

MUGS 2021



# MIDWEST UNDERGRADUATE GEOGRAPHY SYMPOSIUM

APRIL  
24

10 AM - 2:00 PM

*MUGS, hosted annually by a rotation of Geography programs in the Midwest, provides an opportunity for undergraduates to present their research at a formal Geography symposium.*

**This year MUGS is hosted by:  
MACALESTER COLLEGE GEOGRAPHY DEPARTMENT**

Saint Paul, Minnesota USA

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Questions? Contact [mac-mugs@macalester.edu](mailto:mac-mugs@macalester.edu)

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## Conference Organizers

Anisha RajBhandary '21,  
*Macalester GTU Co-President*

Jim Smith '21,  
*Macalester GTU Co-President*

Laura Smith, Ph.D., *Macalester GTU Faculty Advisor*  
*Macalester Geography Associate Professor & Chair*

Laura Kigin, *MUGS Conference Advisor*  
*Macalester Geography Department Coordinator*

## Schedule of Events

**10:00-10:15 AM CST -- Welcome and Introduction**

**10:20-11:20 AM CST -- Concurrent Sessions I**

**11:25 AM-12:25 PM CST -- Concurrent Sessions II**

**12:30-1:00 PM CST -- Lunch Break**

**1:00-2:00 PM CST -- Concurrent Sessions III**

## Structural Notes

Each **concurrent sessions block** consists of 3-4 paper sessions and one lightning session, all simultaneously held. We ask that all presenters remain in their session (e.g. 1A, 1B, or 1C) for the entirety of their concurrent session block. Participants may move freely about as they see fit.

Each **paper session** consists of three 15 minute presentations. Each of these are followed immediately by 5 minutes of Q&A. To represent this, each presenter is slotted for 20 minutes.

Each **lightning session** consists of nine 5 minute presentations. After all have presented, there will be 15 minutes of general Q&A and discussion for the group.

Please use the lunch break from 12:30-1:00 to nourish yourselves and combat Zoom fatigue. There will be an open Zoom room during this time for freeform breakout session discussions, but there is no expectation or obligation to attend!

## Presenter Directory

<u>Concurrent Sessions I (10:20 -11:20 AM)</u>		
<u>Paper Presentations</u>		<u>Lightning Presentations</u>
<u>Session 1A</u>	<u>Session 1B</u>	<u>Session 1C</u>
10:20-10:40 -- Audrey Ochtrup-DeKeyrel  10:40-11:00 -- Avery Cameron-Laffey  11:00-11:20 -- Kendra Held	10:20-10:40 -- Arianna Fredrickson  10:40-11:00 -- Finn Odum  11:00-11:20 -- Linnea Coltvet	10:20-10:25 -- Emily Weiss 10:25-10:30 -- Jacob Slaughter 10:30-10:35 -- Olivia Jascor 10:35-10:40 -- Lydia Godfrey 10:40-10:45 -- Ryan Lefaivre 10:45-10:50 -- Samuel Kelcher 10:50-10:55 -- Stian Kvaal 10:55-11:00 -- Tyler Bergquist 11:00-11:20 -- All Presenters, Q&A

<u>Concurrent Sessions II (11:25 AM-12:25 PM)</u>		
<u>Paper Presentations</u>		<u>Lightning Presentations</u>
<u>Session 2A</u>	<u>Session 2B</u>	<u>Session 2C</u>
11:25-11:45 -- Andrew Gasperlin  11:45-12:05 -- Sarah Clay  12:05-12:25 -- Grace Tobin	11:25-11:45 -- Luke Zaruba  11:45-12:05 -- Tori Franciosi  12:05-12:25 -- Wren Leith	11:25-11:30 -- Ashley Giossi 11:30-11:35 -- Jacob Zuzek 11:35-11:40 -- Marcus Wahlert 11:40-11:45 -- Matthew Larson 11:45-11:50 -- Morgan Schreck 11:50-11:55 -- Elaina Granse 11:55-12:00 -- Xavier Abdullahi 12:00-12:05 -- Rachel Schauer 12:05-12:25 -- All Presenters, Q&A

<u>Concurrent Sessions III (1:00 PM-2:00 PM)</u>			
<u>Paper Presentations</u>			<u>Lightning Presentations</u>
<u>Session 3A</u>	<u>Session 3B</u>	<u>Session 3C</u>	<u>Session 3D</u>
1:00-1:20 -- Alicia Johnson  1:20-1:40 -- Christopher Archuleta  1:40-2:00 -- Quincy Yangh	1:00-1:20 -- Aviva Meyerhoff  1:20-1:40 -- Grace Armon  1:40-2:00 -- Olivia Bruse	1:00-1:20 -- Silas Southworth  1:20-1:40 -- Emily Schneider  1:40-2:00 -- Kristie Olson	1:00-1:05 -- Alexander Lunde 1:05-1:10 -- Alexandra Morrison 1:10-1:15 -- Calvert McCormick 1:15-1:20 -- Emily Rash 1:20-1:25 -- Justin Lalor 1:25-1:30 -- Nate Bennett 1:30-1:35 -- Rachel Schauer 1:35-1:40 -- Sarah Greene 1:40-1:45 -- Jonathan Mortenson 1:45-2:00 -- All Presenters, Q&A

\*All times are in Central Daylight Time

## Detailed Schedule

### Concurrent Sessions I (10:20 am - 11:20 am)

#### Paper Presentation Times:

##### *Session 1A*

Moderated by Daniel Trudeau, Ph.D., Macalester College

10:20-10:40 am

#### **Urban Agriculture in Minneapolis: Stakeholder's Perspective on Social Inequality in the Movement**

Audrey Ochtrup-DeKeyrel, Gustavus Adolphus College

*Abstract: As issues of food insecurity and unsustainable food systems in urban spaces have made their way to the forefront of social justice and municipal focus, urban agriculture (UA) has centered itself in the alternative food system movement. American cities have seen an increase in urban agriculture in recent decades and the growing popularity of the small scale agriculture movement has painted a largely positive picture of urban farming. Many experts, activists, and urbanites hail urban agriculture as a new, equitable method for engaging specifically low income, food insecure communities in the production of food. Critics, however, question the validity of these supposed benefits and whether or not they truly subvert the neoliberal, capitalist system that has led to pervasive food deserts in urban areas. What is truly at question is if urban agriculture perpetuates systems of inequality and what perspective stakeholders in the movement hold regarding this seeming dichotomy. The city of Minneapolis is still early in its city-wide political support and expansion of urban agriculture. Urban farming as a means to combat food access inequality, promote community betterment, and create a more equitable food system has yet to be critically analyzed in its manifestation specific to Minneapolis. This research proposes an in-depth discourse analysis of existing literature on the impacts of UA, which will then be coupled with interviews with representatives of identified stakeholder groups (UA practitioners, supportive government officials, and supportive nonprofit members) to assess if there is an acknowledgment of the possible ways urban agriculture falls short in advancing social justice and if there is active work to address these theoretical shortcomings. Referencing Kristin Reynold's 2015 methods utilized to investigate disparity in New York's urban agriculture system, this study's pilot project found that stakeholders believe and acknowledge there is existing inequity within Minneapolis's own urban agriculture system.*

