was chosen because many summer camps are in remote spaces but there is not much knowledge about what the impacts of this are. To examine this question, interviews and surveys of individuals who attended or worked at residential summer camps in the US were conducted, asking questions focused on the role of location in the camp experience. Additionally, there was an exploration of literature about the history of camps and camp locations. The research demonstrates that location plays a big role in how people experience camp and in the ways that the cultures of specific camps are formed, which can provide insight into how communities are formed and impacted by their geographical locations.

10:05- 10:20

Wind Energy in Iowa: A Case Study in Rural Politics

Eli Ivanov, Macalester

> In September 2022, 54.2% of Iowa's electricity came from wind power. This number is the highest of all U.S. states. The political push for wind energy in Iowa has been spearheaded by conservative senator Chuck Grassley. This research examines campaign press releases, newspapers, market analysis, and legislative documents to assert that Senator Grassley utilizes place - based identity and rational economics to advocate for the proliferation of wind energy to both constituents and financial interests. Grassley's campaign for wind energy provides a helpful case study to understand the intricacies of rural power. In an increasingly partisan political landscape, the story of a conservative politician, in a purple state, who is the self proclaimed "Father of Wind Energy" can provide a lens through which we can understand the nonpartisan influences and dynamics of rural politics.

Bridging the Enrollment Cliff: Can campus design save your college?

Cassandra DeVries, Gustavus Adolphus College

> Midwestern colleges are on the decline, with a prediction that enrollment will drop by at least 15% in the next five years. This theory has been declared the "enrollment cliff", a drop off in the population of college aged students. The pandemic induced shift in education has accelerated that issue, which now requires an examination of physical spaces and needs on college campuses. This study aims to prove that investing in key infrastructure on college campuses can not only attract new students, but bridge the gap of the enrollment cliff through the coming years. Using qualitative data and archival research, this research creates a case study of Gustavus, to determine whether historical investment in infrastructure has led to increased enrollment and retaining of students. Preliminary results imply that investment in residential spaces on the Gustavus campus have positive impacts on student enrollment. These findings suggest that physical space plays a key role for incoming students.

Session 1B – ASC #234
Moderated by Jesse McClelland, Ph.D., Macalester College

9:20-9:35
Towards a Public Geography of the Poor Farm: The Case of Hennepin County, Minnesota

Maura Haas, Leah Prinz, and Matt Trager, Macalester

> Poor farms were county-run welfare institutions in the 19th and 20th Century U.S. that supported the poor and dependent. To offset costs, poor farms paired the goal of poverty relief with working farms. Our team conducted historical research in local archives on the Hennepin County Poor Farm – located in Hopkins from 1864 to 1953 – to create a public-facing presentation that explores social, political, and geographic dynamics and contexts of the institution. Poor farms were misunderstood during their existence and are largely forgotten institutions today. Our presentation seeks to address misconceptions about early social welfare and re-establish poor farms in the local memory.

9:35-9:50
"Separate and Not Equal": Navigating Higher Education in the Twin Cities for People with Physical Disabilities

Cecelia Kaufman, Macalester

> This research lays the foundation to consider what barriers and supports exist for students, staff, and faculty with physical disabilities in higher education institutions in the Twin Cities. Throughout the summer I connected with and interviewed members and advocates of the disability community, which in turn highlighted their narratives and experiences of what is accessible and inaccessible. Given the research focus stems from the gaps in literature of firsthand experiences of people with physical disabilities in higher education, the next steps of this work include expanding the number of participants, creating an even more inclusive approach to this work. To build further, the hope is this work will influence the decision-making processes at higher education institutions across the Twin Cities as they work to create a more inclusive environment. Further, this research hopes to raise the question: what does inclusive and accessible mean for people with physical disabilities across the spectrum and what can what can decision makers do to create an accessible environment?

9:50-10:05
Rezoning in Minneapolis: Urban Schools and the Intersection of Race and Class

Marcus Hansen, Gustavus Adolphus College

> With increased tension and growing racial disparity in the urban landscape of Minneapolis, the public school system has found itself in the spotlight. Minneapolis public schools have passed their comprehensive district design, a large act of rezoning and increasing non-traditional style schools to create a more equitable system and close the gaps. Like any rezoning plan, the process has been messy and disparities in race and class have been exacerbated at the public stage. This project aims to answer the question, how is the politics of race and class reflected in how Minneapolis Public Schools (MPS) have designed their new school zones as part of the comprehensive district design (CDD)? Due to the limitations of time and resources, the scope of this investigation will be specifically on the re-drawn high school zones and all the relative implications. With the CDD being in its first year of implementation this project is very relevant and can be of importance.

10:05- 10:20
Hot Spot Analysis of a United States Population Space-Time Cube (1790-2020)

Auguste Tadie, University of St. Thomas

Understanding how populations have developed in space and time gives crucial insights into economic, environmental, and societal trends. The United States of America has grown and spread dramatically in the last two centuries. To understand how it has changed this project uses a space-time cube and a hot spot analysis to visualize and analyze changes in the population. By creating a space-time cube tool data can be visualized and analyzed in three dimensions. While the x and y values continue to determine data spatially, the z displays the data position temporally. The hot spot analysis of the space-time cube (Emerging Hot Spot Analysis Tool) allows for a better understanding of where populations are changing and how the change relates to their neighbors. This project was carried out using United States Census data collected by the United States Census Bureau and compiled and distributed by IPUMS-NHGIS.

10:20-10:35
Agroecology and Green Revolution from Space; Remote Sensing Analysis of farming systems in West Africa
Brennan Persenaire-Hogeterp, Macalester

I focus on a comparison between agroecology and Green Revolution agricultural techniques. In order to accomplish this analysis I use remote sensing, specifically Landsat imagery, to compare two sites in the Sahel where one site uses agroecology and the other the techniques of the Green Revolution. With my areas selected I analyze the two sites in two different; rainy seasons and dry seasons. For each site and each time period, I use NDVI to assess plant health, NDVI variation to get a rough estimate of plant diversity, and thermal data to assess soil temperature. These variables give valuable insights into the health of the Agricultural system and its surrounding environment. I ultimately find that the NDVI decrease was far greater in Agroecology, and control sites than in the cotton site. The range of NDVI differences in agroecology seasons and the range of NDVI differences in cotton seasons is larger. Thermal findings were inconclusive and needed more work.

