



Kaschak Institute

SOCIAL JUSTICE FOR WOMEN AND GIRLS

Climate Change Research CV
Binghamton University

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TABLE OF CONTENTS

METHODOLOGY	3
FINDINGS	3
I. AGRICULTURE	4
II. ENVIRONMENTAL CHANGE	6
III. ENERGY	14
IV. ENVIRONMENTAL JUSTICE	18
V. ENVIRONMENTAL PRACTICES	20
VI. ENVIRONMENTAL KUZNETS CURVE	21
VII. FRACKING	24
VIII. MIGRATION	25
IX. DISASTERS	26
X. OIL	31
XI. POLICY	32
XII. POLLUTION	40
XIII. PRESERVATION	48
XIV. SUSTAINABILITY	50
XV. WASTE	63

METHODOLOGY

This document outlines Binghamton University's current and past efforts in climate change research over the past 20 years. To compile the contents of the CV, a list of various topics related to climate change was created to streamline the search through Binghamton University's repository for research, *The Open Repository @Binghamton* (ORB). Then, departments from the University that pertained to climate change research were contacted to request articles and research conducted by staff. A survey was created and sent in the email that requested that professors ask students to send in their works on climate change (either current or ongoing) via Brightspace/email. After compiling all articles onto a spreadsheet, the research was thoroughly analyzed to ensure that the material was related to climate change. The research was then divided into subcategories, seen in the Table of Contents above, and formatted accordingly in chronological order within each section.

FINDINGS

There were 94 research articles related to climate change, with over half the articles from the last five years alone (2017-2022). The highest concentration of research was from the Economics department.

The second most significant contributor was the Anthropology Department, then the Public Administration Department. Accordingly, the most prominent individual contributor was Neha Khanna, a professor in the Economics Department. The second biggest individual contributor was George C. Homsy, an Environmental Sciences and Public Administration professor.

There was an unprecedented lack of research conducted by the Engineering and Chemistry departments regarding climate change. While articles were found, that may be used in conjunction with climate change research, few specialized on the topic.

I. AGRICULTURE

1. Addressing the Role of Climate Change in Agriculture and Mexico-US Immigration
 - a. Department: Public Policy
 - b. Author(s): Xiaoxin Liang
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol7/iss1/3>
 - e. Abstract: Among the greatest threats of climate change is the significant impact on mass displacement, particularly as it relates to Mexico-US immigration. Low crop yields from worsening climate conditions have been linked to increased migration of Mexican farmers. With a projected 4.2 million additional migrants in the foreseeable future, it poses a contemporary environmental, social, and political dilemma. This policy brief analyzes several provision proposals to be adopted into the United States-Mexico-Canada Agreement (USMCA), as evaluated under economic cost, equity, environmental impact, and feasibility criteria. My research concludes that the most effective and direct provision proposal is the implementation of adaptive farming to protect small-scale farmers against the adverse effects of climate change. The policy benefits both American and Mexican governments by mitigating financial losses from low crop yield, limiting Mexico-US immigration, and building climate resilience for farmers. This serves as a model for addressing the global increase of climate refugees and can help predict climate change-driven migration patterns in rural areas around the world.

2. Agricultural revolutions in America's heartland: the corn belt and the making of American capitalism
 - a. Department: Sociology
 - b. Author(s): Benjamin J. Marley
 - c. Year of Publication: 2018
 - d. Link: https://orb.binghamton.edu/dissertation_and_theses/86
 - e. Abstract: The family farm has been the foundation of America's cheap food model. This research examines how cheap food from the Corn Belt was produced from the 1840s to the late twentieth century. It investigates how the interrelationships between family farming, proletarianization-housewifization, and national and world markets configured and reconfigured. Utilizing a world-ecological framework, I argue that Illinois and Iowa, the heart of the Corn Belt, were the epicenter of two successive agricultural revolutions that fundamentally transformed world accumulation and world nature. The analysis is centered on the development of successive agricultural revolutions over the longue durée of

capitalism, with the greatest attention on the nineteenth and twentieth century revolutions in the United States. At the core of the dissertation, I examine what I call the ‘double dialectic’: the contradictory relationship within the agrarian household and in relation to world markets and world power. The findings of the study are historical and methodological. Historically, the Corn Belt family farm possessed a unique position within the capitalist world-economy, resulting in relative prosperity and long-term stability. Contrary to regional studies of the Corn Belt, the study provides a world-ecological framework for reconstructing the origins, development, and crisis of the Corn Belt family farm and interpreting how the production of nature, the pursuit of power, and capital accumulation constitute its development.

II. ENVIRONMENTAL CHANGE

1. Approximate Bayesian Computation of radiocarbon and paleoenvironmental record shows population resilience on Rapa Nui (Easter Island)
 - a. Department: Anthropology
 - b. Author(s): Robert J. DiNapoli, Enrico Crema, Timothy Reith, Carl P. Lipo, Terry L. Hunt
 - c. Year of Publication: 2021
 - d. Link: <https://doi.org/10.1038/s41467-021-24252-z>
 - e. Abstract: Examining how past human populations responded to environmental and climatic changes is a central focus of the historical sciences. The use of summed probability distributions (SPD) of radiocarbon dates as a proxy for estimating relative population sizes provides a widely applicable method in this research area. Paleodemographic reconstructions and modeling with SPDs, however, are stymied by a lack of accepted methods for model fitting, tools for assessing the demographic impact of environmental or climatic variables, and a means for formal multi-model comparison. These deficiencies severely limit our ability to reliably resolve crucial questions of past human-environment interactions. We propose a solution using Approximate Bayesian Computation (ABC) to fit complex demographic models to observed SPDs. Using a case study from Rapa Nui (Easter Island), a location that has long been the focus of debate regarding the impact of environmental and climatic changes on its human population, we find that past populations were resilient to environmental and climatic challenges. Our findings support a growing body of evidence showing stable and sustainable communities on the island. The ABC framework offers a novel approach for exploring regions and time periods where questions of climate-induced demographic and cultural change remain unresolved.