10:40-11:00 am

#### **Urban Renewal and Political Capital: How Interstate 94 Was Diverted Through the Rondo in St. Paul**

Avery Cameron-Laffey, Gustavus Adolphus College

11:00-11:20 am

#### **Influence of Swedish Conceptions of Space and the Environment on Urban Planning in Uppsala**

Kendra Held, Gustavus Adolphus College

*Abstract: With the world collectively progressing toward the target year of 2030 to meet the United Nation's Sustainable Development Goals, counties and cities around the world are adopting a variety of tactics. Sweden has been a leading country in sustainable development for decades. The city Uppsala, located near the east coast of the county, has received multiple climate action and sustainability awards, making it part of an elite collection of the world's most sustainable cities. This work intends to understand how cultural understandings of space and the environment have shaped the infrastructure and development of this urban city. Landscapes are neither constructed nor altered in a vacuum; they reflect cultural norms, needs and ideas. Rather than focusing solely on the green infrastructure that could be adopted by cities in the United States, I suggest that there must also be a shift in understanding of space and the environment. I seek to understand how Swedish understandings of space and the environment shape green infrastructure and urban planning in Uppsala, Sweden. Using Uppsala's green infrastructure and urban planning as I guide, I am conducting a discourse analysis on how these structures are promoted and understood. I am also in the process of conducting supplemental interviews of people who either live in or study Sweden on the Swedish conceptualizations of space and the environment. If I am approved to study abroad during the fall of 2021, I will also practice reading the landscape in Uppsala and conducting further interviews with Swedes.*

### **Session 1B**

Moderated by Anna Versluis, Ph.D., Gustavus Adolphus College

10:20-10:40 am

#### **Are Office Spaces Becoming Obsolete? How COVID-19 has rushed the inevitability of office spaces becoming redundant and possibly unnecessary in Minneapolis, Minnesota**

Arianna Fredrickson, Gustavus Adolphus College

*Abstract: Over the last year, many office spaces in Minneapolis, Minnesota have been sitting empty due to the COVID-19 pandemic. While it is under unfortunate circumstances that this has been the reality over the last year, some businesses and companies have reported this last year as their most productive and lucrative year on record. This study looks at how employees are currently handling the work from home period, focusing on the advantages and disadvantages of this work life, as well as what the future of office space looks like for companies that reside in Minneapolis, Minnesota. This study also asks the question of if office spaces are necessary entities in cities, or if they simply take up space that could be used to benefit the general public.*

10:40-11:00 am

#### **COVID-19 and the Right to Information for Indigenous Peoples in Arica and Parinacota**

Finn Odum, Macalester College

*Abstract: This research seeks to understand if the health communication programs in Chile are sufficient and, specifically, if the Chilean state guarantees the right to*

*information of indigenous peoples in the context of COVID-19 in the Arica and Parinacota region. Semi-structured interviews were carried out and analyzed using the Atlas.ti software. The results indicated that the indigenous peoples of Arica and Parinacota need intercultural programs that recognize their rights and cultures, and more access to culturally sensitive information. These findings were focused on COVID-19 but represent long-term issues faced by Chilean indigenous groups nationwide.*

11:00-11:20 am

**Effects of COVID-19 on Children's Development of Sense of Place**

Linnea Coltvet, Gustavus Adolphus College

*Abstract: This project seeks to answer how recent pandemic conditions have altered, improved, or misrepresented children's development and relationship to their sense of place. The main question that I have attempted to answer is as follows: how has COVID-19 affected children's ability to develop sense of place within urban and suburban areas in Minnesota? Within that question, I will pose a couple more: how have severe lacks in mobility, exposure, education, socialization, and accessibility (due to the pandemic) impacted children and their sense of place? In what ways has COVID-19 altered children's common familiarities within their own conception of geography? Through creating and analyzing three separate surveys created for caregivers, children aged 5-10 and children aged 11-15, I have developed a hypothesis. I find that mobility, socialization, exposure, and accessibility have all been majorly disrupted by the COVID-19 pandemic. Young children and their development of a sense of place has been greatly affected. As schools and familiar spaces have closed, children are negatively impacted due to limited environments and infrequent exposure to newness. Though there is some research on the physical and health effects of COVID-19, there is not much research on children or sense of place in combination with the present pandemic. It is my intent that this research fills that gap.*

**Lightning Presentation Times:**

***Session 1C***

*Moderated by Paul Lorah, Ph.D., University of St. Thomas*

10:20-10:25 am

**Targeting Vulnerable Schools in Minnesota to Propose Environmental Education Programs**

Emily Weiss, University of St. Thomas

*Abstract: Nature deficit disorder is the idea that humans, especially kids, are not spending as much time outside as they should. This is a problem for kids who live in cities as well as kids who are surrounded by monoculture crop fields in the rural parts of Minnesota. There is minimal research done on the importance of nature in a person's life but most studies show that it greatly benefits one's physical and mental health, especially now that many are doing online schooling during the pandemic. I will be studying towns in rural Minnesota with vulnerable children. I will do this by targeting prairie lands that are near schools for potential*

*conservation opportunities. The goal will be to create educational programs for the children in these underserved communities to not only learn about prairies, but spend time in them too. I expect to find designated prairie land within a few miles of rural schools that can be used for these programs.*

10:25-10:30 am

**Drivers of Minnesota Wetland Loss**

Jacob Slaughter, University of St. Thomas

*Abstract: Over the past two centuries, Minnesota developed at the expense of vital wetland habitats. This change disrupted ecosystems and poses problems for humans living in areas that should naturally be wetlands. Minnesota has an extensive and interconnected landscape of rivers, streams, and lakes. Wetlands – including swamps, marshes, and bogs – are an important barrier between drier land and bodies of water. This project locates where wetlands have been impacted by landscape changes, as well as what land cover is replacing impacted wetlands. To assess the changes in wetlands, the historic Marschner map of Minnesota land cover from 1895 is used in comparison with a more recent 2014 National Wetlands Inventory map. Additional layers help to identify how wetlands are being replaced, such as those mapping agriculture, development, and paved surfaces. The state of Minnesota established replacement ratios for removal of wetlands based on location; the criteria used for these ratios is assessed in light of this project’s findings.*