Session 1C – ASC #233 *Moderated by Xavier Haro-Carrion Ph.D., Macalester College*

9:20-9:35
If the A's leave Oakland: A Critical analysis of the stake and stakeholders
Kendra Smaby, Gustavus Adolphus College

The MLB has deemed the Oakland Coliseum "unsuitable" for a major league team requiring a new one to be built. With the recent departure of the Golden State Warriors and the Raiders from Oakland, one can't help but wonder if the A's will be next. With this move, either within the city or out of the city entirely, brings a series of challenges and considerations. Ultimately, what is the price that Oakland will pay if it loses the A's and what cost must it bear if it wishes to keep them? More specifically, how do the residents of Oakland perceive these complex socio-geographic challenges and how do they express their priorities in determining what factors are critical to the sense of place of Oakland? A combination of discourse analysis of public comment on plans to build a ballpark in Howard Terminal in the Jack London Square neighborhood and reading the landscape in and around the existing colosseum and neighborhood and that of the proposed waterfront Howard Terminal site. Ultimately, the study aims to identify the factors and stakeholders in the potential move.

9:35-9:50
Cobalt Mining in the Congo: Terrestrial Vegetation Change Analysis
Jacob Orser, Macalester

Cobalt has become a vital ingredient in the world's pledge of decarbonization and fight against climate change. Up to 70% of the world's cobalt comes from the Democratic Republic of the Congo, specifically the provinces of Kolwezi and Haut-Katanga. Cobalt is extracted through two different methods: industrial mines with machinery and artisanal mines with human power, which account for 70-80% and 20-30% of the DRC?s production respectively. In 2002, the World Bank encouraged the DRC to open to foreign investors of which majority came through purchasing of industrial mining operations. In 2010, the world began to invest heavily in electric power, increasing the demand for cobalt batteries and thus artisanal mining operations in the DRC became a center for livelihoods in the southern provinces. I conducted a terrestrial analysis using buffers to measure change in vegetation from 56 industrial mines and 89 artisanal mines between 2002 and 2022. Major findings indicate intensive change and loss of terrestrial vegetation.

9:50-10:05
Learning Through Map-Making: A Cartographic Exploration of Environmental Education
Katherine Koehler UW-Madison

Environmental Education (EE) aims to provide students with knowledge of the environment and skills to solve environmental challenges. EE is therefore inherently geographical; it relies on a deep connection to a place that translates to a care for the environment. Though various geographers have demonstrated the capacity of map-making to help define a person's sense of place and their surroundings, there is limited research on the use of map-

making in relation to desired EE outcomes. My research sought to fill this gap by testing how the map-making process can support EE in a case study at the Aldo Leopold Nature Center in Monona, WI. I used a mixed-methods approach to collect my data, including surveys, observations, interviews with teachers, and analysis of student sketch maps. Generally, my findings indicate that mapmaking in EE programs can successfully meet the objectives of EE when integrated into current routines and framed as specific, adventure-based missions for students.

10:05- 10:20
What Makes a Rudimentary Water System: The political ecology of secondary water sources in Orange Walk District, Belize
Cheyenne Williams, Saint Cloud State University

Education, Perceived water quality and Climate change may affect the politics behind why many residents in rural villages of the Orange Walk District in Belize use secondary water systems, such as rainwater cisterns and groundwater wells, in their households rather than the government-provided Rudimentary Water System (RWS). Belize?s water resources are abundant, both on surface and underground. the operating performance of these systems do not meet the needs of its customers, and are often susceptible to climate events. These factors have negatively affected the availability of potable water in these rural areas and have led residents to be untrustful of the quality of the RWS. This study seeks to explain the effect education, water quality and climate change has that contributes to the use of Secondary Sources for domestic water purposes in Orange Walk district, through the lens of political ecology.

10:20-10:35
Site-Specific Urban Heat Island Remediation in the Minneapolis Urban Core
Maisie Van Rossum – University of St. Thomas

Urban heat islands disproportionately affect vulnerable populations (in this study, the term vulnerable applies to those who are elderly, low-income, non-white, and live in highly paved areas with few trees). The risks associated with urban heat islands include heat stroke, heat exhaustion, and death. The disproportionate levels of urban heat felt by vulnerable communities is often a result of historic disenfranchisement and poor urban planning practices. Using data from the Minnesota Geospatial Commons, Landsat 8, and census data, areas of high vulnerability will be determined. Data will be processed in ArcGIS Pro using model builder and tools such as feature to raster, raster calculator, and clip raster. Further research into urban heat island remediation will be done outside of ArcGIS pro, and after determining the area of highest vulnerability, site-specific remediation plans will be developed. It is expected that high levels of urban heat will be found closer to the urban core of Minneapolis, with communities living in historically disenfranchised areas experiencing higher heat levels. These areas will
have a higher ratio of pavement to greenspace, causing elevated air temperatures. The end goal of this project is to identify an area of extreme heat and to propose site-specific remediation plans that can be implemented on a small scale.

Session 1D – ASC #238 *Moderated by Mikhail Blinnikov Ph.D., Saint Cloud State University*

9:20-9:35
Sponge city: A spotlight on redlined neighborhoods in Minneapolis
Matt Oscanyan, University of St. Thomas

While often overlooked, signs of redlined neighborhoods still exist today. As climate change continues to shape our future, this project focuses on sponge city techniques that can help minimize the urban heat island effect in redlined neighborhoods. While focusing on three areas in Minneapolis, this project analyses how using these techniques can do so. Through analyzing factors such as storm water runoff, flood risk areas, and Digital Elevation Models, a spotlight can be shown on the three most critical redlined areas, and a proposal for each area will be made. Each proposal will detail how the redlined area can be saved and why it needs to be done. Finally, the project will expand on the importance of sponge cities and show examples of successful sponge city projects.

9:35-9:50
Roman Bathhouses: Centers of Social Life and Interaction
James Hunt, Gustavus Adolphus College

This research combines the disciplines of Geography and Classical Studies in an examination of the space and role of bathhouses in the Roman world. In particular, this research aims to acknowledge bathhouses as key public spaces in the Roman world while also analyzing the limited access to such spaces determined by gender or social status. While the works of Fikret K. Yegül and Garrett G. Fagan have examined in-depth the social nature of bathhouses, the topic on the importance of bathhouses as social spaces in public life and the limitations faced by certain communities has not been fully explored. As such, this research explores such constraints through historical, geographical, and classical lenses to best answer how people experienced bathhouses in the Roman world. To this end, both primary and secondary sources are consulted, with greater attention given to primary sources in order to

best understand the perspectives (and lack of perspectives) of the Romans using these spaces. The implications of this research will ultimately show a better understanding of public life in the Roman world and how different communities interacted within public spaces.

A Broader Urban Transport Picture: A comparative analysis of Brazilian BRT and informal transportation sectors
Connery Ritter, Macalester

> While much research has been produced regarding Brazil's implementation of Bus Rapid Transit(BRT), this paper seeks to create a broader picture of Brazil's urban transportation by incorporating the informal transportation sector. This will consider whether the lauded success of Brazilian BRT systems has correlations with its informal transportation sector and whether or not the implementation of BRT has affected how and where informality appears. Most research done on BRT seeks to show its efficacy and effects on the people it serves but in many cases the larger story of a city's transport is left out. Comparing these two sectors gives a better understanding of the BRT system and how and where people are left out. This will be achieved through a literature review of scholarship on the creation of Brazil's BRT systems and their social effects. The same will be done with the informal sector from a historical and access-based context. What I hope to show is the interactions between the two areas and especially the social and developmental effects of BRT in comparison to the urban poor(those who need more access to public and or informal transport) and how their landscapes are changed.

