Abstracts

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Celebrating the 100th Anniversary of NESTVAL -
Climate Crisis Just and Liveable World
Salem State University

Luana Dos Santos
Salem State University

A Second Life: Textile Recycling

The United States produces 292.4 million tons of waste a year, of that 17 million tons is textile waste[3]. Companies today produce cheap, unsustainable clothing which allows us to purchase large quantities for a low cost. Low prices and fads encourage us to keep buying new trends and trashing old ones. This cycle of overconsumption, caused by fashion bands, contributes to yearly waste and pollution. The majority of textiles are thrown away, the majority of which can be recycled and reused. The textile industry produces waste and pollution throughout the construction process. Massachusetts is trying to increase the amount of textiles recycled by implementing new laws and regulations. Recycling reduces disposal cost, energy and material use. Around 95% of textiles can be recycled, 5% being contaminated, but the majority is trashed and ends up in landfills. When recycled nearly 100% of textiles can be reused in various ways. This project looks into the benefits of recycling as well as its restrictions, weighing the pros and cons of systematic waste and disposal. Providing insight on how to increase global recycling, and upcycling. *Keywords: recycling, textiles*

Frankie Mulcare
Salem State University

A Tale of Two Forests: The Amazon and the Menominee

Timber farming is a lucrative business in Brazil, with many farmers taking advantage of the Amazon rainforest and its biodiversity. By 2016 in the state of Pará, legal logging operations harvested 17.3 million cubic meters of forests across 314 species (University of West Angila, 2016). This doesn't even account for the vast amount of illegal logging that occurs in Pará, around 78% of logging documented in the state by satellite imaging was found to be illegal between 2011 and 2012 (Butler, 2013). It would be impossible to stop the timber industry entirely in order to protect the environment but timber farmers can work towards making their industry more sustainable. This research aims to find methods of sustainable forestry in the Amazon through a comparative case study between farmers in the Amazon and those of the Menominee tribe of Wisconsin, who have famously found ways to maintain a biodiverse forest while harvesting timber through principles of reciprocity. The Amazon is a critical carbon sink and home to lots of biodiversity that needs to be maintained. Although there is no way for

the timber industry in the Amazon to be 100% sustainable after the damage that has already been done, an effort still needs to be made. It will be a difficult transition to make but the Menominee tribe have proven that one can be sustainable and lucrative if they value nature from a lens of reciprocity rather than that of something to be used and sold. *Keywords: cAmazon, sustainability, forestry, timber, Menominee*

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Ancient Underwater Insights from a Relic Forest in Southern Québec

After centuries of commercial logging in southern Québec, nearly all old growth forests have disappeared. Even before forestry was modernized, lakeside forests were radically altered throughout the province by a logging method called *la drave*. Lumberjacks would use water highways to transport valuable lumber from deep inland out to international markets. Industrialists made this possible by building a dam at the outlet of a lake in order to flood the landscape upstream and enlarge all the rivers. *Les Draveurs* would then shape lumber from nearby forests into rafts and steer the wood down the watershed to commercial waters. This dangerously lucrative system destroyed virtually all the pre-industrial lakeside forest ecosystems of this bioregion. Old-growth eastern white cedar forests (Thuja occidentalis) used to dominate the lakeshores in the Lower Saint-Lawrence region of Québec. Today, only a handful of these forest types remain unscathed from forestry. For dendrochronologists, the ancient forests can unlock prehistoric information about the regional ecosystem and climate. With the help of ancient trees preserved on the shoreline's lakebed, nearly a millennium of environmental history can be inferred. Dating the ring widths of these lakeside trees and studying the patterns of growth common among them reveals important insights into the dynamics of these relic forests and their connection to past climate changes. These insights can inform better stewardship of the land in a warmer future, leading the way to the potential restoration of a stable forest-type once common before the anthropocene. *Keywords: dendrochronology, forest ecology, Quebec, cedar, paleoclimate*

Theresa Cocola
Southern Connecticut State University

Assessing Sustainable Consumption Behavior: A Case Study of Starbucks, Newington, Connecticut

Human behavior change is key to reducing the severity of climate change therefore research in this field is necessary and invaluable. There are numerous theories and techniques that have been researched in this field. One such technique is tailored information. This is specific information tailored to an individual's behavior. The information is given with the hope that

it will change the individual's behavior. The purpose of this study is to explore and evaluate the effect tailored information has on the purchasing habits of customers at Starbucks Coffee Company. This research will indicate whether tailored information alters the sales records are Starbucks regarding dairy consumption. Dairy consumption is a behavior which has been deemed unsustainable compared to non-dairy alternatives due to the impact dairy production has on land use, emissions, and freshwater use. The tailored information will be communicated through signage posted in two locations in the store which are located before the order station. The results gained from this research will provide data which can be applied to policies and practices of Starbucks Coffee Company to guide and influence consumer behavior in a way that will increase sustainable purchasing practices. This is a micro case study and influenced by the demographics of the Starbucks at which the study is taking place at. The conclusions found in this study can be replicated on a larger scale and in a multitude of business settings. *Keywords: Behavior change, Tailored information, Dairy consumption, Starbucks*

Lucy Fleming, Nicole Buckley, Danielle Hall, Shradha Birdika, and Charlotte Zieselman
Clark University

Assessing Tree Canopy, Temperature and Air Quality in Rhode Island

Within the urban environment, trees are an important component of the natural systems that impact the wellbeing of residents. The benefits provided by urban forests are predominantly witnessed in energy savings through canopy shading of impervious surfaces and temperature regulation via evapotranspiration. Other benefits include aesthetic appeal, increased property values, windbreaks and noise reduction, storm water interception, carbon sequestration, and pollution mitigation. Understanding how tree canopy cover is distributed throughout cities and how trees may impact residents can inform urban tree planting programs to best serve residents and redistribute environmental burdens and benefits more equitably. This study examined how trees can impact heat and air quality in four locations in Rhode Island. The Human-Environment Regional Observatory (HERO) team collaborated with Groundwork Rhode Island, a non-profit focused on building urban resiliency. The main findings of this study showed that trees planted by Groundwork Rhode Island, have survivorship rate of 92.55%, demonstrating that their model of tree planting program has been successful to date. Additionally, the urban heat island effect was reduced by 1°F with every 4-inch increase in tree diameter at breast height (DBH). *Keywords: Tree canopy, Rhode Island, Urban Heat Island*

Charlotte Whyte
Concordia University

Beyond the Norse: Fieldwork for the Environmental History of Indigenous and Nordic Occupation at UNESCO World Heritage Site L'Anse aux Meadows, Newfoundland