2. Biodiversity and Climate Change: The Impact of the Climate Crisis on Natural Ecosystems, and What We Can Do About It
 - a. Department: Environmental Science
 - b. Author(s): Neyda V. Gilman, Jennifer Embree, Jessica Hua, Chad DeVoe, Haley Arnold, et al.
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/library-sustainability-resources/2>
 - e. Abstract: N/A

3. Climate Warming's Alteration of Host-Parasite Dynamics

- a. Department: Biological Sciences
- b. Author(s): Ting-Hsuan Wu
- c. Year of Publication: 2020
- d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol6/iss1/5>
- e. Abstract: Parasites and pathogens have significant roles in host population control, and thus host-parasite interactions affect biodiversity. The important question reviewed in this paper is how changes in temperature due to climate change affect host-parasite interactions. There is mounting evidence that elevated temperatures have both beneficial and detrimental effects on parasites and independently on hosts. These independent changes result in altered host-parasite dynamics through various mechanisms. If elevated temperatures enhance parasite survival, risk of disease transmission among hosts is enhanced as well. This enhancement is dependent on temperature-induced shifts in the host lifecycle, as asynchrony in host and parasite development can result in decreased infection rate and disrupted disease transmission regardless of the increase in parasite survival and density. Host species differ in their responses to temperature elevation. Increased temperature can alter their susceptibility to parasites through changes in their immune functions. Climate shifts also result in host range shifts. As host ranges expand, they may encounter novel pathogens, increasing the risk of spillovers and resulting in a greater mortality rate. From the point of view of native species, newly arriving host species present the potential danger of introducing novel parasites and diseases, which can be detrimental to native species. For seasonally migratory species whose parasites typically decrease during their absence, any climate-induced increase in their parasites' survival prior to their return may decrease the effectiveness of migration, shift their lifestyle to become more sedentary and thus reshape host-parasite dynamic. Altered balance of host-parasite interactions produces changes at higher ecological levels, and the efforts to conserve parasites should thus have the same priority as the need to conserve host species.

4. Floods and Climate Change in Broome County

- a. Department: Environmental Science
- b. Author(s): Maya Wolf
- c. Year of Publication: 2020
- d. Link: https://orb.binghamton.edu/research_days_posters_spring2020/95
- e. Description: Floods "are the second deadliest of all weather-related hazards in the United States" (Ashley & Ashley, 2008), and they are only becoming more

common and more dangerous due to climate change. The Binghamton area has a further elevated risk due to its proximity to the Chenango and Susquehanna river confluence, as demonstrated by the floods here in 2006 and 2011. While there are several flood and climate change mitigation options available, there is little information about the perspectives coming out of Binghamton on these issues. Through semi-structured interviews with community members and local legislators, I will learn how individuals feel they have been affected by floods, as well as what they know about and how they respond to the different mitigation options and efforts. This research could reveal a gap between what representatives think people want and what they actually want, or divides between the needs and incentives of different parts of Broome County. Understanding and reconciling these differences would make Binghamton more prepared to weather the next big flood, or make sure the flood does not get so big in the first place.

5. How is climate change endangering indigenous Andean cultures?

- a. Department: Environmental Science
- b. Author(s): Eliezer Ugarte
- c. Year of Publication: 2020
- d. Link: https://orb.binghamton.edu/research_days_posters_spring2020/91
- e. Description: Over one-sixth of the world's population relies on rapidly-disappearing tropical glaciers.* These glaciers exist in close proximity to the equator due to the high altitude of the mountains where they are found. The tropical glaciers of the Andes in South America have been an intrinsic part of the survival of both the indigenous peoples living there and their culture. Increased glacial melt due to climate change causes deadly floods that threaten mountain communities and deplete their long-term water sources. The United Nations Declaration of Indigenous Rights applies to this situation, but an organized international effort to find a solution has yet to be launched. Meanwhile, climate change increasingly puts the continuation of many indigenous communities and their cultures in jeopardy. In this study, I examine the threat climate change presents to the indigenous peoples and cultures of the Andes through the following lenses: the scientific explanation for the geophysical processes threatening indigenous peoples, the cultural destruction that climate change is causing, the legal argument for protections besides the right to property, and the overall impact and probable consequences of this developing loss on a global scale. * Konkel, Lindsey. "What Are Tropical Glaciers and Why Do They Matter?" Science Line, December 15, 2008. <https://scienceline.org/2008/12/ask-konkel->

tropical-glaciers-melting-andes-mountains-runoff-groundwater/.

6. Population Control=Not Controlling Climate Change

- a. Department: Environmental Science
- b. Author(s): Natasha Ruscoll
- c. Year of Publication: 2020
- d. Link: https://orb.binghamton.edu/research_days_posters_spring2020/77
- e. Description: I plan to have children in about ten years. I do not know how many, but I would like that to be a decision I make with my future family without any limitations. Unfortunately, this may not be possible, because of the growing interest in the idea of population control to help with the climate crisis. Some scholars, like Sarah Conly, believe that population control should be implemented because it is harmful to some of our basic human rights. However, enacting population control infringes on three other basic rights: the rights of future generations, the right to a family, and women's reproductive rights. Anja Karnein, another scholar, argues that it's unfair for us to make decisions for future generations who aren't here to make decisions for themselves. In regard to the second and third rights, we are not legally allowed to limit a woman to having "X" amount of children. This paper will further discuss how population control violates these three rights, and how instead we should be focusing on environmental solutions for climate change. This topic is extremely relevant because, climate change is a problem that has become unavoidable, and will directly affect over 79% of the world population.