Energy Sprawl Solutions: Installing Solar on MN Altered Lands
Anna Curtler, University of Saint Thomas

> As many countries commit to increasing renewable energy supplies and phasing out fossil fuels, significant changes in land use are expected. The transition to renewables has a large footprint on landscape as wild lands are cleared to increase power supplies. Drawing inspiration from existing cases where degraded and altered lands are dedicated to renewables, this study uses GIS to calculate the energy potential of installing solar panels on MN highly developed land. A raster calculator was used to combine data layers that depict MN cropland use and solar potential in MN. The results show that the estimated electricity generation far surpasses MN's annual consumption and could supply a large portion of the US's annual electricity usage. This is not a proposal to install solar panels on all MN pavements; Rather, this shows the enormous potential of expanding solar energy without further land degradation. Policy should be shaped around furthering clean energy efforts while minimizing harm to wild lands.

Going Carbon Neutral by Wind Power in Minnesota
Cecilia Wallace, University of Saint Thomas

> Climate change and the decrease in biodiversity are prime issues in Minnesota, threatening the state's ecosystems, wildlife, and natural resources. Wind power provides energy that doesn't emit carbon and protects biodiversity by reducing the need for fossil fuel extraction. What areas of land in the state should be reserved for wind power while keeping biodiverse and non-resilient land intact? ArcGIS Pro's raster calculator was used to create a map combining wind speed, TNC Suitable Wind Locations, Resilience Score, and MBS Sites of Biodiversity Significance. The study area is land near turbines, away from power lines, that's resilient, and away from biodiverse areas. The findings are that turbines should be placed in Southwest Minnesota in areas of high wind speed, away from power lines, of high resilience, and not biodiverse. The conclusion will influence policy, for individuals have a designated area of land to put wind turbines to meet the MN goal of carbon neutrality by 2040 as they don't release pollutants like other energy.

Session 2A   -- ASC Room 202
Moderated by Paul Lorah, Ph.D., University of St. Thomas

Ethanol's Physical Footprint in the United States
Lauren Scheppmann, University of St. Thomas

> Ethanol has been deemed a renewable and clean option for fuel and that can be seen through the countless ethanol subsidies. However, the corn needed for ethanol takes up a lot of space and it is not as clean as we originally thought. I will be exploring how much land in the United States we would need to sacrifice to fuel all the cars in the United States. I will be using ArcGIS data layers along with the model builder to see how much land it would take to offset ethanol with gasoline
> in the United States. I will also account for the fact that ethanol is less efficient than gasoline and therefore takes more gallons to achieve the same mileage. What I am expecting to find is that it will take a lot of land in order to achieve replacing all gasoline with ethanol. We would probably have to not only sacrifice all cropland but also more

land as well. This would take away from growing other crops as well as other land such as forests or other species' habitats. With the results I find, I am hoping that this will lead to less ethanol production and more habitat restoration in order to promote biodiversity.

11:00- 11:15
Using optimal sites in Minnesota for Agrivoltaics
Brandon Sparrow, University of St. Thomas

Because of the global warming crisis, the transition to renewable energy sources has generated interest in creative use of renewables. Agrivoltaics is the practice of producing both food and solar power on the same plot of land and allows for solar resource collection while plants and animals live under the panels. Solar panels take up a large amount of space and limit space for agriculture. The research in this study will use GIS tools and analysis to determine specific areas in Minnesota that will allow for the most sunlight to maximize solar energy collection, and areas that are able to maximize growth and harvest for crops that are grown under and around these solar panels. Some of these maps include: Distance from power lines, areas that have the most sun, and viable agricultural land. The area we found is that these variables were in the south west because most sunlight and had land that was the best for planting crops.

11:15- 11:30
Windmills, the future of Minnesota Energy production
Ulrik Bakken, University of St. Thomas

The adaptation to a cleaner future works in many facets, but energy production might be the most important one, as this sector is responsible for close to 30% of greenhouse gas
emissions. With data about its production, we are urged to look at new and cleaner methods for producing it. The result must be connected to the landscape, infrastructure, energy needs, and the environmental goals. It is essential to determine the energy needs of Minnesota and review how they are currently being met. To do this, information will be gathered from the Environmental Information Agency (EIA), and mn.gov, both of which will provide an overview of the state`s energy needs and production. The model layers will be based on data gathered from gisdata.mn.gov, and will include layers such as windmills near infrastructure, less biodiverse regions and windspeed. ArcGIS pro will be the tool used to determine ideal sites for wind turbines. It is expected to be found that windmills are the ideal solution for meeting Minnesota's energy needs, while lessening the disturbance to farmland and wildlife. The expected policy implications of this project are that suitable locations for energy production are pinpointed and this benefits wildlife, farmers and the environment.

11:30 - 11:45
The importance of Prairie Restoration for the future of Minnesota.
Rafi Kellman, University of St. Thomas

Grasslands are a very threatened ecosystem globally, but particularly in Minnesota. In Minnesota we have removed over 98% of our prairie, one of the key drives for this removal being farming, most past prairie is now corn and soy farms. 29% of corn grown in Minnesota goes to making ethanol, 1 acre of corn generates the same amount of energy as 320 gallons of gasoline. We have more then twice as much corn as prairie, and the prairie we do have tends to be heavily degraded breaking up prairie into tiny habitats. The focus of this presentation is to find optimal sites in Minnesota for prairie restoration. To decide what land to return to prairie I used Arcgis model-builder. My model shows all the land in Minnesota that is currently used for farming corn, that is sloped making it more inconvenient for farming, that used to be prairie, and that is close to currently existing pieces of prairie. We are devoting land to ethanol, which is not a good or a green fuel source, it seems reasonable that as we shift away from the need for ethanol we return land back too prairie. More prairie gives us healthier water tables, helps birds and pollinators, stores co2, helps against flooding, and preserves biodiversity.

Session 2B -- ASC Room 234
Moderated by, Kelsey McDonald Ph.D., Macalester College

10:45 - 11:00
Milwaukee's Green Space: Who Has Access?
Claire Knopf, Macalester

Attention to the importance of green spaces in urban settings has been increasing. Green spaces offer a number of significant benefits, such as promoting physical, mental, and social health which means they are crucial for supporting the wellbeing of residents. However, there are disparities in access to green areas within cities. This project explores where there is lack of access to green space in the city of Milwaukee, what factors are associated with access to green space, and where there are current opportunities to increase access to green space. Specifically, this project will look at access to public green spaces and difference socioeconomic determinants

through visual and spatial statistical analyses, such as regression analysis and testing spatial autocorrelation. Additionally, after determining what areas are lacking, spaces that offer opportunities to increase access to green space will be identified by looking at vacant lots in these areas.