My MSc research will focus on reconstructing past environmental changes and possible direct human impacts at the L'Anse aux Meadows UNESCO World Heritage site in Newfoundland, Canada. The goal of my project is to provide vegetation and climatic context for the long-term Indigenous and brief Norse settlement on the northern tip of Newfoundland during the past 2,000 years. Although archaeological evidence indicates the site was occupied episodically by Indigenous people for 5,000 years, past research has focused almost exclusively on the relatively short period of Viking occupation. In contrast, there is currently very little research on the much longer Indigenous occupation of the area. To fill this knowledge gap, I collected a lake sediment core near the site in August, 2022, and will analyze it to document past vegetation changes and possible human impacts, focusing on the pre-Columbian period. Using pollen, micro-charcoal, sediment grain-size analysis, XRF-scanning, terrestrial plant macrofossils , and aDNA preserved in the core, together with radiocarbon dating to provide a core chronology, I will reconstruct past vegetation and environmental changes before, during, and after the main periods of Indigenous and Norse occupations. My research will be integrated closely with the data currently being generated by an archaeological team from Memorial University of Newfoundland studying both the Indigenous and Norse settlement of the area. With my work, we hope to better understand the ecological conditions of Indigenous and Norse interactions and match climate reconstructions to human adaptations. *Keywords: L'Anse aux Meadows, paleo-environment, late Holocene, Newfoundland, Norse settlement, Indigenous settlement*

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Biodiversity Impacts of a Potential Climate Change Mitigation Strategy for the Shellfish Aquaculture Industry

Multi-species ocean farming is an emerging aquaculture technique that produces sustainable food sources whilst potentially aiding in mitigating ocean acidification and hypoxia impacts. This ocean farming model co-cultures seaweed and shellfish, and can potentially lead to increases in pH and oxygen that offset acidification and hypoxia. The multi-tiered shellfish cages and suspended seaweed lines used in this aquaculture technique may provide habitat for other species and could increase local biodiversity. The goal of this research is to evaluate potential benefits of multi-species ocean farming by documenting biodiversity changes associated with a commercial eastern oyster (Crassostrea virginica) and sugar kelp (Saccharina latissima) farm located off the coast of Martha's Vineyard, MA. A combination of video analysis and

environmental DNA (eDNA) metabarcoding is being used to quantify biodiversity. GoPro cameras are deployed monthly to collect video in neighboring ocean plots with and without farming activity. Seawater samples are also collected monthly from the two sites, which are filtered, the genomic DNA extracted and sequenced to determine species presence. Preliminary video results suggest that the presence of aquaculture equipment increases species abundance and diversity compared to the ocean plot with no aquaculture equipment. The most common species observed were Scup (Stenotomus chrysops), Threadfin Shad (Dorosoma petenense) and Atlantic silversides (Menidia menidia). These video recordings complement our coordinated environmental DNA (eDNA) analyses and will shed light on the potential for multi-species ocean farming to be an effective mitigation approach for the shellfish aquaculture industry in the face of climate change. *Keywords: eDNA, aquaculture, video analysis, multi-species ocean farming, biodiversity, climate change*

Ella Speidel
Salem State University

Boston Zoning Needs Sustainability

The Zoning Board of Appeal (ZBA) - Boston Planning and Development Agency (BPDA) design review is a process that ensures the maintenance and enhancement of existing character in neighborhoods as exterior alterations, additions, and new construction are proposed. Boston Zoning Code protects distinct Boston neighborhoods from the development of buildings an uses that congruous with their surrounding context. Along with these considerations of maintaining character, zoning should also consider sustainability to ensure the survival of Boston neighborhoods and infrastructure as climate change threats worsen. The three main climate hazards that Boston faces are extreme heat, frequent stormwater flooding, and coastal and riverine flooding. This research will identify ways in which the ZBA-BPDA design review must consider sustainability in terms of Boston's main hazards. There will be an assessment on the content of the ZBA-BPDA design review content and guidelines while identifying opportunities for sustainable considerations in terms of heat and flooding. Residential facades and sites should use water resistant materials, adequate windows for heat and storms, and sufficient setbacks to mitigate flooding. Commercial developments should preserve architectural details while planning for climate risks, utilize landscape buffers as flooding prevention, and employ natural coverage to dispel discomfort during extreme heat. The city of Boston must expand zoning guidelines to promote sustainability through the ZBA-BPDA design review to limit damage of extreme heat, stormwater flooding, and coastal and riverine flooding. It is necessary to both maintain integrity of Boston neighborhoods during development and construction, while also considering sustainability in the urban environment. *Keywords: zoning, sustainability, climate change, development*

Stephen Axon
Southern Connecticut State University

Breaking Blue: Establishing Comprehensive Policy for a Just and Inclusive Transition for the Blue Economy

At a time of substantial interest in the Blue Economy, it is surprising that sustainability dilemmas and justice components are not well integrated within its policy arena. Reviewing several existing U.S. coastal and marine policies, this paper identifies that justice and equity components are essentially missing and advocate for a comprehensive policy framework for a just and inclusive transition for the Blue Economy. Looking forward, this paper reviews and critiques the policy proposal of Senator Elizabeth Warren's Blue New Deal which emerged from the 2020 U.S. presidential campaign. While the current state of the Blue New Deal remains uncertain, we indicate that such a policy framework would integrate justice, equity and inclusivity as part of operationalising the Blue Economy. Given that a comprehensive marine policy framework such as the Blue New Deal is relatively new, this paper concludes with recommendations for how U.S. policies can better incorporate equity, justice and inclusion and how this can be mainstreamed in the Blue Economy. *Keywords: Blue New Deal, Blue Economy, Blue Justice, Governance, Sustainability*

Adam Gallaher, Marcello Graziano, Stephen Axon, and Amanda Bertana
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Breaking Wind: A Comparison Between U.s. and European Approaches in Offshore Energy Leadership in the North Atlantic Region

The United States has only recently begun investing in commercial-scale offshore wind energy (OWE). Although the United States is slow to progress, it is uniquely positioned to build on the existing knowledge that coastal European countries have applied for their own energy transitions. In this study, we analyze how federal and regional plans for expanding the OWE sector in the United States brought to the surface decade-long tensions related to multi-scale governance mismatches, jurisdictional conflicts, and unclear pathways for implementing national industrial policies. Drawing upon the European experience with OWE, we employ a dynamic multi-level perspective framework enriched by socio-ecological elements to examine the United States energy transition through its most promising technology. From our framework we identify six categories of OWE developments characterized by both unique and shared elements between the United States and European coastal countries. These elements are: (1) role of local communities, (2) governance structures, (3) multi-scale government interactions, (4) regional socioeconomic structures, (5) socio-ecological impacts, and (6) relationships with existing industries. Drawing upon our analysis, we identify and conceptually map four research areas in need of further development for the United States and the research

community— (1) knowledge, (2) potential, (3) adaptation, and (4) learning. These insights provide critical information to ensure that the United States expansion into offshore energy generation is characterized by elements of justice, equity, and inclusive regional economic development. *Keywords: offshore wind energy, just energy transitions, blue economy, multi-level perspective, comparative analysis*