7. The Potential for Great White Sharks to Frequent the Long Island Sound

- a. Department:
- b. Author(s): Jake McCarthy
- c. Year of Publication: 2019
- d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol5/iss1/3>
- e. Abstract: There are a few species of sharks that regularly inhabit the coastal waters of Long Island, New York. Rising water temperatures and increasing human/seal populations in the New England/Long Island region have the potential to cause alterations in local species composition, especially as white shark populations continue to grow in the northwest Atlantic Ocean. Increased competition may drive species such as sand tiger sharks and white sharks into areas previously thought to house low shark concentrations, such as the Long Island Sound. This work was written so that tourists and the people of New England become informed as to the ever-changing ecology of our aquatic

ecosystems. Spotting a shark in the Long Island Sound is now a “once in a blue moon” event, but this may change with alterations in our local ecology.

8. Unlikely pioneers: creative climate policymaking in smaller U.S. cities

- a. Department: Environmental Science
- b. Author(s): George C. Homsy
- c. Year of Publication: 2018
- d. Link: <https://doi.org/10.1007/s13412-018-0483-8>
- e. Abstract: With the U.S. federal government stepping away from climate change, a number of cities have indicated that they will continue their efforts to reduce greenhouse gas emissions. Broad statistical analysis and case studies of larger and often progressive cities have provided some insight into what drives local governments to act on climate change mitigation. However, the vast majority of U.S. municipalities, most of them small, do nothing. Understanding what might drive smaller, poorer, and less progressive places is important if local governments are expected to take the lead on this issue of the global commons. In this exploratory study, I examine a group of “unlikely pioneers” —communities that statistical modeling indicates are the least likely to undertake climate change action, but then do act. Using interviews and document reviews in 12 of these communities, I seek to answer the question: what drives these unlikely pioneers to act? I find that local leaders reframe climate change action as a way to save money and attract economic development. Personal environmental ethics drive small town leaders to reduce greenhouse gas emissions. Citizen committees can provide technical resources and political support. Otherwise, and more subtly, citizens can create a political environment that reduces resistance to climate change policymaking. Despite research that indicates fiscal health is correlated to increased sustainability, no communities in this study initiated climate change mitigation from general revenues. All required grants or other revenue to act. In four of the communities, the income from municipally owned utilities provided the fiscal resources for climate change programs.

9. Consequentialism, Climate Harm and Individual Obligations

- a. Department: Philosophy
- b. Author(s): Christopher Morgan-Knapp, Charles Goodman
- c. Year of Publication: 2015
- d. Link: https://orb.binghamton.edu/philosophy_fac/27
- e. Abstract: Does the decision to relax by taking a drive rather than by taking a walk cause harm? In particular, do the additional carbon emissions caused by such a

decision make anyone worse off? Recently several philosophers have argued that the answer is no, and on this basis have gone on to claim that act-consequentialism cannot provide a moral reason for individuals to voluntarily reduce their emissions. The reasoning typically consists of two steps. First, the effect of individual emissions on the weather is miniscule: the planet's meteorological system is so large, and the size of individual emissions so tiny, that whatever impact an individual emission has on the weather must be vanishingly small. Second, vanishingly small impacts aren't morally relevant because no one could possibly tell the difference between such an impact occurring and it not occurring. In this paper, we show why both steps are mistaken, and hence why act-consequentialism implies that each of us has an individual obligation to do what we can to stop damaging the climate, including by refraining from, or perhaps by purchasing offsets against, our own individual luxury carbon emissions.

10. Nested governance for effective REDD plus : institutional and political arguments

- a. Department: Geological Sciences and Environmental Studies
- b. Author(s): Prakash Kashwan, Robert Holahan
- c. Year of Publication: 2014
- d. Link: https://orb.binghamton.edu/geology_fac/2
- e. Abstract: Reducing Emissions from Deforestation and Forest Degradation and Forest Enhancement (REDD+) has become a central focus of global climate change mitigation efforts. Even though the international demand for forest-based carbon sequestration is the key driver of REDD+, forest protection strategies must be implemented on the ground. This cross-scale nature of REDD+ explains why scholars and policy makers increasingly favor nested governance arrangements over either fully centralized or fully decentralized REDD+ governance. The focus of the literature on nested REDD+ governance has mostly been on monitoring, reporting, and verification of carbon emission reductions across sub-national, national, and international levels. We build on Ostrom's principle of 'nested enterprises' to argue that REDD+ must be designed to systematically and formally link national policy reforms with the organization and execution of sub-national (regional and local) forest conservation efforts led by forest users. We also contribute new insights on the political dimensions of nestedness in REDD+, with important roles for inter-community forestry associations and forest rights movements.