11:00- 11:15
Neighborhood Walkability and Physical Inactivity Levels in Las Vegas
Milosz Fernandez-Kepka, Macalester

Automobile-oriented development in sprawling cities across the United States, like Las Vegas, presents a challenge to its residents' walkability and non-leisurely physical activity levels. The lack of walkable neighborhoods in a city may lead to an increase in physical inactivity levels and obesity rates. This study explores the walkability index of census tracts in Las Vegas and the relationship it has with physical inactivity levels and obesity rates. Building on prior literature, I conducted an analysis in Las Vegas through a series of maps and a regression analysis, visualizing the relationship between the walkability and physical inactivity and obesity levels. The data on walkability in Las Vegas comes from the U.S. Environmental Protection Agency. Data on physical inactivity levels in the U.S. comes from the CDC Places website and was generated using the BRFSS (Behavioral Risk Factor Surveillance System). The maps have the purpose of showing the relationship between walkability and health outcomes and highlight the areas of Las Vegas in which the relationship is most significant.

11:15 - 11:30
Allergy-Induced Asthma: The Role of the Urban Forest
Aidan Reynolds, Macalester

As global urbanization accelerates, increasingly large populations of vulnerable people are put in contact with a range of environmental risks. One approach to addressing the health effects of urban pollution, among other socioecological interventions, has involved massive urban tree planting campaigns. Through proper planning and management, urban trees can mitigate many of the health impacts of urban development by improving air and water quality, sequestering carbon, and lowering noise impacts. However, the growing evidence base linking trees to health has indicated possible adverse effects as well. Allergy to tree pollen is a documented ecosystem disservice that exacerbates asthma. Using novel characterizations of the allergenicity of tree species, it is possible to construct an "allergenicity riskscape" for an urban area. Spatial statistical analyses of the riskscape are potentially useful in explaining uneven distributions of asthma hospitalizations.

11:30 - 11:45
Driven to Care: Medicaid Market Access Over Time
North Carpenter, Macalester

This study examines medicare recipients' spatial access to hospitals owned by different groups. Understanding the spatial distribution of healthcare facilities that compete with one another is key to understanding accessibility to higher quality healthcare. Continually expanding economic literature suggests that less competition reduces quality of care in fixed price markets.

Using recently released ownership and change of ownership data from the Centers for Medicare & Medicaid Services (CMMS), this study looks at where travel times to competing hospitals overlap. Using drive time areas and ownership data, I identify the number of competing hospitals within set driving ranges across Minnesota. This analysis, done over the time span of the data, allows me to identify the broad changes in competitive Medicare accessibility over time.

11:45 – noon
Evaluating Crowdsourced iNaturalist Indicators of Lyme Disease
Joel Sadofsky, Macalester

This study evaluates crowdsourced iNaturalist-based indicators of Lyme Disease (LD). LD pathogen density is related to low density of predatory mammals, as well as high density of Ixodes Scapularis ticks and small reservoir mammals. Prior literature lends credibility to LD modeling through citizen science (involving public participation), however these cases still require training for all participants. This study differs by using completely crowdsourced observation data of I. Scapularis ticks and other predatory and reservoir mammals as variables aiding in the prediction of LD incidence. I. Scapularis observations and presence of predatory mammals of common reservoir species will be evaluated as predictors of spatially smoothed and raw reported rates of LD aggregated from 2011-2020 by county in Minnesota and Wisconsin. Visual and spatial statistical analyses will serve to evaluate the relationships between these indicators and the incidence of LD (CDC data).

Session 2C -- ASC Room 233
Moderated by, Xavier Haro-Carrion Ph.D.,

10:45 - 11:00
Post-Typhoon Haiyan Adaptation Strategies of Farmers in Leyte, Philippines
Carmen Quintos, Macalester

As climate variability increases, typhoons and other natural disasters intensify. In 2013, Super Typhoon Haiyan, one of the most devastating typhoons on record, hit the Philippines and caused 2.98 billion USD worth of damage, including 600,000 hectares of ruined farmland. Leyte, located in the Eastern Visayas region, is a primarily agricultural island, and its proximity to the Typhoon Belt makes it highly vulnerable to storms like Haiyan. Haiyan completely disrupted Leyte's land, agriculture industry, and the lives of farmers— particularly cash crop farmers of rice, coconut, and sugarcane. Using a comprehensive literature review of these farmers' adaptation strategies post-Haiyan in Leyte, research indicates that crop change, aid programs, migration, and livelihood/income change are the dominant strategies. As climate disasters continue to harm farmers and land, it is crucial to identify effective and sustainable adaptation strategies in order to support livelihoods and maintain crop productivity.

11:00- 11:15
Quantifying Climate Change - A Case Study of Namibia's Himba Tribe
George Wojcicki, Macalester

Climate change is a growing threat to sustaining the human population, and its ramifications can manifest themselves in different ways around the world. In Southern Africa, the general prediction is a trend of drying, increasing surface and air temperatures, and aridification. These changes pose an immediate risk of displacement to millions of people, such as the OvaHimba, the last semi-nomadic tribe in Namibia and Angola, who inhabit the already-inhospitable Namib Desert. This study seeks to understand climate change's effects on the OvaHimba's landscape itself by analyzing the monthly changes in vegetation with 16-day MODIS NDVI data provided by NASA. This study hopes to corroborate existing studies of aridification by using remotely sensed data. With a greater understanding of how climate change is affecting the landscape of the OvaHimba, Namibian and Angolan leaders can make more informed decisions on how to best protect these people and preserve their livelihoods.

11:15 - 11:30
Wildfire Affects on Vineyard Productivity in Napa Valley
Emmett Clancy, Macalester

This presentation uses Remote Sensing and GIS technologies to outline and analyze the effects of California wildfires between the years 2015 and 2020 on commercial vineyards in the Napa Valley AVA (American Viticultural Area). By analyzing NDVI and other vegetation indices overlayed with wildfire boundaries, this presentation predicts trajectories for recovery and potential future wildfire effects on said agricultural regions.

11:30 - 11:45
Languages of Resistance: Opposition to Affordable Housing in Columbia Heights, Minnesota
Geena Zebrasky, Gustavus Adolphus College

Throughout the history of the United States, the suburbs have proven to be sites of fierce resistance to any form of housing that upsets the residents' idealized concept of a neighborhood. This article investigates the continuation of suburban resistance to the construction of affordable housing. Through a content analysis of public city council documents and planning commission meeting hearings, I classify the primary forms that the opposition takes. I argue that opposition draws on stereotypical, and often racialized, fears of urban cities. Furthermore, as proposed affordable housing brings the idea of a different spatial reality to suburban backyards, I argue that this opposition is the result of a desire to preserve the idealized concept of a suburb in the face of change. This research adds to a growing body of literature investigating resistance to affordable housing construction, offering insight into what guides the oppositional agenda.