10:30-10:35 am

**Secure Climate Strongholds in Minnesota**

Olivia Jascor, University of St. Thomas

*Abstract: This project focuses on locating climate strongholds within Minnesota that are already under protection through state or national parks, as well as conservation easements. This project is important because it allows us to see if the areas that Minnesota currently protects are climate strongholds, meaning the state is protecting land that has a better chance of providing suitable habitat for species as climate change redefines the Minnesota landscape. The project defines climate strongholds as: 1.) a region with diverse topography (varied aspect, slope, hilliness), 2.) a low cost distance of movement for species out from the site, and 3.) a high or outstanding classification as a significant biodiverse site from the Minnesota DNR. The project took these variables and reclassified them so they are all weighted the same, which allowed a map layer to be created that shows climate strongholds within protected areas in Minnesota.*

10:35-10:40 am

**Climate Resilient Sites without Invasive Species in Southeastern Minnesota for Conservation**

Lydia Godfrey, University of St. Thomas

*Abstract: This research focuses on locating nature’s strongholds in Southeastern Minnesota that host few invasive species and comparing my results to conservation priority areas identified by the Nature Conservancy. The Nature Conservancy is an*



*international nonprofit organization focused on conserving lands and protecting the environment. Climate change is projected to cause unpredictable species range shifts. Thus, a primary question to conservation is how best can species be protected for centuries to come in the face of climate change? One way to do this is by conserving nature's strongholds that contain resilient lands many species can shift to. Nature's Strongholds have diverse abiotic features, microclimates, and provide numerous ecosystems that will be able to withstand climate change. Southeastern Minnesota was chosen as a study area due to its high stronghold potential and current lack of protection. Data layers used to determine nature's strongholds included a Digital Elevation Model and a layer depicting Observations of Terrestrial Invasive Species. These data layers were compared with forested areas identified by Marshner Pressetlement Data, since natural forests are at risk for climate change and invasions of nonnative species. Finally, this information was analyzed alongside conservation priority data from the Nature Conservancy to compare findings. The research was done by utilizing ArcGIS Pro. In ArcGIS, raster calculator, cost distance and reclassify tools were used to make new data layers.*

10:40-10:45 am

### **Spatial Analysis of Citizen Science Participation in Rock Island County**

Ryan Lefavre, Augustana College

*Abstract: Citizen science is growing rapidly due to the increased accessibility of phones with GPS capabilities, leading to a wider catalogue of scientific data, including observation types and recorded locations. Studies have been conducted to understand the spatial analysis of the recorded location in various areas across the world, but none have looked at citizen science's spatial analysis in the Midwest. This research is focused on spatial trends of iNaturalist observations in Rock Island county, IL, based on landcover and protected land access types. Analyzing the relationship between citizen science observations and landcover creates a starting point to begin conceptualizing citizen science within a spatial view. Understanding the spatial trends of citizen science observations in Rock Island county can help facilitate local conservation projects centralizing efforts in high observation hotspots.*

*Using ArcMap's hotspot analysis and other overlay features, the iNaturalist data for Rock Island county was analyzed and assessed. The results show that 54% or 1,377 of the observations were made on developed land cover. Forest landcover had 36.8% or 933 of landcover observations. Additionally, 30% of the observations were made on protected lands. Of those observations, 47% of those observations were made on open access land such as local parks, recreation management areas and state conservation areas.*

*There is a trend of increased iNaturalist participation in developed lands, which reflects findings in similar studies analyzing citizen science participation. Future research can be conducted to understand better why developed landcover and open*

*access landcover have many observations. Future research comparing these findings to other counties in the Midwest can validate these results.*

10:45-10:50 am

**Future Conservation of Indigenous Food Systems through Climate Strongholds**

Samuel Kelcher, University of St. Thomas

*Abstract: Climate change is expected to have a plethora of effects that will likely impact ecosystems to varying levels. One thing that will be maintained throughout these ecosystems is that resilient ones are more likely to adapt and survive. Thus, it is crucial to map out where resilient sites, known as climate strongholds, to determine where conservation should be done to protect ecosystems in the future. Wild rice is an example of a potentially threatened ecosystem in the Midwest. Because of biological impact via ecosystem services as well as its cultural importance in indigenous food systems as well as Midwesterners as a whole, determining where wild rice strongholds are, as well as where they can go are important for conservation of this staple food. We were able to obtain GIS layers with information regarding the digital elevation model, as well as location of wild rice within the state. Using these data layers, we were able to create climate strongholds in Minnesota through a raster calculator with standardized slope, aspect, and focal statistics inputs. Once this was generated, we could input the wild rice layer to determine where wild rice strongholds are present in Minnesota to target these areas for conservation. Additionally, we were able to obtain a layer showing Native American Tribal Lands in Minnesota, and further sought to target wild rice strongholds near Native American Tribal land. In doing so, we would be able to accomplish the goal of finding areas of resilience for wild rice which could be given to Native American Tribes to conserve.*

10:50-10:55 am

**Planting Trees to Protect Minnesota's Resilient Trout Streams: Targeting Climate Resilient Areas for Restoration to Enhance Trout Habitat in Minnesota**

Stian Kvaal, University of St. Thomas

*Abstract: Trout in Minnesota are particularly susceptible to the effects of climate change including warmer summer temperatures, changes in streamflow, drought, the abundance of wildfires and severe thunderstorms, and increased erosion. Additionally, the effects of urbanization have been found to alter watershed runoff, stream hydrologic and thermal regimes, channel morphology, water quality, and biological communities. Trees and vegetation within riparian areas provide trout with cover and protection from erosion and high temperatures. Locating, protecting, and reforesting areas that will remain resilient to climate change is important for the protection of trout species in Minnesota. In this project, I will identify climate strongholds based on Minnesota topographic variation using the Minnesota Digital Elevation Model as well as standardized slope, aspect, and neighborhood hilliness in Minnesota. Within Minnesota's climate strongholds I will use the focal statistics, reclassify, Euclidian distance and raster calculator tools, and the Minnesota State Designated Trout Streams data layer to identify specific trout streams that are resilient to the effects of climate change. I will then use the*

*Minnesota Annual canopy cover (1973-2018) data layer to observe tree loss near resilient trout streams in Minnesota. Reforestation efforts in these areas must be prioritized to protect and increase future resiliency.*

10:55-11:00

**Identifying Conservation Mismatches in the United States and Recommending Climate Resilient Areas for Restoration**

Tyler Bergquist, University of St. Thomas

*Abstract: There is a mismatch where biodiversity hotspots lie and where federally protected lands are located. This mismatch is highlighted in Jenkins's article "US protected Lands Mismatch biodiversity Priorities". With the high number of endemic species and the low amount of federally protected land, we see a glaring need to shift conservation efforts to the southeast. Since conservation dollars are so limited, each project needs to be seen as an investment. Those investments need to be precise with specific actions and goals in mind otherwise precious opportunities could be lost. We will identify climate strongholds within this mismatch and recommend they are acquired to protect high amounts of endemic species. This is important because many species perform ecosystem services which provide society with many benefits. By using Jenkin's data, a model was created using various endemic species data layers which was run through a raster calculator to generate a conservation priority index. Next, applying the federal lands data layer to the Euclidean distance tool, we measure the distance from federally protected land. Lastly, pairing the climate strongholds data layer with the cost distance tool, we will locate climate resilient areas and potential corridors within the biodiversity hotspots Jenkins identified.*