11. Biomass Accumulation and Carbon Sequestration in Four Different Aged *Casuarina equisetifolia* Coastal Shelterbelt Plantations in South China

- a. Department: Biological Science
- b. Author(s): Faming Wang, Xin Xu, Bi Zou, Zhihua Guo, Zhian Li, et al.
- c. Year of Publication: 2013
- d. Link: https://orb.binghamton.edu/bio_fac/17
- e. Abstract: Thousands of kilometers of shelterbelt plantations of *Casuarina equisetifolia* have been planted to protect the southeast coastline of China. These plantations also play an important role in the regional carbon (C) cycling. In this study, we examined plant biomass increment and C accumulation in four different aged *C. equisetifolia* plantations in sandy beaches in South China. The C accumulated in the *C. equisetifolia* plant biomass increased markedly with stand age. The annual rate of C accumulation in the *C. equisetifolia* plant biomass during 0-3, 3-6, 6-13 and 13-18 years stage was 2.9, 8.2, 4.2 and 1.0 Mg C ha⁽⁻¹⁾ yr⁽⁻¹⁾, respectively. Soil organic C (SOC) at the top 1 m soil layer in these plantations was 17.74, 5.14, 6.93, and 11.87 Mg C ha⁽⁻¹⁾, respectively, with SOC density decreasing with increasing soil depth. Total C storage in the plantation ecosystem averaged 26.57, 38.50, 69.78, and 79.79 Mg C ha⁽⁻¹⁾ in the 3, 6, 13 and 18-yr plantation, with most of the C accumulated in the aboveground biomass rather than in the belowground root biomass and soil organic C. Though our results suggest that *C. equisetifolia* plantations have the characteristics of fast growth, high biomass accumulation, and the potential of high C sequestration despite planting in poor soil conditions, the interactive effects of soil condition, natural disturbance, and human policies on the ecosystem health of the plantation need to be further studied to fully realize the ecological and social benefits of the *C. equisetifolia* shelterbelt forests in South China.

12. Climate Change and the Co-Production of Knowledge and Policy in Rural US Communities

- a. Department: Public Administration
- b. Author(s): George C. Homsy, Mildred Warner
- c. Year of Publication: 2013
- d. Link: <https://doi.org/10.1111/soru.12013>
- e. Abstract: Climate change requires action at multiple levels of government. We focus on the potential for climate change policy creation among small rural governments in the USA. We argue that co-production of scientific knowledge and policy is a communicative approach that encompasses local knowledge flowing up from rural governments as well as expertise and power (to coordinate

and ensure compliance) flowing down from higher level authority. Using environmental examples related to land use policy, natural gas hydro-fracturing, and watershed protection, we demonstrate the importance of knowledge flows, power, and coordination in policy creation. Co-production of knowledge and policy requires respect for local knowledge and a broader framing of issues to include both environmental and economic perspectives. While we see potential for local action, we caution that polycentric approaches lead to externality problems that require multilevel governance to ensure coordination and compliance.

III. ENERGY

1. Using multifactor inputs bp neural network to make power consumption prediction
 - a. Department: Electrical and Computer Engineering
 - b. Author(s): Hao Song
 - c. Year of Publication: 2018
 - d. Link: https://orb.binghamton.edu/dissertation_and_theses/82
 - e. Abstract: With the development of modern information and technology (IT), smart grids became one of the major components of smart cities, to take full advantage of the smart grid, the capability of intelligent scheduling and planning of electricity delivery is essential. For this purpose, researchers have investigated methodologies for power consumption prediction and demand side management (DSM). In addition, conducting a comprehensive analysis and obtaining an accurate evaluation of power consumption are the premise and basis for a more robust and efficient power grid design and transformation. Therefore, it is meaningful to explore forecasting models that are able to reflect the power consumption change effectively.
Making electricity consumption prediction based on neural network has been a popular research topic in recent years, and backpropagation neural network (BPNN) algorithm has been recognized as a mature and effective method. This thesis applies the BPN to predict the electricity consumption of Pecan Street, a community with a relatively large-scale smart grid, and takes more factors into account, such as weather condition, weekend and holiday. The influences of each factor have been evaluated for a deeper insight. While what presented in this thesis is not mature, it may inspire more discussion and further study to guide the design of future smart grids.

2. Design and synthesis of novel nanometallic catalysts and electrode materials for green fuel cells
 - a. Department: Materials Science and Engineering
 - b. Author(s): Jing Zhang
 - c. Year of Publication: 2018
 - d. Link: https://orb.binghamton.edu/dissertation_and_theses/65
 - e. Abstract: The United Nations formally adopted 17 sustainable development goals (SDGs) at its 2015 summit. Many of these goals addressed issues such poverty, hunger, health, education, climate-change, gender equality, water, sanitation, energy, urbanization, environment and social justice. The seventh SDG seeks to ensure access to affordable, reliable, sustainable and modern energy for all. So among all renewable forms of energy, fuel cells with high

efficiency have attracted a lot of attention recently. In particular, the direct ethanol fuel cells (DEFCs) and microbial fuel cells (MFCs) are significant due to their green fuel, less waste generated and environmental friendliness. Hence the overall goal of this work is to develop novel catalysts and electrodes for improving the efficiency of different designs of fuel cells.

Towards achieving this goal, the project was divided into three phases. For the first phase, a new electrode material was prepared for Ethanol Oxidation Reaction (EOR) based on Pt and alloyed PtCr nanoparticles fabricated via electrodeposition on a glassy carbon electrode. The catalyst was tested in acidic media. The typical SEM images showed the near spherical Pt structures with diameters in a range of 50–120 nm. The general size of the PtCr nanoparticles were determined to be around 105 nm and the surface aggregates were from 400 nm to 1 μ m at 40 cycles. However, the primary challenge has been attributed to the loss of the catalysts into solution. We hereby demonstrate an approach using poly(amino) acid (PAA) films as supporting material in order to improve the stability and inherently the efficiency of the catalysts. This catalyst was created via spin coating of PAA layer (thickness \sim 4 μ m) on the surface of electrocatalysts. The PAA/Pt and PAA/PtCr combination permits the diffusion of ethanol towards the surface of the Pt or PtCr nanoparticles resulting in efficient reduction while simultaneously preventing the loss of the catalysts into the solution. Electrode stability of 900 cycles (three days) was recorded at varying potential scan cycles. This electrode coated with PAA was found to be three times as durable when compared with the bare catalysts surface (300 cycles). And this work could allow the widespread use of these combinations for stable and efficient electrochemical reduction of ethanol.