11:45 – noon
Engaging in the process of peacebuilding as outsiders in Colombia: The Geographies of human migration and displacement
Benji Huff, Gustavus Adolphus College

A decades-long civil conflict in Colombia claimed the lives of many fathers, brothers, and sons. The daughters, sisters, and mothers of these were forced to pick up the fragments of their lives and move to safer places. Many who were displaced in this way migrated to Medellín, the Colombian city of eternal spring. These women built community with each other and with the urban landscape they now reside. This intentional community building is catalyzed by forgiveness and engagement within the environment of the *barrios* of Medellín. As an outsider the

Geographer can learn to evolve from studying a peacebuilding process to being an active part of the intentional peace building process by engaging through learning, listening, and connecting person to person.

Session 2D – ASC 238 *Moderated by Tiffany Grobelski Ph.D., Gustavus Adolphus College*

10:45-11:00

Minnesota's Energy Sprawl: The Hidden Costs of Corn Production

Mark Neuman, University of St. Thomas

> Energy sprawl is a critical issue in the US due to its detrimental effects on natural habitats, wildlife, and humans. This research aims to explore the extent and impact of energy sprawl in Minnesota by answering the research question: "How has energy sprawl changed land use patterns and impacted ecosystems and communities in Minnesota?" Using a combination of literature review, data analysis, and GIS mapping, this study examines the land use changes associated with corn and soybean production in Minnesota for use in ethanol. By closely looking at specific data layers on climate resilience and optimal wind sitting, a greater analysis of energy sprawl can be determined. Analysis of energy sprawl reveals significant habitat fragmentation, loss of biodiversity, and disruption of ecosystem services. The results suggest that energy sprawl has far-reaching consequences on the environment and the findings call for a comprehensive and sustainable approach to energy development that considers environmental, social, and economic factors. The conclusions highlight the urgent need for policymakers to prioritize conservation and sustainable land use planning in energy development. This research provides insight into the complex relationship between energy sprawl and environmental degradation and emphasizes the importance of proactive measures to mitigate the adverse effects of land use for biofuel production.

11:00-11:15

Maximizing wind-energy potential on disturbed lands in Minnesota

David Gallagher, University of St. Thomas

> Increasing wind energy production has required extensive land use changes and negatively impacted biodiversity. One option promoting habitat conservation is building turbines on disturbed land in agricultural, industrial, or mining areas. Minnesota is one state that could significantly increase wind power production on disturbed lands, but the amount of potential area and energy production is unknown. We addressed this question by estimating Minnesota's maximum wind power potential on disturbed lands. Using land use cover and optimal wind power siting layers in ArcGIS Pro and information from the United States Department of Energy, we located all of Minnesota's disturbed land
> suitable for wind power and quantified the potential annual wind power production. Results showed that building turbines in disturbed areas could provide all of Minnesota's and a significant portion of the nation's power needs. Our work demonstrates that increasing renewable energy production does not necessarily require destroying natural habitat despite large land use requirements.

11:15-11:30

Solar Energy Expansion and Prairie Protection in Southwestern Minnesota

Emma Dorn, University of St. Thomas

> Beginning in the 1980s, Minnesota prairies have been increasingly at risk to become converted to cultivation, development, and mining. Between the years 2003 and 2015, over 62 percent of native prairies were converted to other land uses, one being corn ethanol production. Economic incentives encourage the installation of wind turbines in prairies because of their lower real estate value and the benefit of producing renewable energy. However, wind turbines directly put wildlife and biodiversity at risk in these areas. To determine the best way to increase renewable energy production without damaging current prairies, I explored the MN geodatabase layers of solar efficiency, DNR native prairies, and Marschner land use cover. With the ArcGIS Euclidian distance tool, I found areas of high solar efficiency within areas of current corn ethanol production within thirty meters of current native prairies in Southwestern MN. These areas show that corn ethanol production is destroying native prairies and its large footprint in MN is inefficient for national energy production. Creating protected solar plants adjacent to prairies in current corn ethanol plants of Southwestern MN would benefit the renewable energy economy and could create a monetary flow toward protecting native prairies through government incentive programs.

11:30-11:45

Saving Minnesota's Native Prairies: The Role of Conservation and Restoration in Preserving Biodiversity

Morgan Smith, University of St. Thomas

> Restoring native prairies in Minnesota is vital for ecological integrity, biodiversity, and human well-being, but climate change poses challenges. Climate change affects precipitation, temperature, growing seasons, invasive

species, and water availability, making it important to identify resilient areas near native prairie suitable for conservation. To address climate change's impact on Minnesota's prairie ecosystems, conservation should prioritize protecting natural strongholds to maintain biodiversity and natural processes. Restoration efforts should mimic natural ecosystem structure and function, with flexible and adaptive conservation approaches necessary to tackle climate change's challenges sustainably. Using ArcGIS, resilient sites near native prairies can be identified and conserved. Native prairies suitable for restoration are in southwestern Minnesota, where corn and soy are farmed. This information poses the question of whether we value agriculture or biodiversity more.

11:45- Noon
Climate Resilience and Strongholds: Rewilding Minnesota
Hallie Vick, University of St. Thomas

> The rapid expansion of industrial agriculture over the last century has led to the extreme degradation of North America's prairies. This is especially true in Minnesota where 29% of the land has been given over to corn and soy production. As carbon emissions continue to rise and warm the planet, habitats change, and species' ranges also change dramatically. If prairie is restored in the right areas, it can provide a suitable habitat for plants and animals even in the event of 1 or 2 degrees of warming, and it can sequester carbon from the atmosphere by storing it underground. To target climate resilient sites for prairie restoration in Minnesota, I looked at two data layers: Marschner land use cover, which shows pre-settlement prairie cover, and the Minnesota Cropland 2021 layer, which shows how much of the native prairie has been given over to agriculture. In addition, the ArcGIS multi-directional terrain tool was used to show which areas of the state contain climate resilient microclimates. The results show that prairie should be restored in the Southwestern part of the state where the terrain is geo-diverse and some native prairie remains. Not only will rewilding these areas provide a habitat that will be resilient in the face of climate change, but it also has policy implications for its ability to sequester carbon in the context of a global carbon market.