11:00-11:20 am

**Q&A/Panel Discussion**

**Concurrent Sessions II (11:25 am - 12:25 pm)**

**Paper Presentation Times**

***Session 2A***

*Moderated by Laura Smith, Ph.D., Macalester College*

11:25-11:45 am

**SWLRT; Assessing the Extension**

Andrew Gasperlin, Gustavus Adolphus College

*Abstract: I am looking into SouthWest expansion of the Light Rail transportation system in the Twin Cities Metro. This expansion, when completed, will run from downtown Minneapolis and ending along Highway 212 in Eden Prairie. The expansion, currently in construction phases, will pass through Minneapolis, Saint Louis Park, Minnetonka, Hopkins, and Eden Prairie. My goal in conducting this research project is to look at the criteria that this specific expansion met to be approved by the local city/state governments involved in the approval process. The expansion will serve highly car-dependent and low-density communities along its route rather than other underserved communities in the metro. I seek to understand*

*what motives city governments and planning commissions had when designing, planning, and approving this expansion. I am collecting information from sources such as city council meeting minutes concerning the expansion as well as looking at planning commission reports to see the process that was taken in order to develop the expansion. The purpose of this project is to analyze what city governments looked at to approve this project and draw out motivations of urban transportation developments in the Twin Cities metro area.*

11:45-12:05 pm

**Cycling in the City: Visualizing Equity in Minneapolis Bike Infrastructure**

Sarah Clay, Gustavus Adolphus College

*Abstract: Visualizing inequities in Minneapolis bicycle infrastructure is a critical step towards implementing more inclusive non-motorized transportation policies, plans, and infrastructures. The study identifies and visualizes block group level areas of Minneapolis most in need of bicycle infrastructure improvements and their corresponding racial and socioeconomic demographics. The study additionally identifies and visualizes specific roadways in Minneapolis that require improved safety measures in order to encourage more residents to feel they can utilize micromobility. The study intends to help mitigate inequities, promote access, and improve the safety of bicycling and other non-motorized forms of transportation by using weighted site selection analysis to identify and prioritize areas that are racially and socioeconomically marginalized. Interviewing, discourse analysis, GIS analysis, and cartography methods were employed to facilitate a more comprehensive understanding of Minneapolis policy and planning work, to compile robust geospatial datasets, and to produce cartographic representations of bicycle infrastructure disparities. Results of the study provide various municipal agencies and NGOs with clear visualizations upon which more accessible and equitable non-motorized transportation networks can be established.*

12:05-12:25 pm

**A Feminist Approach to Walkability: Centering Care in Urban Design**

Grace Tobin, Gustavus Adolphus College

*Abstract: The field of Urban Planning is dominated by white male urban planners. This overwhelming patriarchal influence has manifested physically in our built environment being designed with financial concerns in mind rather than that of local communities. This research aimed to represent many different perspectives and backgrounds through previous literature which proved extremely difficult as the literature is saturated with the perspective of white male urban planners. As mentioned earlier, this has visible consequences in our cities and towns. Saint Peter, Minnesota provides a modern example of what this outdated version of planning can look like in an American small town. This research analyzes the walkability of Saint Peter's downtown area and utilizes methods of observation and reading the landscape. The current infrastructure in Saint Peter discourages pedestrians from engaging in the community as a direct result of prioritization of the automobile experience. Ways to center the community in Saint Peter through changes in pedestrian-oriented urban design are discussed. The purpose of this*

*research is to encourage others to critically examine their surroundings and to present a viable example of what a planning approach that centers community care can look like on a small scale.*

## **Session 2B**

*Moderated by Christopher Strunk, Ph.D., Augustana College*

11:25-11:45 am

### **An Assessment of Park Equity and Accessibility using GIS and Statistical Analyses in Minneapolis, Minnesota**

Luke Zaruba, Gustavus Adolphus College

*Abstract: Equity and accessibility have long been attempted to be incorporated into urban park planning processes through the construction of parks in low-income or minority communities, the implementation of policies designed to promote equity and environmental justice, and by improving funding for parks in areas that normally did not receive an abundance of funding. However, ultimately parks remain inequitably distributed and inaccessible to demographic groups who have historically always had limited access. The goal of the proposed research is to utilize geospatial and statistical methods to answer the questions: Are parks equitable in their accessibility across Minneapolis? Is there a relationship between the predominant socioeconomic standing, race, or ethnicity of residents within an area (e.g., neighborhood, census tract, etc...) and the likelihood of their proximity or accessibility to parks? Though the research strictly uses quantitative and computational methods to gain a further understanding of the phenomena, there is plenty of potential to eventually expand upon this research and use more qualitatively focused research designs to enhance and broaden our collective understanding of park planning and equity and accessibility in Minneapolis. As many past studies have also determined, I expect that there will be some degree of inequitable distribution of parks and therefore inaccessibility to parks in Minneapolis, with minority and low-income communities facing the greatest number of difficulties when accessing parks.*

11:45-12:05 pm

### **Seeking Transformative Justice: Accessibility to Anti-Carceral Reparations for Survivors of Sexual Assault**

Tori Franciosi, Gustavus Adolphus College

12:05-12:25 pm

### **Gentrification in the Craft District: Place-making Among Lincoln Park Residents**

Wren Leith, Gustavus Adolphus College

*Abstract: This research is a case study analyzing the relationships between gentrification in retail spaces and place-making in local residents in Duluth's Lincoln Park Craft District. Lincoln Park is a neighborhood in Duluth that has long struggled with high rates of poverty and unemployment (City of Duluth, 2017). In recent years the City of Duluth and local organizations have partnered together to promote business development along West Superior Street in Lincoln Park (Gleeman, 2017). Business developments in low income neighborhoods such as*

*Lincoln Park have long been associated with negative effects on place-making among local residents (Bridge and Dowling, 2001). I conducted interviews with a variety of stakeholders in the Lincoln Park neighborhood to get a sense of how residents feel that business development in the Craft District has impacted the community and place-making within their neighborhood.*