The second phase was focused on the development of a new, easy, fast and green method to synthesize anisotropic Pt nanomaterials for application in EOR. The Pt nanomaterials were formed by combining sugar ligands with PtCl₄ in water at room temperature and the reaction occurred immediately. Six types of sugar ligands were tested in this study: N,N'-dilactosylphenylene (LPDA), Lactose+p-aminosalicylic acid (LpAS), D-galactose+(3-amino) propylaniline (44DG), lactose-4,4-ethylenedianiline (L-44EDA), galactose-4,4-ethylenedianiline (G-44EDA) and galactose-4-sulfonyl phenylenedianiline (GPSA). Based on the intrinsic chemical structures and properties of the different sugar ligands, various sizes and shapes of Pt nanomaterials were generated, including uniform tiny nanoparticles and fancy nanoflowers. The electrochemical properties of the sugar ligands were determined using cyclic voltammetry (CV) which showed that

LPDA exhibited the greatest electroactive property with two redox couples at 0.28 V and 0.68 V, respectively. And based on the Randles Sevcik equation calculation, the results demonstrated that the redox reaction of LPDA is reversible with two numbers of electrons transferred.

The third and final phase of the project was the development of two different designs of microbial fuel cells. The first design was the traditional one-chamber MFC. So, in order to prove the performance of fuel cell, Pt nanoparticles were electrodeposited onto reticulated vitreous carbon electrode (RVC). Subsequent experiments confirmed that the power density of MFC increased by two times when compared with that containing no Pt catalyst. The second design was a microfluidic-based MFCs using paper as the substrates, which was carried out in collaboration with Choi's research group at BU. Our objective was to develop novel paper-based electrodes for improving the performance of paper MFCs. PAA was employed for the first time as a supporting material for Origami or paper-based design of MFCs due to its hydrophilicity and electrical conductivity. Overall, this work has shown that different methods had been successfully used to synthesis metallic catalysts and electrodes materials for different types of green fuel cells. Because ethanol is a great alternative green fuel, the electrodeposited Pt and PtCr alloy showed superior performance for EOR, especially after modifying with PAA, the overall efficiency of the DEFCs were increased by three times. Finally, since water has been used as fuel and bacteria as catalysts, the new electrodes materials reported in this work helped to improve the power output and current density of the MFCs compared with previous work. Hence this project could potentially contribute to achieving the seventh SDG of affordable, reliable, sustainable and modern energy for all.

3. Motivated Markets: Instruments and Ideologies of Clean Energy in the United Kingdom
 - a. Department: Anthropology
 - b. Author(s): Joshua Reno
 - c. Year of Publication: 2011
 - d. Link: https://orb.binghamton.edu/anthropology_fac/8
 - e. Abstract: This article examines efforts to reconcile capitalist and ecological values, focusing in particular on the instruments and ideologies that pervade the United Kingdom's developing renewable energy sector. In keeping with neoliberal models of economic knowledge and practice, renewable energy instruments target the motivations of individuals by using incentive programs to reach environmental policy goals. The argument focuses especially on the way

newly implemented market devices shape and represent the motivations of energy producers, suppliers, and traders. The centerpiece of the U.K. government's initiative is the creation of an artificial market in renewability, bought and sold as a virtual commodity. Although the realities of economic motivation complicate the practical implementation of the renewable market, these are represented as isolated and self-interested “exchanges” by market devices, providing policymakers and their critics with partial yet authoritative accounts of renewable policy, premised on narrow and contested assumptions about economic motivation and action

4. Untitled Work

- a. Department: EECE/Center for Autonomous Power
- b. Author(s): Aleksander Piatek
- c. Year of Publication: Ongoing
- d. Link: https://orb.binghamton.edu/anthropology_fac/8
- e. Abstract: Researching performance of various perovskite configurations through simulation software coupled with research into chemical/mechanical stability of the films. Primary question is how to maximize performance through simulation to justify physically building a solar cell which will then be scrutinized for both stability and performance. I am working on this research under the direction of Professor Tara Dhakal.

IV. ENVIRONMENTAL JUSTICE

1. Environmental Justice and the Multigenerational Persistence of Environmental Exposure Economics

- a. Department: Economics
- b. Author(s): Neha Khanna
- c. Year of Publication: 2022
- d. Link: <https://www.epa.gov/environmental-economics/environmental-justice-and-multigenerational-persistence-environmental>
- e. Description: Although air quality in the United States has improved substantially over time, the most polluted neighborhoods from almost four decades ago still see relatively worse air quality. We examine whether and to what extent the disproportionate exposure to low environmental quality among socio-economically disadvantaged populations transmits from one generation to the next. This is important for environmental justice since in-utero and early childhood environmental exposure partly explains adulthood socioeconomic status which, in turn, determines residential choices, thus creating a multigenerational low environmental quality trap.