Session 3A -- ASC Room 202
Moderated by, Paul Lorah Ph.D., University of St. Thomas

<u>1:25 - 1:40</u>
Corn Ethanol vs Prairie: Carbon Sequestration in Minnesota
Ellie Romfoe, University of St. Thomas

> Agriculture in the United States is dominated by corn, with large quantities used in the production of ethanol. Marketed as a clean alternative to pure gasoline, ethanol is a widely used biofuel. However, the full life cycle of corn for ethanol production emits large amounts of greenhouse gases. In this paper, I investigate the change in carbon sequestration in a scenario where land used to grow corn for ethanol is converted into prairie. This is done by creating land use/land cover maps, a biophysical table calculating the carbon sequestration by land use type, and putting those into the InVEST model created by the Natural Capital Project. The InVEST program runs the model given those parameters and allows me to compare levels of current statewide carbon sequestration to the amount of carbon that would be sequestered if land used to grow corn for ethanol is converted into prairie. The results indicate that given this land use change, Minnesota can offset a significant amount of its CO2 emissions while restoring native habitats and improving water quality.

<u>1:40 - 1:55</u>
Agrovoltaic Farming in Southwest Minnesota
Shakira Mwakitawa, University of St. Thomas

> Minnesota will require the production of carbon-free electricity by 2040. Solar is a clean source of energy that could potentially be used to achieve this goal; however, solar panels require extensive amounts of land to produce large sums of energy. This energy sprawl problem can be solved through agrovoltaics. The focus of this article is on the determination of suitable areas for solar and agricultural co-location to maximize land use without degrading prairie ecosystems. This can be accomplished through raster calculator and data layers such as solar insolation, agricultural land and environmental quality. Only 180 sq kilometers of solar panels are needed to power Minnesota. Vast land in the Southwest of Minnesota is most suitable for the development of energy production by agrovoltaic projects. This development will encourage policy support for programs that help farmers invest in agrovoltaics.

<u>1:55 - 2:10</u>
Optimizing Wind Energy Production in Minnesota
Nathan Borsch, University of St. Thomas

> The purpose of this research is to investigate whether wind energy has the environmental viability and sustainability to become a primary source of electricity in America. The United Nations has a goal of zero carbon emissions by 2050. Can Minnesota reach that by utilizing wind power? This study

employed review of ArcGIS data collected in Minnesota based on environmental factors such as windspeed and resilience. This data was analyzed to determine the optimal locations for wind power. The results indicate that large areas of Minnesota are ideal. It also has significant environmental advantages such as lowering emissions of greenhouse gases and having little impact on the land around it. The Midwest region has some of the greatest potential for wind energy production. The data highlights that many states such as Minnesota could produce more energy than they consume with net zero carbon emissions while avoiding significant negative impact on local wildlife. Utilizing wind energy in Minnesota as a primary source of energy can help eliminate reliance on nonrenewable energy sources.

2:10 - 2:25
Optimal Agricultural Rewilding Sites in Minnesota
Katie McGinnis, University of St. Thomas

Agricultural sprawl threatens preservation of Minnesotan native habitats, carbon sequestration, biodiversity, and more. As human population increases, it is important to optimize land to protect ecosystems while fulfilling agricultural resource needs. Advancements in agricultural technology – such as lab grown meat, vertical gardens, and shifts in diets – reduce the need for sprawl. This study answers: which agricultural areas are optimal for rewilding in Minnesota?
I used Raster Calculator in ArcGIS to locate areas in Minnesota that are climate strongholds, near current Minnesota native prairies, and determined to be an optimal rewilding site by The Nature Conservancy. These data layers will show sites that are resilient to climate change, will increase habitat connectivity, and a priority for conservation efforts. I anticipate the most optimal rewilding sites to be near the Minnesota River, southern Minnesota, and western Minnesota. It is critical to provide economic incentives to farmers, such as conservation easements and financial incentives for ecosystem services, to ensure a sustainable switch from agricultural production to native prairie.

2:25 - 2:40
Minimizing Minnesota's Energy Sprawl Using Agrivoltaics
Cooper Anderson, University of St. Thomas

The utilization of agrivoltaics in Minnesota has the potential to revolutionize the way we generate energy and cultivate crops. Agrivoltaics refers to the simultaneous use of land for solar photovoltaic power generation and agriculture. Since solar power is a renewable energy source, it can provide clean energy to the country while taking up minimal space, as the same land can also be used for agriculture. The purpose of this research is to identify the optimal areas in Minnesota where agrivoltaics can be used to maximize their benefits and reduce our environmental footprint caused by energy sprawl. By using ArcGIS to analyze Minnesota's land, I was able to identify the most favorable location for agrivoltaics and how this implementation could benefit the state based on the chosen site. After calculating the amount of sunlight available and the efficiency of solar energy to power, I determined the amount of land needed for agrivoltaics to meet Minnesota's current power demand. Additionally, I identified the areas with the highest levels of sunlight currently used for crops that are not climate strongholds. In conclusion, agrivoltaics offers an excellent option for optimizing land use for both agriculture and solar energy production. With my findings, it is necessary to make major changes at a federal level to promote widespread adoption of agrivoltaics to reduce our environmental footprint and generate renewable energy for the state.

Session 3B -- ASC Room 234
Moderated by, Kelsey McDonald Ph.D., Macalester

1:25 - 1:40
From Gas to Asthma in the Foothills of the Bakken Formation, North Dakota; The Relationship between Changes in Vented & Flared Natural Gas Production and Asthma Rates from 2016 to 2021
Csanad Hegyi, Macalester

Emissions from oil and gas productions lead to public health concerns. Many studies link ground-level-ozone, a by-product of synchronous methane, VOC, and HDAP release, to elevated levels of asthma. However, there is a need to further explore the fluctuation of natural gas production and its relationship to changes in asthma rates over time.
In response, looking at the Bakken Formation, one of the most important sites of new oil production in the U.S., this study explores the extent at which fluctuations in gas production are an indicator for elevated asthma rates in immediate communities. Over a 6-year period, through a near-far analysis, the study looks at the relationship between the location of methane plume emitting sites and census tract level asthma rates. Additionally, a regression analysis investigates the significance between averaged annual asthma rates and the fluctuations of gross natural gas withdrawals.

Nourishing Equity: The Social Determinants of Food Access and Deserts in the Twin Cities

Christian Gustin, Macalester

A food desert is defined as a geographic area with limited access to affordable and healthy food options, which often impacts low-income and minority communities disproportionately. The study focuses on three key determinants that contribute to food deserts: housing, transportation, and race/ethnicity demographics. To explore the relationships between these social determinants and food desert accessibility in Minneapolis, the study will use a predictive model built with supermarket locations, ranking census tracts based on proimity to locales. A regression analysis will be conducted to evaluate the strength of the relationships between housing, transportation, race/ethnicity demographics, and access to supermarkets. By analyzing the social determinants of food deserts, this project aims to shed light on the underlying causes of this issue and explore potential solutions to address it. The findings from this study can inform policies and interventions aimed at improving food access and reducing disparities in health outcomes for low-income and minority communities.