## **Lighting Presentation Times**

### **Session 2C**

*Moderated by William Moseley, Ph.D., Macalester College*

11:25-11:30 am

#### **The Metro Makes Money: How Light-Rails Impact Investments in the Twin Cities, MN.**

Ashley Giossi, St. Catherine University

*Abstract: Providing accessible public transportation should increase the amount of investments in areas with newly built mass transit systems. This concept is important because if constructing new transit lines, like light-rails, boosts financing in these neighborhoods; it raises the argument that it could help low-income communities. This project's study area is the Twin Cities, MN, and looks at the light-rail that opened in 2014, connecting the two cities. The variables included are transit stops 100 feet from the light-rail, parcel data from both Hennepin and Ramsey county before and after building the light-rail, and census data. The project produced a model that merged stop ridership patterns from 2013, 2016, and 2020 showing ridership before and after the city built the light-rail. Then did a spatial join to connect these results to census level data and used select layer by location to find the transit stops 100 feet from the light-rail. Next, using the "generate drive time trade areas" tool created a 5-minute walk radius around the light-rail stops. This study expects to find that better access to metro transit will increase community investments in the same areas.*

11:30-11:35 am

#### **COVID and Crime**

Jacob Zuzek, University of St. Thomas

*Abstract: COVID has impacted us in many ways, whether it is mentally, financially, or socially. There are hundreds of little changes that are affecting us every day. One such impact is how COVID has affected crime. A recent increase in carjackings has brought the public's eye onto how even less serious crimes can affect the everyday person. In a time where there is so much danger we can't control, it is important to stay informed and aware of the environment around us. This study looked at specifically the Minneapolis area from January 1st, 2020 to March 11th, 2020 (before the mask mandate) compared to January 1st, 2021 to March 11th, 2021 (almost one year into the mask mandate). The question looking to be answered is how has total crime, as well as crime groups, changed before mask and social distancing mandates were put into place vs after one year with the mandates. The police incidents data is from the Police Information Management System (PIMS), which is updated daily. Using the point density tool and layer selection, layers for crime during the time of focus, crime by larger crime group,*

*and crime density were made for the data. Based on the analysis of the data and maps, we have observed: (1) Overall crime rate is down by nearly 20% primarily due to a significant decrease in theft and robberies, this is likely due to there being far fewer people in the cities including employees and tourists. (2) According to the density maps, crime is more spread out and less concentrated within the downtown area (in the center of the map). Again, this is likely due to there being fewer people in the cities including employees and tourists. (3) Vehicle theft, including carjackings, saw a significant increase throughout the city. This could be due to a number of reasons so the cause of this increase is unclear.*

11:35-11:40 am

**Ease of Access: Distance from Hospitals and the Impact of COVID-19 in Minnesota**

Marcus Wahlert, University of St. Thomas

*Abstract: The COVID-19 pandemic's devastating effects over the past year have revealed the vulnerabilities of many groups, often hitting less financially secure groups and racial minority groups with greater severity. One other vulnerability that it has revealed is inequality when it comes to healthcare access. This study aims to measure the relationship between physical distance from hospitals and COVID-19 fatalities to determine if this is a meaningful factor in how deadly the disease is for those infected. It will use GIS models to measure travel times from hospitals to find the areas of Minnesota most spatially isolated from hospitals and combine this with population data to find populated areas without close access to a hospital. This will then be compared to COVID-19 fatality rate data to determine if there is a relationship between the two. Data will be derived from Minnesota Geospatial Commons data on hospital locations and COVID-19 information from John Hopkins University. This study has the possibility to indicate if there is correlation between physical distance from hospitals and the fatality rate of COVID-19, which could prompt further study on this issue to determine if more hospitals are needed in certain areas of the state and indicate where new hospitals could best serve vulnerable populations.*

11:40-11:45 am

**Minnesota Agriculture and Environmental Pollutants**

Matthew Larson, University of St. Thomas

*Abstract: The modern agricultural processes necessary for the production of the world's food supply often carry unfortunate and often overlooked detrimental environmental consequences. Mishandling or overapplication of agricultural chemicals, such as fertilizers and pesticides, can often lead to leaks into adjacent water bodies. The presence of unintended agricultural chemicals in waterbodies due to run off often leads to a variety of environmental and ecological problems. This is most apparently seen in the great algae bloom south of Louisiana in the Gulf. This project will investigate agricultural chemical spills and their relation to near agricultural fields, and waterways in Minnesota. This will be conducted using layers from the Minnesota geospatial commons. The main layers used are the Minnesota crop cover layer, Minnesota chemical spills, and Minnesota impaired*

waters. The relation between spills, agricultural fields, and waters ways will be shown using geospatial tools in ArcGIS Pro.

11:45-11:50 am

### **Climate Strongholds for MN Moose**

Morgan Schreck, University of St. Thomas

*Abstract: A changing climate means a changing landscape. The moose population in Minnesota face a crisis: the crisis of a warming climate. Moose are known for their climate sensitivity, so identifying climate strongholds and corridors is crucial to ensuring their longevity within the Minnesotan landscape as it changes. Their primary range is within the Arrowhead of Minnesota, near clusters of willow and aspen trees, so this was the chosen study area. Layers from the MN Geospatial Commons such as moose range, Land Use & Land Cover 2016, MN Native Plant Communities, and GAP Land Cover were added to the project that already consisted of combining slope, hilliness, hill shade, and aspect into raster calculator to find climate strongholds in Minnesota. In order to connect the climate strongholds and preferred tree habitat, these data layers were combined and, using the reclassify tool, the Land Use & Land Cover data set was specified to target aspen trees and willow stands in the Arrowhead region. The end result is a map depicting climate strongholds in Minnesota that contain a substantial amount of the desired tree species for moose.*

11:50-11:55 am

### **Nature Strongholds: Finding places in Minnesota that are resilient and good choices for conservation**

Elaina Granse, University of St. Thomas

*Abstract: Looking for land to invest conservation money, it is important to think about what that land will most likely look like in the coming years, decades, and centuries. One small pocket of land may seem like an ideal location to invest in conservation for any number of reasons, but if in the following centuries the ecology has changed past recognition, the reasons for conserving this piece of land will mean nothing. Because of this, resilient land should be the first looked for, changing little as time passes. Second item to look for is nature corridors connecting islands of habitat and giving land bound species a chance to migrate from growing inhospitable areas.*

*Looking at Minnesota a model was created to determine where the land was most resilient, from geography such as slope, but also with cornerstone species such as wolves that keep an area's ecology stable. From there was finding non-public lands in the model.*

11:55am-12:00 pm

### **Forest Protection Priorities by Predicted Urban Change in the Twin Cities**

Xavier Abdullahi, University of St. Thomas

*Abstract: The Twin Cities have been experiencing population growth over the past few decades, and that growth will continue based on current projections.*



*Population growth is a significant contributor to urban change, which affects the amount of forest cover. This study uses data from the Metropolitan Urban Service Areas (MUSA) Composite. MUSA depicts current, and future sewer serviced boundaries based on communities' comprehensive plans for a seven-county metropolitan area of the Twin Cities of Minneapolis and St. Paul (Geospatial Commons) to predict urban change. Using the predicted urban change data and estimated climate stronghold areas determined by steepness, slope direction, and canopy cover, this study indicates at-risk climate strongholds due to urban change. These predictions help determine land protection priorities that allow for continued urban growth while considering local stronghold ecosystems to conserve the Twin Cities' forested ecosystems best.*