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Calhau River: A Physical-Chemical Diagnosis of its Spring, Medium and Low Course

Environmental monitoring is an important strategic resource for the maintenance of natural resources, environmental planning and the promotion of public policies for a better understanding of the relationship between the growth of urban centers and the environment. Notably, there are several cases of water bodies that end up directly impacted by the lack of urban planning, and history tells several cases of large epidemics caused by the contamination of water bodies. The rapid urban expansion of São Luís follows nonsense with the planning of effluent collection networks, drainage gutters and other civil construction artifices to intercept negative contributions in its water bodies. For the present work, the study area was delimited to the Calhau River basin, from its sources in the Vinhais and Alto do Calhau neighborhoods, through the meeting of waters near Avenida dos Holandeses to the river mouth in the Avenida Litorânea region, summer resort and frequently visited by the population. Multiparameter monitoring being carried out at different points of the river for its characterization and environmental diagnosis between January and August 2021. *Keywords: Environmental Monitoring, Calhau River, Effluent, Urban Planning, Environmental Impact.*

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Climate Change in the Arctic: Fear, Hope & Ignorance

Are we just lemmings jumping off a cliff?
Simon (2016), you might have been right after all. *Keywords: Arctic, Climate Change, Blue Economy, Arctic Circle Assembly*

Ashley Benitez-Ou
University of Connecticut

Climate Change Policies and Social Vulnerability in the Metropolitan Region of Curitiba, Brazil

Currently, one of the most important challenges in adaptation planning is the development of robust approaches for measuring the progress of implemented interventions. This study explores if and how climate change and related environmental policies have addressed the needs of vulnerable populations in the municipalities of the Metropolitan Region of Curitiba. In this study, the spatial and temporal patterns of natural hazards (from 2011 to 2021) and a social vulnerability index (developed by the Atlas of Human Development in Brazil) are analyzed and compared with the resulting policy patterns from a previous study. In the previous study, is uncovered that climate-related policies are concentrated in municipalities with a higher urban population, GDP, and environmental and urban management budgets. Meanwhile, rural municipalities, appear underserved in the context of local adaptation. Preliminary results of this study show a high rate of natural disasters with high economic and social impacts. In the MRC, some types of disasters, such as droughts and flash floods, occur more frequently. These impacts are mostly concentrated in the city of Curitiba, where the most vulnerable populations reside. Although progress is picking up the pace with initiatives like the Parana's Climate Change Program, it is imperative to continue understanding the socioeconomic and political dynamics of climate change adaptation. *Keywords: climate change, social vulnerability, disasters, policies, Brazil*

Charles Button
Central Connecticut State University

Climate Change, Warming Ocean Currents, Spawning Points & Diffusion Patterns of Hurricanes in the Atlantic Ocean Basin

The UN Intergovernmental Panel on Climate Change has stated, through numerous reports and presentations, that hurricane strength and frequency has, and will continue to increase due to human-induced global climate change. This research will share results of initial research that demonstrates that hurricane spawning points have been shifting latitudinally (i.e., northward) and longitudinally (i.e., westward) in a spiraling pattern as the water temperatures of the Atlantic Ocean continue to rise. *Keywords: climate change, global warming, hurricanes*

Eve Vogel
University of Massachusetts – Amherst

Connections, Contradictions and Contests of Low-Carbon Electricity: Lessons from Massachusetts' Drive for Hydro-Quebec Power

This paper outlines the just-published Introduction for the 2020/2021 Northeast Geographer special issue, *Quebec Hydropower for a green Massachusetts? Connections, contradictions and contests of electricity*. The paper situates the reader geographically, first in Québec, where Hydro-Québec is completing a large four-dam hydropower construction project on the Romaine River, in the territory of the Innu First Nation, a river they call the Unamen Shipu. The electricity must travel hundreds of miles through new transmission lines across the northern woods to connect to southern Quebec and one of the northern New England states, before it can connect to densely populated Massachusetts, the state that is the policy driver and financial source for much of this construction. The seven special issue articles show that in Quebec, agreements were signed with Innu bands, enabling construction, but the effects have been a mixed blessing; while in New Hampshire and Maine, major political battles erupted, and a transmission line has not been built; and in Massachusetts, policymaking and advocacy focused mainly on decarbonization targets, not these potential distant impacts or negotiations. Collectively, they reveal that the political-geographical organization of decision-making across these different spaces is shown to shape renewable energy development and the distribution of benefits, profits, costs, and impacts. Three theoretically informed themes are drawn out as inherent in the use of large-scale renewable electricity from remote locations as a route to climate mitigation: spatial and material linkages (connections), political economies and political ecologies (contradictions), and divided political geographies (contests). *Keywords: hydropower, Hydro-Quebec, energy justice, energy transition, energy geographies, Massachusetts, clean energy*

Shaina Sadai and Delta Merner
Union of Concerned Scientists

Designing Litigation Relevant Research: The Attribution of Sea Level Rise to Industrial Carbon Producers

The courts have become a critical venue for addressing climate change and holding the corporations most responsible for rising greenhouse gas emissions accountable for their actions. However, litigation is much stronger if it is informed by robust and meaningful research, and there is a clear need for more corporate attribution research focusing on localized impacts. Here, we will present:

- New methodologies for assessing how emissions attribution work can assess damages from sea level rise at the local level,
- Demonstrate how research from the physical and social sciences can be designed to better inform litigation, and

• Share insights and opportunities for ongoing engagement from the nexus of science and litigation.

Geography as a discipline is uniquely suited to lead on litigation relevant research through applied geographic work that combines strengths from the physical and social sciences to engage with meaningful and transformative solutions. We invite discussion on these proposed methodologies and additional tools the geography research community might need to engage deeper with the types of applied geographic research that could inform climate litigation. *Keywords: sea level rise, litigation, corporate attribution, climate change*

Hanah Speroni
Salem State University

Driving Forces to Slow C02 Emissions

Driving will always be a large part of everyday life. From people going to work, traveling to see family or simply going to the grocery store. C02 emissions are hurting our planet and a direct influence is the automotive industry and juts how many people are on the road. Focusing on a way to transition out of this dependency of using cars for all modes of transportation will significantly help our planet. *Keywords: Cars, Driving, C02*

Syma Ebbin and Nathaniel Trumbull
University of Connecticut

Fishing for Space in the Blue Economy: Conflict and Cooperation among Fishing, Aquaculture and Wind Industries in Southern New England Working Waterfronts