We use individual survey data from the Panel Study of Income Dynamics to create a sample of Individual – Grandparent pairs, with information on each generation’s own and family characteristics, geospatial identifiers, and census tract PM2.5 from 1981 – 2015. We link 9,023 individuals to 3,590 maternal grandmothers; 8,358 individuals to 3,356 maternal grandfathers; 7,170 individuals to 3,039 paternal grandmothers and 6,746 individuals to 2,866 paternal grandfathers. Our preliminary analysis suggests that, on average, the intergenerational correlation in pollution exposure is positive and statistically significant. Nonetheless, while African American individuals continue to live in areas with significantly higher air pollution, the correlation with their grandparents’ exposure to PM2.5 is weaker than for white individuals. This is consistent with Currie et al. (2020)’s work that highly polluted areas with a larger African American population have experienced a disproportionately greater improvement in air quality over the last few decades.

This is on-going work. Our immediate next step is to consider the rank in air quality exposure as an alternative measure to absolute PM2.5 concentration. In addition, we will also assess whether the disproportionate exposure over generations can be explained by early exposure that leads to poor adult socioeconomic outcomes and therefore results in residential sorting to neighborhoods with poorer environmental quality.

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2. The Environmental Justice of the COVID-19 Pandemic: Evidence from New York State
 - a. Department: Economics
 - b. Author(s): Ruohao Zhang, Huan Li, Neha Khanna
 - c. Year of Publication: 2021
 - d. Link: <https://pubmed.ncbi.nlm.nih.gov/34667335/>
 - e. Abstract: The decline in human mobility and socioeconomic activities during the COVID-19 pandemic has been accompanied by reports of significant improvements in air quality. We evaluate whether there was a uniform improvement in air quality across neighborhoods, with a special attention on differences by race. We focus on the COVID-19 lockdown in New York State, an early epicenter of the pandemic in the United States. Using a triple difference-in-differences model, we find that, despite the seasonal decline in particulate matter pollution starting late March (concurrent with the lockdown period), the lockdown narrowed the disparity in air quality between census tracts with high and low shares of non-white population in rural New York, whereas the racial gap in air quality remained unchanged in urban New York.

V. ENVIRONMENTAL PRACTICES

1. Managing the Experience of Evidence England’s Experimental Waste Technologies and their Immodest Witnesses
 - a. Department: Anthropology
 - b. Author(s): Joshua Reno
 - c. Year of Publication: 2011
 - d. Link: https://orb.binghamton.edu/anthropology_fac/7/
 - e. Abstract: This article explores the techno-environmental politics associated with government-sponsored climate change mitigation. It focuses on England’s New Technologies Demonstrator Programme, established to test the “viability” of “green” waste treatments by awarding state aid to eight experimental projects that promise to divert municipal waste from landfill and greenhouse gases from the atmosphere. The article examines how these demonstrator sites are arranged and represented to produce noncontroversial and publicly accessible forms of evidence and experience and, ultimately, to inform environmental policy and planning decisions throughout the country. As in experimental science, this process requires that some bear witness to the demonstrators, but in a disciplined way. Whether through the extrapolation of facts about technical performance by affiliated third-party consultants, or the orchestration of visitor centers open to the general public, making the demonstrators public involves controlling the ways in which they are interpreted and perceived. However, the unstable publicity of waste management facilities proliferates unofficial accounts as well. These acts of counter witnessing, as I refer to them, not only potentially dispute the official evidence collected from the demonstrators, they also can pose a challenge to the understanding of technology upon which such government initiatives are based.

VI. ENVIRONMENTAL KUZNETS CURVE

1. Total Factor Productivity and the Environmental Kuznets Curve: A Comment and Some Intuition

- a. Department: Economics
- b. Author(s): Neha Khanna, Florenz Plassmann
- c. Year of Publication: 2007
- d. Link: <https://doi.org/10.1016/j.econ.2006.09.020>
- e. Abstract: Chimeli and Braden [Chimeli, Ariaster B., Braden, John B., 2005. Total factor productivity and the Environmental Kuznets Curve. *Journal of Environmental Economics and Management* 49, 366–380] derive a necessary and sufficient condition under which inter-country differences in total factor productivity can yield an Environmental Kuznets Curve. They argue that their results emphasize the importance of differences in total factor productivity across countries as well as the need for decreasing returns to scale in pollution-abating technologies for the existence of an Environmental Kuznets Curve. We show that their Proposition 1 is equivalent to Proposition 2 in Lieb [Lieb, Christoph M., 2002. The Environmental Kuznets Curve and satiation: a simple static model. *Environment and Development Economics* 7, 429–448]. This implies that, even in Chimeli and Braden's model, contemporaneous changes in the marginal rate of substitution between environmental quality and consumption on the demand side and the marginal rate of transformation between these goods on the supply side drive the pollution–income relationship. This is a very general condition that does not rely on either differences in total factor productivity or decreasing returns to scale in abatement, and which is widely applicable.

2. A Note on the 'Simple Analytics of the Environmental Kuznets Curve'

- a. Department: Economics
- b. Author(s): Neha Khanna, Florenz Plassmann
- c. Year of Publication: 2006
- d. Link: <http://proxy.binghamton.edu/login?url=https://www.jstor.org/stable/44379236>
- e. Abstract: In a widely cited paper, Andreoni and Levinson (2001) argue that, under very mild restrictions on preferences, increasing returns to scale in pollution abatement are a sufficient condition for pollution to ultimately fall to zero with income growth. We show that the existence of an Environmental Kuznets Curve depends on the relative magnitudes of the returns to scale in abatement and in gross pollution, rather than on their absolute values.

Increasing returns to scale in abatement by themselves are not sufficient for pollution to fall with income unless the returns to scale of abatement exceed the returns to the production of gross pollution.