1:55 - 2:10

Public Health Impacts of Wildfires: A Case Study of Asthma in Colorado

Felicia Winfrey, Macalester

This study explores the impact of wildfire season on asthma emergency department visits and hospitalizations in Colorado and the spatial clustering of asthma across the state. With the likelihood of wildfires increasing due to climate change, so will the adverse health effects on Colorado's increasing population. Fires on the West Coast also impact Colorado's atmosphere as wind patterns often compound in extremely poor air quality that can result in increased asthmatic emergency department visits and hospitalizations. Using historical health data and their relation to air quality, this study examines the spatial and temporal distributions of patterns. Methods such as spatial clustering and regression modeling are used to explore the relationship between air quality and visits to healthcare facilities. Preliminary explorations of the data reveal a relationship between the two variables. Understanding this relationship can help reveal the impact wildfires have on public health.

2:10 - 2:25

Social Vulnerability and Depression in the United States: Implications for Public Health and Policy

Sonat Taydas, Macalester

In 2020 an estimated 14.8 million U.S. adults aged 18 or older had at least one major depressive episode with severe impairment in the past year. Exploring spatial patterns of depression in the United States can help shed light on how to best address this issue. One explanatory variable for depression is social vulnerability, prior research shows this relationship between social vulnerability and depression in the United States is strong. In a county level analysis of depression and the social vulnerability index, areas that experience more clustering can be identified through spatial analysis. This is coupled with other statistical tools to further explore this relationship. This analysis is done at different time periods to examine how the relationship between depression and social vulnerability is changing over time in the United States.

2:25 - 2:40

Survival of the Closest: An Analysis of Travel Time to Neonatal Care in Texas

Bennet Christensen, Macalester

This study explores the relationship between infant mortality and travel time to neonatal care units. Lack of access to quality healthcare drives infant mortality rates, as many sources of infant mortality are preventable. In the US, access to neonatal care units continues to be a problem, especially in rural areas. The placement of these care units is a spatial issue. Infant mortality data is accessed from the Texas Vital Statistics Linked Birth and Death Records from 2011 to 2014, and has been aggregated up to the zip code level. American Community Survey data is used to account for socioeconomic status. Using travel time as a measure of access, regression analysis is performed to determine the risk of infant mortality associated with distance and socioeconomic status.

Session 3C -- ASC Room 233 *Moderated by, William Moseley Ph.D., Macalester*

1:25 - 1:40

Waste Mismanagement strategies in Mt. Everest Region

Sangay Sherpa, Saint Cloud State University

The Himalayan democratic republic of Nepal is not only one of the least developed countries in Asia Pacific region but is also land-locked. a double disadvantage in its efforts to fulfill development aspirations (Upadhayaya, 2011). Its environment is sensitive, its geography is complicated, and the human traffic is a hassle in the mountainous regions, especially in touristy locations. The continuation and quality of mountain ecosystem resources and services are under risk due to rising waste impacts brought on by expanding tourism, illegal waste practices, and reckless

disposal of waste and unawareness by local people due to lack of education. The recently released Waste Management Outlook for Mountain Regions examines issues with waste management in mountains, their effects on regions downstream, and current solutions. This succinct statement summarizes the main Outlook findings and draws attention to areas that require additional research.

1:40-1:55
Understanding the Interactions between the U.S. Operational Bureaucracy and Immigrants in relation to Immigration Enforcement Policies.
Ellen Hofstede, Gustavus Adolphus College

> This research study aims at deciphering the influence the United States Presidential Administrations have over Immigration Enforcement Policies and how this affects the interactions between those working for the U.S. Operational Bureaucracy and Immigrants on the U.S.–Mexico border. I argue that when the legislation of immigration guidelines among United States presidential administrations prioritizes the rights of immigrants, the behavior of employees working for the United States bureaucracy shifts to match those guidelines, leading to better treatment of Latino immigrants. This paper will briefly overview how United States Immigration Law operates, Immigration Enforcement Policies from the Obama, Trump, and Biden Administrations, the relationship between U.S. immigration law and living space, and an impact analysis on Latino immigrants from these laws and policies. Qualitative data will be collected through one-on-one interviews to assess how U.S. Immigration Law influences the regulation process for federal agencies focusing on the Department of Homeland Security. Selected interviewees will either have direct experience with United States Immigration Policy or are familiar with them; interviewees will be addressed through pseudonyms to ensure confidentiality.

1:55-2:00
Absentee Agricultural Land Ownership in Nicollet County
Emily Gerencer, Gustavus Adolphus College

> Minnesota has 25.4 million acres of farmland, and 11.6% of this is rented (United States Department of Agriculture & Minnesota Department of Agriculture, 2021). Rented farmland is often owned by a non-operator landlord, many of whom live a great distance from the area where their land is owned. These people are referred to as absentee landowners, and their distance from the local region of their land has the potential to influence outcomes in the local economy, land tenure and management, engagement in conservation practices, and personal identity with the land (Bawa and Callahan, 2021). This research seeks to understand how absentee agricultural landowners in Nicollet County, MN impact local communities and economics. Specifically, it asks: 1. What percent of agricultural land in Nicollet County is owned by an absentee landowner? 2. Where do these absentee landowners live? 3. How do the environmental values and sense of place among absentee landowners influence their land use decisions?

Poster Session 1:05 -1:20 Atrium, Second floor

Understanding the impacts of wildland fires on ecosystem habitats using geospatial analysis
Victor Araya, Gustavus Adolphus College

> The research objective addresses the impacts of wildland fires on tree canopy. Wildfires are a major concern plaguing global forests. Scientists and researchers have been utilizing tools and spatial technologies to study these forest fires. The VIRRS fire algorithm represents the best quality detection system for assessing wildland fires which focuses on the quality of fire pixel anomalies. The Suomi-NPP VIRRS C2 product (SV-C2) along with its bands of the Brightness, Brightness T31 temperature and Fire Radiative Power were conducted to assess these pixels. Spatial autocorrelation and Hot Spot analyses were used to represent spatial patterns among fire observation points. Our study was on August 20th, 2020,over the San Joaquin Valley of central California. Our main study focused on the Anthony Chabot National Forest. Results represented extreme clustering for all three bands with Hot Spots and Cold Spots mainly presenting similar fire patterns with respect to each band.

Tree ring analysis of growth dynamics and climate response for Pinus resinosa and Quercus montana in the Allegheny Plateau, Central Pennsylvania
Rachel de Sobrino, University of Minnesota

> Elevated warming and changing precipitation regimes are influencing tree growth dynamics and mortality globally. In the northeastern United States, ecological disturbances often complicate the relationship between climate and tree growth. This study uses dendrochronology to investigate site history and assess the growth dynamics and climate response in tree rings of red pine (Pinus resinosa) and chestnut oak (Quercus montana) in the Allegheny

Plateau of Central Pennsylvania. We find strong synchrony in growth for both species, with climate exerting an underwhelming influence on tree ring growth. P. resinosa growth is most strongly linked to climate in the latewood for summer temperatures, while Q. montana has a weak response to winter temperatures at the annual scale. This weak relationship to climate suggests the importance of further investigating the role of ecological disturbance for these species in this region.