Working waterfront space is limited, leading to competition for coastal space among waterfront dependent, and non-waterfront dependent industries. The ascendance of offshore wind energy in the US is squeezing already scarce port resources, exacerbating competition for these spaces, and generating conflicts. The Biden administration's prioritization of wind energy generation has augmented demand for port space to serve as production, staging and marshalling areas for this offshore development. Although the development of wind power will occur offshore, Southern New England ports are anticipating port use by wind companies. This paper focuses on the competition for waterfront space among the fishing, aquaculture and wind industries in select ports in this region. As part of the Blue Economy, the wind power industry is seeking to reshape port usage, generating both winners and losers. This paper explores the processes by which port space is being (re)allocated and examines the generation of conflicts and cooperation among competing stakeholders. *Keywords: Offshore wind, working waterfronts*

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Flood Adaptation to Advance Climate Justice — Insights using Deep Learning

Flooding causes nearly a third of losses from natural disaster worldwide (WHO, Reuters 2022). An increasing body of evidence shows that underserved sectors of the population bear the brunt of this loss(Hallegatte,2015, Santanna,2018, Zhang,2021) Hence, as communities struggle to fund and implement adaptation actions to combat sea level rises and extreme weather events(Ward,2014, Wahl,2015, Alfieri,2016), they must strive towards equity and climate justice. In this paper, we aim to guide these policy decisions and evaluate not only whether our climate adaptation actions are effective but also for whom. In this paper we use the Community Rating System Program aimed at increasing communities flood adaptation nation wide to evaluate the benefits of such adaptation interventions as function of socio-geodemographic characteristics. We take a data-driven approach that exploits the statistical power of the National Flood Insurance Program (NFIP) dataset and the latest advancements in Deep Learning to examine the effectiveness of the CRS in relation to communities' characteristics such as income, flood proneness, and population. Our findings lead to two key considerations for policy makers seeking to advance climate justice goals while improving flood adaptation. First, communities with fewer resources benefit from flood management interventions. Thus, these interventions will be crucial in curbing climate exacerbated inequalities. Second, climate justice goals may be hampered by a one-size-fits-all approach. Overall, our findings demonstrate that flood adaptation programs must be evaluated from a climate justice lens, examining not only whether they work but also for whom. *Keywords: flood adaptation, climate justice, deep learning*

Helen Sajo
University of Massachusetts – Amherst

Fortressing in Baton Rouge, Louisiana And its Racial Implications

Baton Rouge is the diverse capital of Louisiana, home to approximately 453,000 residents. With the claim of being "two-thirds of the revenue to the East Baton Rouge Parish government with only one-third of that government's expense in return," according to their website, the residents of the proposed area of St. George voted to secede from East Baton Rouge Parish, and become their own parish, which includes having their own government and school system. The incorporation of the 60-square mile area went through mid-October 2019 with 54% of voters supporting the proposition of St. George, taking away control of the area's taxes, schools, and other public services from East Baton Rouge. The people leading the effort claim that the incorporation of this new city will benefit all of the surrounding areas, and they have been advocating for St. George since early 2012. The Chairpersons leading the St. George campaign also claim that this initiative was founded because the residents of the proposed area were "dissatisfied by the quality and cost of services from the City-Parish governance model in East Baton Rouge Parish, the quality of the institutions that the governing elite created, to

particularly include the K-12 educational system, and the disparity in political influence enjoyed by the people of the southern part of the parish." In reality, the main reasons for this split are racial bias, public school systems, and economic development and will leave lasting effects on the East Baton Rouge Parish community. *Keywords: racist geographies, economic geography, city planning*

James Hayes-Bohanan and Robert Amey
Bridgewater State University

Geographic Literacy in NESTVAL's Second Century

While it has been common to decry widespread geographic illiteracy in the United States, the most obvious remedy -- teaching geography -- continues to prove elusive at many levels. For NESTVAL to be a viable organization for a second century, it is incumbent on academic and professional geographers to involve ourselves in K12 geographic education. This presentation describes approaches we have taken at Bridgewater State University -- many of them in collaboration with NESTVAL colleagues. We then invite a discussion of how to open NESTVAL's second century with more effective outreach, advocacy and support for geography education at all levels. *Keywords: geographic literacy, geography education, geography outreach*

Kevin Bean
University of Massachusetts

GIS Capacity in ASEAN vs ECOWAS

As GIS education becomes a more important aspect of interdisciplinary education it is important to see who is gaining access to this training and where. Two regional entities ASEAN (Association of Southeast Asian Nations) and ECOWAS (Economic Community of West African States) are responsible for regional cooperation on a variety of issues involving trade, education, and environmental management. GIS is a tool which can help facilitate all of these activities, yet the implementation of GIS education in these areas is as of yet not quantified.

The goal of this paper is to establish a region by region comparison of where GIS education is in each regional organization. With this analysis we can establish a baseline for where each regional body stands and see what goals are feasible given the existing infrastructure. *Keywords: GIS, education, Africa, Southeast Asia*

John Hayes
Salem State University

Government and Think Tank GIS Data Viewers in Geography & Sustainability Instruction

The fields of natural resource management, environmental impact assessment (EIA), climate change science and policy, food systems and the environment, and sustainability science all require spatial thinking. A dilemma that can occur for Geography programs is whether or not to have a GIS course prerequisite for courses in the topics listed above. In the case of Salem State – we enjoy having majors in Biology, Geology, Political Science, and other majors take our upper-division classes in these fields. If we have a GIS course prerequisite, it is a hurdle for these students and our enrollments suffer, sometimes preventing the class from running. For my classes in the fields listed above, I have always included GIS content, showing the value of both remote sensing and GIS to the management of natural resources, the practice of EIA, etc. For many years I have included applied GIS exercises using MassGIS's OLIVER and MORIS geographic data viewers. Students are exposed to GIS overlay analysis and geographic data layers for real-world investigations and analyses – with a learning curve that can be accomplished in one class. This presentation will show examples of the use of OLIVER (now MassMapper) and MORIS in geography and sustainability instruction. Examples of sea level rise and coastal flooding GIS viewers from think tanks and other government agencies will also be discussed. *Keywords: GIS applications, GIS data viewers, environmental geography, sustainability, climate change impacts, applied science pedagogy*

Ana Emlinger[a] and Keith Ratner[b]
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How Online Classes Exacerbate the White-Latino Achievement Gap, and What to do About it

This presentation is a follow-up to the findings obtained from the Immigrant Voices survey conducted at Salem State University during the Spring 2020. In this research, different examples of teaching practices were found that may not consider the real world situation of immigrant students. In this presentation, several of the results of the Immigrant Voices survey will be shared. This will be followed by a description of the concept of a "socio-cultural lens." Specific examples of how online classes can exacerbate the White-Latino achievement gap will be shared next and concluding the talk will be a presentation of some potential teaching practices that aid in designing and facilitating online classes through a socio-cultural lens. *Keywords: gEducation, Latino*