12:00-12:05 pm

**Access to Parks in the Twin Cities Metropolitan Area**

Rachel Schauer, St. Catherine University

*Abstract: This research focuses on access to parks in the Twin Cities metropolitan area. Urban and suburban parks are important for connecting residents with nature and outdoor recreation opportunities, as well as providing mental and physical health benefits. However, access to parks is not equal for all residents of the Twin Cities. This project locates areas in the seven metropolitan counties (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington) that are underserved by access to parks. Using the Generate Drive Time Trade Areas tool, this project locates areas that are outside of a 20-minute walking distance from the nearest park. The Suitability Modeler tool is used to create an index based on American Community Survey data from 2015-2019. By overlaying these maps, this project locates neighborhoods where parks are less accessible to residents and makes recommendations based on these findings.*

12:05-12:25 pm

**Q&A/Panel Discussion**

**Lunch Break (12:30 pm - 1:00 pm)**

*Please use the lunch break from 12:30-1:00 to nourish yourselves and combat Zoom fatigue. There will be an open Zoom room during this time for freeform breakout session discussions, but there is no expectation or obligation to attend!*

**Concurrent Sessions III (1:00 pm - 2:00 pm)**

**Paper Presentation Times:**

**Session 3A**

*Moderated by William Moseley, Ph.D., Macalester College*

1:00-1:20 pm

**The Future of Bison Restoration in the United States**

Alicia Johnson, Gustavus Adolphus College

*Abstract: While collecting information on ecological restoration pertaining to bison last semester I noticed a deficit in the literature related to the projection of bison restoration in the United States, this is where my research comes in. After obtaining a firm understanding of the current situation of bison restoration in my Research Methods class, I went on to collect qualitative data on the thoughts of “bison experts” in my Geography capstone course. Using the survey method of data collection I was able to ask a range of professionals who work with bison questions about the goals of their organizations, what their thoughts were related to the future of ecological restoration with a bison focus, and what they wished people outside the world of bison conservation and restoration knew about said work.*

1:20-1:40 pm

### **Gardening in Madison, WI During the COVID-19 Pandemic**

Christopher Archuleta, University of Wisconsin-Madison

*Abstract: The COVID-19 pandemic has been affecting people’s social and physical wellbeing. Gardening is a way people have been adapting to the pandemic, as seen in the increased demand and subsequent shortages of seeds. We administered a survey (n=562) to examine how COVID-19 is affecting the cultivation of edible plants in home and community gardens in Madison, WI, focusing on gardening experiences and practices. Gardeners of all levels of experience indicated that the pandemic has impacted their activities. They disclosed various affective responses and practical solutions to these perturbations. Our results also revealed that people spent more time gardening in 2020. Furthermore, data from community garden managers confirmed that there were nearly no declines in community garden engagement. We conclude that our findings reflect gardeners’ adaptations to the pandemic.*

1:40-2:00 pm

### **The Spirits of Nature: Indigenous Ecological Knowledge in the Hidden Valley of Happiness**

Quincy Yangh, Gustavus Adolphus College

*Abstract: In Buddhism, Tsum is one of the seven deep hidden Himalayan valleys. Among the many etymologies of the word ‘Tsum’, one wider known definition is pure or vivid, derived from the literal Tibetan word ‘Tsumbo’. Tsum is also known as Beyul Kyimulung; the hidden valley of happiness. Beyuls were created by the great eighth-century saint Guru Padmasambhava to protect it from degeneration. The Tsumpas, the Indigenous people of Tsum Valley, hold environmental and ecological practices and knowledge that align with Indigenous Ecological Knowledge (IEK) or Traditional Ecological Knowledge and Indigenous geographies discourse. The main goal of this project is to document the prominent ecological knowledge and practices of the Tsumpa community. The main research question of this project is What are prominent environmental and ecological knowledge and beliefs passed down from Tsumpa elders to the current generation of the Tsumpa youth? Through interviews, this research offers a variety of*

*ecological practices and knowledge pertaining to Tsum Valley. This largely includes spiritual-based ecologies and historical ecologies.*

*Key terms: Indigenous ecological knowledge, ecology, Himalayas, Indigenous Geographies*

### **Session 3B**

*Moderated by Laura Smith, Ph.D., Macalester College*

1:00-1:20 pm

#### **Social Dimensions of Urban Mass Timber Housing Development**

Aviva Meyerhoff, Gustavus Adolphus College

*Abstract: Although wood is not a new building material, mass timber, a family of innovative wood products, has gained recent attention as it emerges in U.S. development. Distinct from traditional residential wood construction, mass timber refers to several engineered wood products, consisting of smaller wood pieces conjoined together either chemically or mechanically. Mass timber has gained attention for its environmental sustainability benefits, particularly climate mitigation through its carbon storage potential, causing its visibility to increase for urban development. This research seeks to explore how mass timber has been applied to urban housing development and what role it may play in perpetuating green gentrification. Understanding the role the natural environment can play in built environments is important in the context of climate change and an increasingly urban global population. Additionally, it is important to explore the social implications of such development, interrogating whether systems of green gentrification manifest as a result of the introduction of green and low carbon infrastructure. Drawing on key informant interviews and discourse analysis of mass timber-based urban sustainability discourse, this research seeks to uncover social dimensions of mass timber housing development, with implications in the social and built environments.*

1:20-1:40 pm

#### **Polluted Parishes: Narrating Illness and Industry in Louisiana's Petrochemical Corridor**

Grace Armon, Macalester College

*Abstract: The region between Baton Rouge and New Orleans, mostly populated by Black and low-income communities, is known as Great River Road, the Industrial Corridor, and the Petrochemical Corridor. Health problems attributed to the 130 petrochemical facilities in the region have also branded the region "Cancer Alley." Major companies located in the corridor after buying plantation land, and tax exemptions for industry in Louisiana led to an industrial boom in the 20th century. By the 1970s, residents experienced different respiratory illnesses, cancers, and skin rashes, as well as chemical explosions that came with living close to petrochemical facilities. However, no research ever definitively proved industry's negative health effects. Industry did not deny that health and safety risks existed but did not disseminate accurate information regarding pollution's effects. The corridor also faces continuing development, worsening hurricanes, and COVID-19, which all worsen air pollution and health effects. This project is an historical*

*narrative examining social and historical contexts of how environmental injustices in Cancer Alley originated and are perpetuated. I argue that slavery's legacy, government and industry collusion, failure to provide accurate and timely information to residents, and refusal of officials to listen to residents' concerns all perpetuate environmental injustices.*