(In)Equitable Water Allocation During Drought: Water Use Reduction Actions and Minority Communities in the Twin Cities Metropolitan Area

Marit Isaacson, Gustavus Adolphus College

Drought has become an increasing concern in Minnesota in recent years. To help mitigate its effects, there is a Minnesota Statewide Drought Plan that outlines actions taken at the varying drought severity levels. This proposal aims to examine this plan, and specifically its water cutback actions, in the context of environmental justice. Using a mixed-methods approach of surveys, interviews, and geographic information system processing, the research will determine whether racial/ethnic minorities in the Twin Cities Metropolitan Area will be disproportionately impacted by these cutbacks in comparison to white populations in the same broad geographical region.

Evaluating the Effectiveness of Water Stress Measures as Indicators of Wildfire Severity in Northern Minnesota

Georgia Gayle Kretz, Macalester

In the past number of years, the American Midwest, along with many other world regions, has seen a drastic uptick in the frequency and intensity of wildfires due to climate change. Minnesota, in particular, has always been home to many fires—both of the wild and prescribed variety—but in the age of climate change, rising temperatures and recent drought conditions have aggravated them. As climate change worsens, it is of the utmost importance that we adapt to what could be our new reality: Minnesota as a tinderbox. A number of studies, including a recent work from California, have remarked upon the significance of vegetation water stress measures as indicators for fire severity (Pascolini-Campbell et al., 2022). However, their effectiveness has been proven to vary by biome type—and there's no guarantee that what works for the savannas and shrublands of California will be effective in Minnesota's forests and prairies. Thus, an independent analysis must be conducted to determine the usefulness of these indicators for the Upper Midwest. In my project, I will evaluate the effectiveness of water stress as an indicator for fire severity across the tallgrass aspen parklands and coniferous forests of northern Minnesota. Should this prove to be a viable approach, it could pave the way for more accurate prediction of fire risk across the state and beyond, allowing Minnesotans and other Midwesterners to better prepare our homes for the more dangerous fire seasons to come. I will acquire spatial severity data for several (3–4) medium-to-high-intensity fires in Minnesota in the last two decades from the Burn Severity Viewer dataset (Burn Severity Viewer, n.d.). Then, I will acquire Landsat 7 imagery of those areas pre-fire. Using their NDVI, I will determine the spatial water stress patterns of each pre-fire area, and will compare these with the observed severity of the fires, looking to see how strongly water stress is correlated with increased fire severity. Afterwards, I will compare the individual correlations found between water stress and fires in the aspen parkland biome and coniferous forest biome to determine whether there is any difference in the effectiveness of water stress as an indicator in each biome.

Energy Sprawl: Land Use efficiency for Suitable Renewable locations in Minnesota

Mumtas Mohamed, University of St. Thomas

Minnesota is trying to produce carbon-free electricity by 2040. This means a switch to renewables like wind and solar, but some are concerned by energy sprawl. The challenge of the energy sprawl is finding a way to reduce land-use footprint while also balancing biodiversity protection. Knowing which energy is right for biodiversity protection and the optimal areas to place it reduces the land-use footprint. Finding optimal resilient areas for energy production while protecting biodiversity using wind and solar suitable locations that are far from climate strongholds and prairie reserves to reduce land-use footprint addresses the energy sprawl challenge. The study area is Minnesota, and the data used is land cover and resilient scores, TNC suitability wind location, solar suitability locations, and DNR prairie subset in Minnesota. Using the Fishnet tool to compare the footprints of wind and solar and raster calculator to analyze land cover, wind speed, solar insolation, climate strongholds, and areas deemed suitable for renewables by the Nature Conservancy to find optimal sites for large-scale renewable energy projects that do not degrade prairie habitat. Also, using land cover type to compare with resilient sites shows which areas are biodiverse. The resilient areas and areas with high solar energy generated are in Southern Minnesota and those areas have high biodiversity. So, optimal areas to combine wind and solar renewables will be near areas with high solar exposure and high wind speeds that are near cropland, power lines, and non-resilient areas with low biodiversity. Results give insight into future renewable energy demands, so policymakers might consider looking into the trade-offs between energy and land use to make efficient use of land while meeting

renewable energy needs.

Does access to transit in Redlined and Green Lined neighborhoods vary in the Twin Cities?
Mumtas Mohamed, University of St. Thomas

> The practice of redlining limited home loans in marginalized communities and encouraged investment in wealthier green lined neighborhoods. This research compares the relationship between income and walk time to the nearest transit stops in both redlined and green lined neighborhoods in the Twin Cities. This is accomplished by calculating walk time polygons around metro transit stops, analyzing Met Council parcel data and scatter plot analysis. Today, single-family homes in redlined neighborhoods have relatively low estimated value per acre. Relative to green lined neighborhoods, these historically disadvantaged neighborhoods need access to transit. Results inform policy on future transit investment.

Climatological Relationships of False Rings in Pinus resinosa in North-Central Minnesota
Kjersten Peterson, University of Minnesota

Protected Public Lands and the Composition of Surrounding Rural West Economies
Ethan Smith, University of St. Thomas

> Shifting economies in the rural west result from federal protection of land which have, on one hand, locked up potential resources for use, and on the other, spurred growth of amenity and tourism-based industries. This project discovers if proximity to protected land impacts composition of rural economies in non-metro counties in 11 Western states. To address the Modifiable Areal Unit Problem, three concentric drive time trade areas were generated around the point intersections of protected areas and roads. A comprehensive US Business dataset was used to select, by NAICS codes, businesses within designated classes of Old (extractive) or New West (tourism). Within a half hour drive of federally protected lands (National Parks, Monuments, Wilderness) in the study area, New West Businesses out-employ and out-number Old West Businesses. Additionally, in 8 of 11 states, New West Businesses contribute to their state's total sales volume at a greater rate than Old West Businesses in the same state. Based on results, evidence shows that protecting land contributes to more sustainable economies and does not negatively affect economies nearest these lands. These results could be used to support policy in favor of continuing protection of land or protecting new land.

Accessibility of Public Transportation in Saint Cloud, Minnesota
Abigail Uselman, Saint Cloud State University

> The purpose of my study is to analyze the accessibility of public transportation in Saint Cloud, MN. I will use the Metro Bus route map in the Saint Cloud greater area (Saint Cloud, Waite Park, Sartell, and Sauk Rapids) as my study area. How accessible are bus stops/lines to passengers based off distance buffers from the bus route in the Saint Cloud greater area? Is there a correlation between household income levels and distance to a bus stop? Do all areas meet the transportation needs of individuals living nearby based on some socio-economic characteristics?