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Investigating Spatial Temporal Changes in Firearm Discharge During the COVID-19 Pandemic: Case of Hartford, Connecticut

The COVID-19 pandemic and the associated government policies profoundly impacted many aspects of our society, including neighborhood security and violence. In this study, we seek to answer two questions. First, how have gunshots changed over the last few years, especially in 2020, in relation to the COVID-19 pandemic in Hartford, Connecticut? Second, what were the underlying variables that may have impacted gunshots' frequency and spatial distribution during the pandemic? To accomplish this, we analyzed the trends in ShotSpotter Acoustic Detection System data in Hartford, Connecticut, to identify spatial and temporal trends between January 2017 and December 2021. We found the highest rate of change (59% increase) occurred between 2019 and 2020, coinciding with the COVID-19 pandemic. We then examined the relationship between this observed change and SafeGraph cellphone mobility data to see how changes in mobility associated with the pandemic coincide with changes in gunshots. Finally, we evaluated these changes with variables from the Social Vulnerability Index at the census tract level. The results and discussion show the impact and possible influences of gunshots and associated neighborhood violence during the pandemic and may help policymakers, law enforcement, and healthcare providers address this public health problem.
Keywords: COVID-19, Firearms, Social Vulnerability, Mobility, ShotSpotter, Connecticut

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Investigating the Feasibility of Culturing a Summer-Growing Species, Gracilaria tikvahiae, to Supplement the Emerging Seaweed Industry in the Face of Climate Change

The U.S. seaweed industry is worth $300 million and is currently dominated by the winter-growing species *Saccharina latissima*. As climate change is warming our oceans, new seaweed species are needed to maximise productivity, grow the industry and diversify income. *Gracilaria tikvahiae* is a native summer-growing species which naturally grows in 20-28°C seawater temperatures in nutrient rich areas along the East Coast U.S. This seaweed species also has high market appeal as a food product and also in the phycocollid industry. *Gracilaria tikvahiae* has been successfully cultured for decades in Asia, however, it is not currently commercially grown in the U.S. This research is investigating different light sources and temperatures to determine the ideal culturing conditions for *Gracilaria tikvahiae* with a focus on practicalities for seaweed farmers. Specifically, we are culturing *Gracilaria tikvahiae* under natural light in a greenhouse and under LED lights in a laboratory to determine which light source facilitates

the fastest growth. To determine the ideal seawater temperature conditions for culturing this seaweed species, we are maintaining three treatments in the laboratory at the lower (20°C), mid (24°C) and upper (28°C) end of their temperature tolerance range. In the greenhouse, we are maintaining the minimum temperature of two treatments at the lower (20°C) and in the mid (24°C) of their temperature tolerance range. This experiment will provide insights into the feasibility of commercially growing this economically viable summer-growing seaweed species, which could supplement the budding winter-growing sugar kelp industry as our oceans continue to warm with climate change. *Keywords: seaweed industry, Gracilaria tikvahiae, climate change*

Maddison Ogorzalek
Salem State University

Is Wind Energy Viable?

A new offshore wind industry is, officially, being built in Salem, Ma. I will be looking into the details of the wind industry and if it's a suitable sustainable industry to be located in Salem. Is the offshore wind marshalling yard around the Salem Harbor Footprint property even worth building? How will this new industry exactly endorse a greener living in Salem? Looking into all the gritty details that come with shipping materials, jobs, and how the industry as a whole could be more sustainable. I will be taking a look at the location it will be being built upon and if it deemed a suitable area. Can this new piece of machinery offer the locals in Salem a greener sustainable way of living and how it will affect other factors of the locale. *Keywords: sustainable, green living, cause, effect, consequences, opportunities*

Ian Bergemann
Southern Connecticut State University

Long-Term Water Quality Monitoring at Outer Island, Branford, CT

The Long Island Sound has been a historically significant marine natural resource for Connecticut's economy, residents, and native species. Despite its recognized value, water quality monitoring has only been conducted by a handful of government agencies, nonprofit organizations, and academic institutions. Among those is Southern Connecticut State University's Outer Island water quality monitoring program which began in June 2013. The island is located 3 miles from the coastline of Stony Creek, Branford, Connecticut, and within the Thimble Islands. Local businesses and recreational boaters utilize the island chain during the summer for fishing and tourism. The study aims to enhance our understanding of annual trends in water quality in Long Island Sound, as it may have a critical impact on local ecological and economic systems.

The Outer Island water quality monitoring program has been conducted daily every summer (June-August) for the past 10 years. The study parameters include dissolved oxygen, salinity, water temperatures, specific conductance, turbidity, and pH. Due to variations in Island

Keeper intern engagement dates, complete data sets could only be established for the month of July for each year. Monthly means were calculated for each water quality parameter and regression analysis was used to determine trends over the past 10 years. This study and its results demonstrate the critical need for analyzing long-term seasonal trends in the marine environment, especially in areas of high recreational and economic activity which depend on that same environment. *Keywords: Long Island Sound, water quality monitoring, long-term monitoring, Connecticut*

Matthew McCourt and Paul Frederic
University of Maine – Farmington

Mapping Western Maine's Changing Villages and Hamlets

Villages, hamlets and other rural settlements have undergone dramatic changes over the past century and a half in northern New England. In many small 19th century settlements, waterpower supported clusters of manufacturing activity, alongside a variety of commercial and civic functions, in communities of approximately 50 to 350 residents. Multiple social and economic forces have led to concentration and relocation of these manufacturing, commercial and civic functions outside rural settlements, with far-reaching consequences for residents.

This collaborative project maps historic settlement patterns in 20 western Maine small towns, villages and hamlets, in order to analyze their changing spatial form. Alongside additional investigations using interviews, surveys, archival research, and rephotography, this geospatial study links the changing form of Maine's villages and hamlets to the lived experience of small rural places. *Keywords: Maine, geospatial analysis, rural geography*

Richard Kujawa
Saint Michael's College, Vermont

Meet the Ferals; Pigs That Is: A Story of Space, Place and Power

Widely regarded as the *perfect* invasive species, feral pigs are opportunistic mammals with a complex and growing impact on an array of places and landscapes. Conventional and social media, reality television, and Federal and State policy education/communication channels have been among the venues raising the species' profile. In this paper I present ideas on the origin, diffusion and current geographies of feral pigs. Using insights from interdisciplinary animal studies, I examine historic and contemporary accounts of feral hogs as both an economic asset but also a threat to agriculture, endangered species, ecosystem integrity, and human health and safety. My exploratory work documents considerable heterogeneity and contradiction in state-level policy venues which vary from resistance to government-sponsored trapping and hunting bans (Missouri) all the way to state-approved voyeuristic experiences of hunting with high powered, semi-automatic weapons from helicopters (Texas). Drawing on academic, policy,

journalistic, commercial, and popular culture discourses I explore the ways in which feral pigs, in common with other invasives, have become both the objects for elimination using hunting, trapping, and poisoning but also a focus for sustained popular curiosity. *Keywords: animal studies, human-environment relations, environmental policy*