3. Household Income and Pollution: Implications for the Debate About the Environmental Kuznets Curve Hypothesis

- a. Department: Economics
- b. Author(s): Neha Khanna, Florenz Plassmann
- c. Year of Publication: 2006
- d. Link: <https://doi.org/10.1177/1070496505285466>
- e. Abstract: Country-level analyses of global Environmental Kuznets Curve (EKC) relationships that use multicountry panel data sets are likely to suffer from several types of aggregation bias that may explain why previous studies have yielded conflicting results. The authors analyze 1990 cross-sectional data for the United States for three pollutants and test the general EKC relationship as well as the pure income effect. Their results suggest that the income level at which households reduce their exposure to pollution depends on the nature of the pollutant. They find consistent evidence for such a relationship for coarse particulate matter but little evidence for nonmonotonic relationships for carbon monoxide and ground-level ozone.

4. Preferences, Income and the Environment: Understanding the Environmental Kuznets Curve Hypothesis

- a. Department: Economics
- b. Author(s): Neha Khanna, Florenz Plassmann
- c. Year of Publication: 2006
- d. Link: <https://www.jstor.org/stable/3697754>
- e. Abstract: We derive a simple expression for the income-pollution path using the standard static model of the environmental Kuznets curve (EKC). This expression makes it straightforward to identify the general characteristics of utility and pollution functions that lead to such a curve. We show that suitable preferences can always lead to an EKC while there is no technology that yields an EKC for all types of preferences, and we derive a sufficient condition for technology that leads to an EKC for almost all types of preferences. Our results hold for a model with multiple goods with different pollution intensities and for a production economy with nonconstant relative price of consumption and environmental effort. We derive our results without assuming specific functional forms and we encompass several other models as special cases.

5. The Demand for Environmental Quality and the Environmental Kuznets Curve

Hypothesis

- a. Department: Economics
 - b. Author(s): Neha Khanna, Florenz Plassmann
 - c. Year of Publication: 2004
 - d. Link: <https://doi.org/10.1016/j.ecolecon.2004.06.005>
 - e. Abstract: Household demand for better environmental quality is the key factor in the long-term global applicability of the Environmental Kuznets Curve (EKC) hypothesis. We argue that, for given consumer preferences, the threshold income level at which the EKC turns downwards or the equilibrium income elasticity changes sign from positive to negative depends on the ability to spatially separate production and consumption. We test our hypothesis by estimating the equilibrium income elasticities of five pollutants, using 1990 data for the United States. We find that the change in sign occurs at lower income levels for pollutants for which spatial separation is relatively easy as compared to pollutants for which spatial separation is difficult. Our results suggest that even high-income households in the United States have not yet reached the income level at which their demand for better environmental quality is high enough to cause the income–pollution relationship to turn downwards for all the pollutants that we analyzed.
6. The Income Elasticity of Non-Point Source Air Pollutants: Revisiting the Environmental Kuznets Curve.
- a. Department: Economics
 - b. Author(s): Neha Khanna
 - c. Year of Publication: 2002
 - d. Link: [https://doi.org/10.1016/S0165-1765\(02\)00153-2](https://doi.org/10.1016/S0165-1765(02)00153-2)
 - e. Abstract: This paper examines the income–pollution relationship for three non-point source pollutants in 1990. Ambient concentrations reported at monitors throughout the US are regressed on median household income and other socio-economic variables for the census tracts in which the monitors were located. Contrary to earlier studies, a u-shaped relationship is obtained.

VII. FRACKING

1. Drilling for Oil and Gas: An Interview with John Holko
 - a. Department: Environmental Science
 - b. Author(s): Logan Kinney
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol7/iss2/12>
 - e. Abstract: This is a personal interview with John Holko, president of New York based company Lenape Resources.

2. Gas and Oil Drilling: A Look at Waste Management
 - a. Department: Economics
 - b. Author(s): Logan Kinney
 - c. Year of Publication: 2020
 - d. Link:
<https://sites.google.com/binghamton.edu/2020researchdaystemplate/search-by-author-k-n/kinney-logan>
 - e. Abstract: Hydraulic fracturing is a method of extracting oil and gas developed in the 1940s. The purpose of hydrofracking is to gain access to fossil energy deposits that had previously been inaccessible. This process produces a large majority of the world's waste, in addition to polluting air and water. Due to this, hydrofracking in the state of New York was banned in 2014, yet continues in surrounding states such as Ohio and Pennsylvania. Being that high-volume fracturing was banned in New York I chose to focus on Pennsylvania, more specifically Susquehanna County. I want to determine how waste management processes have changed in this area since the ban in New York. The Department of Environmental Protection in Pennsylvania collects production and waste reports for the wells located throughout the state. I examine these reports, in order to determine the factors that negatively affect the environment. I expect that waste will have been managed in a way that is more conscious of the environmental impacts this industry is having, however with the continued practice of hydraulic fracturing I do expect to see an increase in the number of waste products being produced. This affects today's society in everyday life, gas and oil are a necessity for many aspects of our lives, for example they generate heating and electricity. It is important to minimize the waste produced from this industry to prevent further contribution to polluting the environment.