1:40-2:00 pm

### **Placement of Cristo Rey Schools in Urban Spaces for Youth Access and Opportunity**

Olivia Bruse, Gustavus Adolphus College

*Abstract: Cristo Rey Jesuit High School in Chicago is the first to employ the Cristo Rey Educational Model, which is now shared between other Cristo Rey Schools across the country, exclusive to urban areas. This educational model functions as a private school, but students attend class for four days a week, and on a fifth day, they work in different businesses and companies in the area to gain job experience before graduation and to support their education financially. There is much more literature available for the Chicago school, which inspired my interest in adding to the literature on the Minneapolis Cristo Rey school. In this project, I will be analyzing placement of the Minneapolis Cristo Rey School, particularly the dynamics of the urban space and community around the school. It is important to understand the cultural, social, and environmental dynamics and complexities in South Minneapolis to then understand the placement of a Cristo Rey school. This opens up details of population demographics, in particular neighborhood household income, poverty rate, race and ethnicity, and X generation in the United States.*

### **Session 3C**

Moderated by Holly Barcus, Ph.D., Macalester College

1:00-1:20 pm

### **Food Sovereignty & The Cuban Agroecological Revolution**

Silas Southworth, Macalester College

*Abstract: The Food Crises of 2007 and 2008 were symptoms of the failed neoliberal world order, which for the last four decades has dominated economic discourse and policy. With 75 million people driven to hunger and yet another 125 million into extreme poverty (Bello 2009, 1), it became abundantly clear that the large-scale industrial agricultural system that was supposed to be the remedy to hunger and poverty had massive shortcomings. Since the early 1990s, pushback against neoliberal structural adjustment policy and its implications on the food security of countries in the global south has been prominent. Small farmers, indigenous communities, and peasants organized and founded La Via Campesina, a social movement with over 160 member organizations mobilized in 72 countries. La Via Campesina is calling for a transformation of an “increasingly industrialized global food system driven by an unjust trade regime and the interests of multinational corporations” (Mann, 2015, 446). What is their alternative? The answer lies in food sovereignty.*

1:20-1:40 pm

**Environmental Racism in Minnesota: A Critical Analysis of Modern Environmental Injustice in the Twin Cities Metro Area**

Emily Schneider, Gustavus Adolphus College

1:40-2:00 pm

**Adoptee Geographies: The Paucity of Knowledge, Data and Resources for Young Adoptees (18-25) in the Midwest at Gustavus Adolphus College, St. Peter MN.**

Kristie Olson, Gustavus Adolphus College

*Abstract: Adult adoptees can be examined in a sense that they are a 'Forgotten Population'. They have continuously represented an underserved identity as they continue to exist throughout time and space. Post childhood adoptees can typically experience the transition to adulthood without adequate awareness, comprehensive knowledge or a sense of affirming methodological support. There is a significant gap in the discernment of realities that project a harmful narrative where adoptees remain a population who are expected to express plethora of joy and elation confined into a vulnerable space of emotional turmoil. I see this time period as a formative chapter in an adoptee's life therefore, I am examining the spaces of higher education at Gustavus Adolphus College and the landscape that is present in rural Minnesota. In this project I explore the following questions: To what extent is there a paucity of demographic data regarding adopted individuals along with archival evidence of supportive programming? To what extent are administrators in the College aware of the need for such a program including its benefits and how does this correlate to the school's commitment to Diversity, Equity and Inclusion? Finally, can Gustavus Adolphus College adopt a comprehensive adoptee program that spans beyond the confinement of the school's Center for Inclusive Excellence in the near future? In conclusion, this research project critically analyzes the sphere of higher education and the feasibility for a private liberal arts institution to cater to the needs of a historically forgotten population.*

**Session 3D**

Moderated by Xavier Haro-Carrión, Ph.D., Macalester College

1:00-1:05 pm

**The Rate of Sediment Change on the Mississippi River Floodplain**

Alexander Lunde, Augustana College

*Abstract: To understand how the world is changing around us it's important to look at the very foundation that controls this world. The soil is an essential component to ecosystems around the world and understanding what is happening to it is necessary for future progress. My Senior Project brought me to the Mississippi River to explore how sedimentation has changed the Mississippi over the last 90 years. This change in sedimentation is caused by the creation of many manmade structures along the Mississippi River and is creating catastrophic problems downstream and many more potential issues in the future. Some of the more prominent manmade structures affecting the Mississippi River come from the United States Army Corps of Engineers and the many levees, locks, and dams created along and within the Mississippi. My research revolved around a number*

*of river islands within pool 18 of the Mississippi and specifically involved digitizing a number of handmade contour maps from the 1930s which were created by the United States Army Corps of Engineers before they implemented all the lock and dam systems along the river. This 1930s elevation data was compared with LiDAR maps from 2011 and manually collected data (by myself) from 2020. The goal of this data was to determine if there are significant changes to the amount of sediment aggradation occurring on these islands by analyzing the change of elevation over time. In the end I determined that over the last 90 years the rate of sedimentation has gone from 1.37 cm/yr to 3.12 cm/yr within pool 18 of the Upper Mississippi River basin.*

1:05-1:10 pm

### **Analyzing Underlying Processes Shaping Minnesota Forest Change**

Alexandra Morrison, University of St. Thomas

*Abstract: Forest cover change in Minnesota is driven by significant land use and land cover change, including logging, agriculture, urbanization, and natural processes. Previous analysis of Minnesota forests indicate spatial variation in forest cover change, presenting areas of forest decline or regrowth. In this study, I aim to determine the underlying processes that influence forest cover change. As forests provide key ecosystem services including climate mitigation, carbon sequestration, and biodiversity hotspots, they are important areas of conservation concern. Understanding the characteristics that influence forest loss and regrowth can help inform future conservation or restoration efforts aiming to protect and regenerate forests. Focusing on Minnesota, USA, I examine the forest cover change over time and determine the areas experiencing loss and regrowth using the University of Minnesota's Annual Canopy Cover (1973-2018) in Minnesota layer. Further, I analyze the comparative variables of vegetation cover, slope, and land cover change to characterize the underlying processes using GIS raster calculator and slope tool. To study the patterns of underlying processes influencing forest cover change, I use the GIS tools of 10k resolution fishnet, zonal statistics, and scatterplot regression analysis. These results will present characteristics that influence forest change and will aid future forest regeneration efforts.*

1:10-1:15 pm

### **Integrating Remote Sensing and GIS into Higher Level Geoscience Education Using Unmanned Aerial Systems and High Precision GPS**

Calvert McCormick, Carthage College

*Abstract: The utilization of drones in remote sensing has been increasing in recent years. This is due to the fact that drones can capture high-quality geographical information at low altitudes using remote sensing technologies, with a higher temporal resolution. Drones provide temperature data, allow for the construction of 3-D visualizations, and obtain data on different bands of light. This helps document vegetation health and can show changes in water depth, among many other variables. In recent years, Carthage College has begun to utilize drones in their Geoscience and natural science courses. A class-specific to drones has been implemented into the Geospatial Science Department, which is titled Unmanned*