Ian Bergemann
Southern Connecticut State University

Multi-comparison of Mapping Methods for a Highly Dynamic Natural Perched Beach, Guilford, CT

The Connecticut coastline is considered a valuable economic and natural resource, however, impacts of seasonal erosion and sea level rise pose significant threats. The monitoring of local beaches to assess these threats remains a mixed method of beach surveying by non-profit organizations, state and federal departments, and academic institutions. Starting in the Fall of 2021, Southern Connecticut State University faculty began using Unmanned Aerial Vehicles (UAVs) to monitor a unique natural perched beach in Chaffinch Island Park, Guilford, CT. This site was originally documented in 1978 by the town of Guilford and identified as a natural perched beach that appears to be migrating landward at an unknown rate. The study has evolved into a graduate research thesis that aims to enhance coastal monitoring practices by comparing multiple methods of mapping a highly dynamic beach environment.

The thesis compares 4 different methods of mapping the beach at Chaffinch Island in 2016, 2021, and 2022. UAV or drone flights were processed with Pix4D software to produce ortho-mosaic Digital Surface Models. The data was imported into ArcGIS along with LiDAR imagery for further analysis and volume comparisons. An Electronic Total Station and Emeri Method were utilized to capture an evolving beach profile and volume for a single transect. The study and results demonstrate diverse and cost-effective methods of monitoring and mapping a highly dynamic coastline. This is especially important as accessible methods for continuous monitoring of coastal environments will be required as climate change exacerbates local erosion and sea level rise. *Keywords: coastal monitoring, drones, UAVs, coastal erosion, Connecticut, perched beach*

Judith Otto
Professor, Environment, Society, and Sustainability Department, Framingham State University

New England, Student Equity, and the Future of Regional Geography

Courses in regional geography have traditionally exposed university students to the diversity and variety of human experience around the world. Closer to home, courses about one's home region can offer new perspectives on familiar surroundings. I am spending my current sabbatical preparing an open-access textbook for teaching the Geography of New England. This resource will provide low-cost, universally-accessible educational materials that are

flexible and can be customized in the future by other instructors. As currently envisioned, the textbook foregrounds environmental changes and planning strategies for a sustainable future as pathways to re-engage students with the discipline of geography. It also seeks to tell the stories of those who have traditionally been marginalized in our communities. I welcome suggestions and recommendations from colleagues on this ongoing project. *Keywords: New England, sustainability, regional geography, diversity and inclusion, open educational resources (OER)*

Nathaniel Trumbull, Carol Atkinson-Palombo, and Syma Ebbin
University of Connecticut

Offshore Wind Blows Ashore: Community Acceptance of Offshore Wind's Onshore Presence in Southern New England

The overarching research questions that we address in this paper are: How do coastal communities in Southern New England regard the siting of cables and sub-stations associated with the development of offshore wind (OSW) energy; how and why do these opinions differ across locations; and how might these perceptions affect the timing and overall feasibility of OSW energy development targets? The states of Connecticut, Massachusetts, and Rhode Island have adopted ambitious wind energy procurement goals and are relying on OSW to help meet their decarbonization targets. From a technical perspective, OSW technology has been deployed around the world perhaps leading one to assume that it should be relatively straightforward to deploy along the coast of the United States. However, whether US states will be able to achieve their OSW energy goals is predicated upon the multi-dimensional concept of social acceptance of OSW technology by coastal communities. This involves securing acceptance from municipal and regional governance institutions, acceptance by business in the realm of markets and innovation, as well as from residents and property owners in these areas. These dimensions manifest at a variety of spatial scales, and may be influenced by middle actors that work up and down spatial scales and across dimensions of acceptance. This paper focuses on the public reception of an offshore wind cable landfall and substation project in Falmouth, Massachusetts, proposed by Mayflower Wind to move energy produced at its future wind farm south of Martha's Vineyard to the onshore grid. *Keywords: blue economy, renewable energy*

Fateme Salemi[a], Jeannine-Marie St-Jacques[a], and Matthew Peros[b]
[a] Concordia University and [b] Bishop's University

Paleoflood Reconstruction in the Ottawa River Basin, Canada, Using Sediment Cores

Severe flooding occurred in 1974, 1976, 2017 and 2019 in the Ottawa River Basin (ORB), Canada. The floods of 2017 and 2019 resulted in the evacuation of ~14,000 persons and at least ~$1 billion in costs for governments alone. As a result of the economic damage of the floods, there has been much discussion as to whether the 2017 and 2019 floods are a consequence of

anthropogenic climate change and/or land use changes. Also under discussion is the possibility of the likelihood of repeated such events. To avoid such expensive losses and to better manage ORB floods, we need better spatial and long-term data on flood risks and vulnerabilities. Unfortunately, the regional flood instrumental records are very short and there are relatively few streamflow gauges on unregulated tributaries of the basin. Therefore, there is not enough data to accurately estimate the natural 100-year flood return periods in the various sub-basins. These missing long-term major flood frequency and magnitude data can be inferred using floodwater sediments which typically differ from sediments deposited during non-flood conditions. By taking sediment cores from oxbow lakes of four tributaries of the ORB, radiometrically dating them, and analyzing their past changes in composition using X-ray fluorescence, magnetic susceptibility, particle size analysis and percent organic matter, etc., past floods in ORB can be reconstructed and mapped. Also, we will examine whether floods have increased in the last century because of heavy human landscape disturbance and/or global warming, relative to the floods of the more natural nineteenth century. *Keywords: paleofloods, Ottawa River Basin, oxbow lakes, flood frequencies, sediment cores*

Shradha Birdika, Charlotte Zieselman, Nicole Buckley, Lucy Fleming, and Danielle Hall
Clark University

Perceptions of City Trees among Rhode Island Residents

The Clark University Human-Environment Regional Observatory (HERO) program collaborated in July 2022, with Groundwork RI, a non-profit focused on urban resiliency, to identify the places where tree planting would be the most beneficial to local residents. Each of the four study locations were identified as Environmental Justice Communities (EJCs), which meet certain criteria that illustrates unequal access to environmental harms and benefits. Groundwork RI seeks to help neighborhoods to be less susceptible to environmental degradation by planting trees along streets that lack trees. The research objectives were: (1) Explore residents' perceptions of tree planting and tree canopy impact in the four study locations; and (2) Elevate residents' voices in EJCs where Groundwork RI is focused on planting trees. The results of the study showed that residents had mostly positive perceptions of trees. Many who were surveyed expressed interest in receiving a tree from Groundwork. Many expressed the importance of trees on air quality. Residents were in favor of more tree planting and liked that available resources should be devoted to tree planting. The top environmental concerns were extreme heat and poor air quality. Better communication between urban residents and weather and air quality forecasts must occur to close the gap of climate education within these communities. *Keywords: Rhode Island, trees, resident perceptions, Groundwork RI*

Ian Kennedy
University of Massachusetts – Amherst

Quantifying Aggregate Demand for Roundwood at Primary Processing Mills in the Northern US – A Machine Learning Approach

The Family Forest Research Center (FFRC), in coordination with the USDA Forest Service - Forest Inventory & Analysis (FIA) Program, implements the Timber Products Output (TPO) Survey annually, tracking primary processing mills' timber procurement throughout the United States. This project uses response-level data from the past three TPO iterations to visualize mills' aggregate demand for roundwood in the Northern US. Outputs will aid policy-makers concerned with preserving heavily-harvested forest landscapes, as well as those within the industry who may seek to source logs closer to home, ideally minimizing haul distance. While the TPO survey does garner information on procurement-source location, the breadth of this data is poor. To overcome this, this project hinges on the collection of procurement radii for each entity. However, the question regarding radii was first introduced in 2019 and thus verified responses for the question are limited (~1/6 of the sample). To overcome this, regression analyses of varying complexity are conducted to impute missing radii, with the leading model utilized for sample-wide imputation. With the regression predictions, mill locations are geocoded using a stepwise hierarchy corresponding to the level of accuracy for each address 'field' (mailing, physical, lat/lon). Once geocoded, buffers are drawn around each location using the corresponding verified or predicted radii, weighting each buffer by the mill's procurement volume (roundwood). From there, each independent buffer is mosaiced to produce a final 'heat map'. Data cleaning, analysis, and model visualization was implemented in Rstudio. Mapping was implemented in ArcGIS Pro using a Python-based script. *Keywords: Timber, Lumber Products, Forest Management, Modeling, GIS, R*

Abigail Lucas
Southern Connecticut State University

Spatial Trends in Mercury Contamination in New Haven Harbor

Previous studies have shown mercury concentrations within New Haven Harbor to vary spatially based on proximity to past and present industry. The objective of this study was to examine spatial trends in mercury concentrations within New Haven Harbor. Students and faculty from the Werth Center for Coastal Marine Systems participated in sediment collection in the summer of 2021 on 6/16/21 & 6/29/21. Sediments were collected via ponar grab aboard the New Haven Sound School's vessel the Island Rover. Locations for sampling stations included 18 locations on 6/16/21 and 10 sampling locations on 6/29/21. The collected sediment samples were processed through freeze-drying before being weighed into Millstone DMA 80 Mercury Analyzer to determine mercury concentration. Loss on ignition (LOI) was also examined for each sample. Positive correlations existed between mercury concentration and LOI. Grain size was also found to have a correlation, finer grain sizes correlated with higher concentrations of mercury. Mercury concentrations of each sample were compared to crustal abundance.

Mercury's crustal abundance is about 0.08 mg/kg and sediments were seen across New Haven Harbor at levels between 0 mg/kg and 0.6 mg/kg. The average mercury concentration across New Haven Harbor was 0.2557 mg/kg. This data shows that New Haven Harbor's sediments remain at an elevated level compared to crustal abundance, indicating that industry has caused elevated levels of mercury. Mercury's effects range low (ERL) is 0.15 mg/kg and effects range median (ERM) is 0.71 mg/kg. All sediment samples lie below the ERM, and most were above the ERL. *Keywords: mercury, loss on ignition, New Haven*

Gabriel Dietz
Salem State University

Sustainability in Aquaculture

Fish are a very important resource to the people living on the island of Hawaii. Many people's jobs are dependent on the fish, as well as many people's meals. In 2018, it was estimated that there was a total of 2.5 Million pounds of fish were caught near-shore by commercial and noncommercial fisheries. As climate change is having an increased impact on the environment, it is more important than ever to look at the collection and export of fish from Hawaii and discuss different methods that can and are being done to make the business more sustainable. I will be creating a poster about the business of aquaculture and discussing different sustainable options for the industry. *Keywords: Aquaculture, Fish*

Kaitlin McKenna
Salem State University

Sustainability Metrics in Competitive Metal Manufacturing Assessment

In response to the development of new low-energy consuming machines, improved design methods, and increasing socio-economic pressure for more development of sustainable products by customers is pushing Massachusetts metal manufacturing facilities in a new direction. Sustainable metal manufacturing in Massachusetts is characterized by utilizing the newest sustainable efforts like Molten Oxide Electrolysis (MOE) and implementing resource conservation, recycling, and waste reduction. Historically, manufacturing plants were very dirty and disregarded environmentally friendly practices. In researching peer reviewed sources, a cost-benefit analysis was used in determining the findings. Sustainability is measured in cost reduction, increase in wealth generation, and risk reduction. Environmentally friendly inventions and initiatives were found to generate wholistic positive benefits measured by the companies performance outcomes. *Keywords: manufacturing, sustainability, cost-benefit analysis*

Gwendolyn Robinson
Salem State University

SWOT Analysis of Sustainable Housing Construction in Coastal Communities

I will perform a SWOT analysis of sustainable housing construction in coastal communities in this research poster. The poster will include an analysis of various strengths, weaknesses, opportunities, and threats within the industry. Some topics or subjects I will consider may include climate change, sea level rise, and energy production and use. *Keywords: housing, sustainability, construction, industry, coastal communities*

Siqi Lu
Department of Geography, University of Connecticut

The Built Environment Assessment of Residential Areas during the Coronavirus Disease (COVID-19) Outbreak

The COVID-19 epidemic has emerged as one of the biggest challenges in the world But there is still insufficient understanding of how environmental conditions may impact the COVID-19 pandemic. Airborne transmission is regarded as an important environmental factor that influences the spread of COVID-19. The natural ventilation potential (NVP) is critical for airborne infection control in the micro-built environment, where infectious and susceptible people share air spaces. This research takes Wuhan as the study area to evaluate the NVP in residential areas to combat COVID-19 during the outbreak. I used four fundamental residential area layouts based on the semantic similarity model for point of interest (POI) picking. The study results show that improvement of NVP in spatial and temporal scales and efficiency in the residential areas may help to combat COVID-19. *Keywords: COVID-19 outbreak, environmental factors, residential area layout, natural ventilation potential*