*Aerial Systems (Drones). This enables students to learn how to operate drones hands-on. By using drones, Carthage College has given students an opportunity to help create data that can then be used by students in the Geospatial Department. This will allow students to use data locally to Carthage College and will also allow for future studies in multiple GIS courses. This was possible by purchasing a drone through a Wisconsin Space Grant Consortium grant. This project will ultimately allow for the implementation of local drone data into courses offered by Carthage College's Geospatial Department.*

1:15-1:20 pm

**Identifying Climate Resilient Corridors to Connect Native Prairie Sites in Minnesota**

Emily Rash, University of St. Thomas

*Abstract: As climate change shapes the future of Minnesota prairies, finding islands of resilience and connectivity is more important than ever. As a result of climate change, growing seasons may alter or extend slightly. Prairie may be exposed to high temperature, moisture stress, and risk of frost. Elevated temperatures can also increase evaporation of water from the soil, reducing soil water availability. This research uses four components to identify key areas of prairie habitat that will be pivotal for protecting the land. Climate resilient lands were located, then native prairie within these, a Friction of Distance layer was created, and then Cost Distance modelling was used to locate corridors connecting those sites. To do this, I analyzed data from the Minnesota Geospatial Commons such as native prairie extent, DEM, hills, slope, and aspect to find geographically variant areas. The tools used in ArcGIS were Cost Distance, Friction of Distance, Reclassify, and Raster Calculator. This was then compared to larger areas of prairie in Minnesota. The larger the areas of prairie, the more resilient they are. I set my parameters at 10,000 acres or more and examined how connected these areas are. This was then compared to The Nature Conservancy's connectivity data.*

1:20-1:25 pm

**Housing Displacement: The Relationship Between Canopy Cover and Construction**

Justin Lalor, University of St. Thomas

*Abstract: Since the end of World War II, land cover in the Midwest has greatly changed due to increased urban sprawl. This, in turn, inhibits conservation efforts in contiguous areas as the land has been greatly altered and fragmented in a nearly irreversible manner. Thus, this project examines how tree cover in the Metro area of the Twin Cities has changed since 1973. To accomplish this task, this research will examine the change in tree cover over time in relation to various layers, such as parks, roads, land value, and water. Using ArcGIS Pro, this project will use tools such as Raster Calculator and Reclassify to locate changes in the landscape over increments of five years. From this, the research hypothesizes times with high urban development and sprawl will lead to decreased land cover, yet as time progresses canopies will reappear as homeowners and developers plant trees, thus increasing the lost number of trees. However, the original population trees may not*

*equal the amount from 1973 as housing and infrastructure has diminished the amount of land once occupied by trees.*

1:25-1:30 pm

**Mapping Patterns of Change in the Twin Cities Urban Tree Canopy**

Nate Bennett, University of St. Thomas

*Abstract: The urban tree canopy is a critical component to a healthy and beautiful city. Despite efforts to improve urban tree canopy coverage, many cities experience large losses in trees due to invasive species, poor planting decisions, and extreme weather events. As a result, only 50% of the trees planted in urban areas survive to 13-20 years of age when they can provide the most benefits to their surroundings (Roman, 2014). This project assesses the current status of the urban tree canopy and historical tree canopy losses that have occurred within the Twin Cities. Raster calculator tools are used to analyze changes in tree canopy coverage using annual canopy coverage layers from 1973 to 2018. Using a fishnet and zonal statistics tools, patterns in tree canopy change are then compared to historical records of invasive species, extreme weather events, and NLCD land cover layers to identify factors contributing to the current status of the urban tree canopy. Analyzing factors underlying tree canopy change within the Twin Cities can help guide future investments towards locations where trees will be able to survive long-term and provide the greatest benefits to people and the environment.*

1:30-1:35 pm

**Land Ownership and Forest Cover Change in Lake County, Minnesota, 1973-2018**

Rachel Schauer, St. Catherine University

*Abstract: Trees provide important ecosystem services including habitat, carbon storage, and improvements to air and water quality. However, forest cover is threatened by climate change, development, and invasive species. This research analyzes change in forest cover distribution in Lake County, Minnesota within different land ownership categories, including federal, state, county/local, and private, in order to understand how ownership influences forest cover. This project uses annual tree canopy cover data between 1973 and 2018 and the Raster Calculator tool to produce change in tree canopy cover. The Zonal Statistics tool is used to show changes and current forest cover for each land ownership category. This project analyzes which land ownership types have experienced positive or negative changes and the current status of forest cover.*

1:35-1:40 pm

**Analyzing the Relationships Between Population Change, Road Density, and Forest Cover Change in Minnesota**

Sarah Greene, University of St. Thomas

*Abstract: The location and distribution of forests in Minnesota has shifted over the past century as a result of a number of factors including increasing human populations and growing transportation networks. The construction of roads has allowed for population sprawl and increased natural resource exploitation like logging. Forests provide habitat for biodiversity and they play a vital role in the*



*carbon cycle, making them important for climate change mitigation. Understanding the relationship between roads, population change, and forest change provides management insights into strategies to protect forests. The purpose of this project is to investigate the underlying processes of forest persistence, regrowth, and loss in Minnesota. I will use Raster Calculator to create a layer of Annual Canopy Cover change from 1973 to 2018. Using Line Density and Point Density tools, I will calculate the road density and population density. Using a Fishnet and Zonal Statistics, I will create grid cells containing mean values for forest change, road density, and population density. I will then use Scatter Plot Analysis to assess the relationships between variables.*

1:40-1:45 pm

**Analyzing Changes in Development on Forest Canopy Cover in Minnesota's 7-County Metropolitan Area: 1978 - 2016**

Jonathan Mortensen, University of St. Thomas

*Abstract: In the state of Minnesota, the effects of climate change due to excess greenhouse gasses will become increasingly worse, especially when considering increasing levels of carbon dioxide. Forests possess a collective ability to fix substantial masses of carbon within themselves. However, extensive deforestation has diminished their presence, yet we don't know by how much. The Twin Cities metropolitan area of Minneapolis and St. Paul in Minnesota was selected as a study area to observe the effects of reforesting a landscape as development increases. Raster data depicting land use change between 1978 and 2016, including forest canopy cover, was used in conjunction with a 30m digital elevation model of the state, along with polygonal municipal boundaries was selected. Canopy cover and land use from 1978 was subtracted from their 2016 counterparts to determine change via Raster calculator, while the digital elevation model was used to derive slope and elevation above sea level to determine whether patches of untouched forests were "unfavorable" or selectively preserved. Results could indicate a solely negative correlation between increased urban development and forestation, possible positive effects generated by this development, or possibly a mixture of both.*

1:45-2:00 pm

**Q&A/Panel Discussion**