Bryce Ruest
Salem State University

The Energy-Intensive Production of the Pharmaceutical Industry

The pharmaceutical industry serves a strong purpose to people all over the world. It provides medications to a variety of different patients and also provides medical supplies to patients who need it. The industry keeps growing as well with new medications and new advances in healthcare to provide every patient what they need. Although this industry has a lot of benefits, it also comes with its cons. Pharmaceutical production requires a lot of power for specific environments with certain temperatures and humidity which makes the production energy-intensive. This industry spends over 1 billion dollars a year on energy and generates emissions

that are harmful to the environment as well. These emissions can lead to harmful chemicals in the atmosphere and potentially lead to climate change and other environmental damages. But switching over to more energy efficient strategies, the industry could save up to more than 30% in costs and prevent emissions from entering the environment. With better management of the money for this industry, it could potentially save money and provide better services to patients and potentially help combat climate change and other environmental problems. There are many resources that go into pharmaceutical production and better management of those resources can make production more efficient as well as help increase the production of medications and other pharmaceuticals and also prevent medications from being back-ordered. *Keywords: Apharmaceutical industry, medications, energy*

Megan Tremblay
Concordia University

The Fire History of the Albany Pine Bush Preserve, New York State

Pine barrens are an ecosystem type unique to North America that contain many rare and often endangered species of fauna and flora. They are fire-dependent ecosystems because their species compositions and their reproductive cycles rely on the regular disturbance of wildfire. The Albany Pine Bush is the best intact inland pitch pine-scrub oak barren in the Northeastern United States. Many years of land development and fire suppression threatened this unique landscape. In 1988 a preservation area was established by the Preserve Commission to maintain and expand the pitch pine-scrub oak barrens whose management included prescribed fire as a necessary disturbance. A better understanding of the fire history is needed to understand its natural fire cycle to inform future fire management decisions. For this study, I completed a fire history reconstruction of the Albany Pine Bush barren using sediment core micro-charcoal from the early Holocene to present day. Evidence of frequent fire events were found consistently throughout the lake and peatbog sediment cores spanning the last 12,000 years. Average fire return intervals (FRIs) of 488 and 494 years were found for the respective cores which is the highest frequency FRIs that are detectable for the resolution of the study. Preliminary results from a high-resolution pollen analysis of the same sediment cores reveal the consistency of the vegetation and therefore the presence of the pine barren throughout the Holocene. Hence, my results suggest that fires have been a consistent disturbance in this pine barren since its establishment in ~10,500 BP. *Keywords: fire reconstruction, charcoal analysis, pollen analysis, pine barren, fire return interval*

Antoine Lachance[a], Jeannine-Marie St-Jacques[a], Matthew Peros[b], and Pierre Francus[c]
[a] Concordia University, [b] Bishops University, and [c] INRS

The History of Storms and Hurricanes Over the Past 1000 Years in the Gulf Of St. Lawrence, as Told by Coastal Ombrotrophic Peatbogs on the Magdalen Islands, Québec, Canada

Storms are pervasive dangers to coastal communities in Eastern Canada and, under future climate change, these extreme weather events are projected to increase. However, the impacts of climate change on storm variability have not been studied extensively in Eastern Canada, in part due to the short and incomplete instrumental storm record. Here we present a new, high-resolution record of storms over the last millennium, based on sediment cores from two ombrotrophic peatbogs on the Magdalen Islands, in the Gulf of St. Lawrence. We used a combination of aeolian sand and titanium content to identify allochthonous elements from the surrounding beaches and cliffs, that would have been deposited in the peatbogs during extreme weather events. These storm indicators have been confirmed using the hurricane record from the Magdalen Islands over the past 150 years. Our reconstruction indicates a particularly active storm period between 1400-1650 CE, a period also identified in 4 other studies in the North Atlantic, as well as a notable increase in storms since 1930 CE. While warm sea-surface temperatures (SSTs) anomalies seem to have contributed to more frequent storms since 1930 CE, it is less obvious for the 1400-1650 CE increase, which happened during the Little Ice Age, a period of cooler SSTs in the North Atlantic. Our study is the first using ombrotrophic peat cores in North America, as well as being the northernmost on the continent, and allows us to better understand the factors that control the variation of storms in the Gulf of St. Lawrence.
Keywords: paleotempestology, hurricanes, storms

Carsten Braun
Westfield State University

The Recession of Glaciers in Uganda and Venezuela: A 2022 Update

There are about 215,000 documented glaciers in the world today (outside of the three major ice sheets) and this presentation provides an update on the glaciers located in the Rwenzori Mountains (Uganda) and in the Sierra Nevada de Mérida (Venezuela). The Duke of the Abruzzi Expedition of 1906 identified about 30 glaciers in the Rwenzori Mountains which have decreased in area from about 7.51 km2 (1906) to only about 0.35 km2 (January 2022). This recession and disappearance is likely caused by a combination of a) increases in air temperature and b) decreases in atmospheric humidity. The eleven glaciers in Venezuela were first mapped in 1910 (about 10 km2) and in 2022 just a single glacier remains (about 0.03 km2). This makes it difficult to imagine that permanent ice will survive in the Venezuelan Andes for more than a few years. These findings are obviously not surprising given the global state of glaciers (in-general)

and the consensus of the scientific research conducted in the Rwenzori Mountains and in the Sierra Nevada de Mérida(in-particular) over the years. This study compiles all existing research and data in an accessible and interactive format (Esri Story Map) and updates the glacier area measurements using publicly-available satellite imagery. *Keywords: glacier, Africa, Venezuela*

Aidan Santerre
Salem State University

Water Scarcity Resilience: Bermuda as a Use Case for a Global Desalination Paradigm

Access to fresh water is the most basic fundamental necessity for prospering communities, agro-industrial operations, high-intensity manufacturing processes, and flourishing organic life; However, climate change is disproportionally facilitating water scarcity in disadvantaged communities as it grows into a global risk. Advanced water delivery systems can improve access to fresh water immediately but only serve as a palliative measure. An external stimulus like desalination to increase the total potable water supply, or at least supplement irrigation and manufacturing uses, is an appropriate solution. Looking at Bermudas' advanced reverse osmosis model it is possible to conclude that desalination is not only a viable sustainable solution but the common sense option to ensure universally just access to fresh water. *Keywords: Desalination, Climate Change, Water Scarcity, Resilience, Sustainability*

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A typical manuscript should be between 12 and 20 double-spaced pages of text. The journal will consider both shorter and longer pieces depending on their appropriateness. Articles submitted for consideration must be typewritten using Times New Roman 12-point font, double-spaced, 1-inch margins and with a minimum of special formatting. Electronic submission is preferred as a Word document. Do not place any identifying information in your manuscript or your file names to ensure a blind review. This includes names of authors, their affiliations or acknowledgments.

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Separate pages for references
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