VIII. MIGRATION

1. Migration and displacement in a changing climate
 - a. Department: Geography and Environmental Studies
 - b. Author(s): Neyda V. Gilman, Jen Embree, Robert McLeman
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/library-sustainability-resources/5/>
 - e. Abstract: Binghamton University Libraries is excited to host a Zoom talk with Robert McLeman, Geography and Environmental Studies Professor at Wilfrid Laurier University. Dr. McLeman is a Coordinating Lead Author for the Intergovernmental Panel on Climate Change's (IPCC) working group on impacts, vulnerability and adaptation. He will join us for an October 15th lunchtime talk on:
 - current trends in displacements and migration due to hurricanes, floods, droughts, fires, etc
 - projected future risks (including sea level rise)
 - implications for the US (including displacements of people within the US, displacements of people in other countries who then migrate to the US)
 - possible responses (policies and practices)

2. Natural disasters and migration
 - a. Department: Economics
 - b. Author(s): Ariel R. Belasen, Solomon W. Polachek
 - c. Year of Publication: 2013
 - d. Link: https://econpapers.repec.org/bookchap/elgeechap/4026_5f17.htm
 - e. Abstract: Migration economics is a dynamic, fast-growing research area with significant and rising policy relevance. While its scope is continually extending, there is no authoritative treatment of its various branches in one volume. Written by 44 leading experts in the field, this carefully commissioned and refereed Handbook brings together 28 state-of-the-art chapters on migration research and related issues.

IX. DISASTERS

1. Fire & Flood Interview with Vanessa
 - a. Department: Environmental Science
 - b. Author(s): Vanessa Raditz, Elizabeth Wang, Kelly Clark, Jennifer Embree, Neyda V. Gilman
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/library-sustainability-resources/3>
 - e. Abstract: N/A
2. Sustainability and Disaster Planning: What are the Connections?
 - a. Department: Public Administration
 - b. Author(s): George C. Homsy, Lu Liao, Mildred E. Warner
 - c. Year of Publication: 2019
 - d. Link: https://orb.binghamton.edu/public_admin_fac/47
 - e. Abstract: In this paper, we examine the connections between resiliency and sustainability by asking: can disaster planning lead to more sustainability actions? In a survey we conducted of 1,899 cities, towns, and counties across the United States in 2015, we found that disaster plans are three times more common than sustainability plans. Our regression models find both types of plans lead to sustainability action as does regional collaboration across the rural-urban interface. However, we find that hazard mitigation planning may be done without including sustainability staff, citizens, and other officials. After controlling for motivations, capacity, and cooperation, we find rural communities are more likely to have sustainability plans than suburbs, though their level of sustainability action is lower due to capacity constraints. Our models of multilevel governance find local motivations balance sustainability's concept of environment, economic development, and social equity – and are more important drivers of action than grassroots or higher level government funding and policy. This bodes well in a context where federal government leadership on sustainability is absent.
3. How Disasters Affect Local Labor Markets: The Effects of Hurricanes in Florida
 - a. Department: Economics
 - b. Author(s): Ariel R. Belasen, Solomon W. Polachek
 - c. Year of Publication: 2018
 - d. Link: <http://www.jstor.org/stable/20648894>
 - e. Abstract: This study improves upon the Difference in Difference approach by examining exogenous shocks using a Generalized Difference in Difference (GDD) technique that identifies economic effects of hurricanes. Based on the Quarterly

Census of Employment and Wages data, worker earnings in Florida counties hit by a hurricane increase up to 4 percent, whereas earnings in neighboring counties decrease. Over time, workers experience faster earnings and slower employment growth than workers in unaffected counties. Hurricanes have a greater impact in coastal and Panhandle counties, and powerful hurricanes have greater economic effects than weaker ones. Further, the GDD technique is applicable to analyze a wider range of exogenous shocks than hurricanes.

4. Protocols, awareness, and preparedness of Dominica during Hurricane Maria: small island developing states' challenges to resiliency and adaptation to climate change
 - a. Department: Environmental Science
 - b. Author(s): Keanna Nicole Julien
 - c. Year of Publication: 2018
 - d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol7/iss1/3>
 - e. Abstract: Among the greatest threats of climate change is the significant impact on mass displacement, particularly as it relates to Mexico-US immigration. Low crop yields from worsening climate conditions have been linked to increased migration of Mexican farmers. With a projected 4.2 million additional migrants in the foreseeable future, it poses a contemporary environmental, social, and political dilemma. This policy brief analyzes several provision proposals to be adopted into the United States-Mexico-Canada Agreement (USMCA), as evaluated under economic cost, equity, environmental impact, and feasibility criteria. My research concludes that the most effective and direct provision proposal is the implementation of adaptive farming to protect small-scale farmers against the adverse effects of climate change. The policy benefits both American and Mexican governments by mitigating financial losses from low crop yield, limiting Mexico-US immigration, and building climate resilience for farmers. This serves as a model for addressing the global increase of climate refugees and can help predict climate change-driven migration patterns in rural areas around the world.

5. How do hurricanes impact scholastic achievement? A Caribbean perspective
 - a. Department: Economics
 - b. Author(s): Nekeisha Spencer, Solomon Polachek, Eric Strobl
 - c. Year of Publication: 2016
 - d. Link: <https://link.springer.com/article/10.1007/s11069-016-2494-7>

- e. Abstract: This study examines whether hurricanes have any impact on performance in high school standardized examinations. The analysis uses a panel of thirteen Caribbean countries and over 800 schools for the period 1993 through 2010. In particular, the effect on subjects in the humanities and sciences is examined. A generalized difference-in-difference technique is utilized to study the relationship at the school, parish, year and country levels. The results show a negative and significant effect on performance in the sciences if hurricanes strike when school is in session, and a positive or no effect when school is not in session. In addition, subjects in the humanities remain unaffected.
6. Do Natural Disasters Induce More Crime?
 - a. Department: Environmental Science
 - b. Author(s): Michael Lentini, Plamen Nikolov, Matthew Schwartz
 - c. Year of Publication: 2016
 - d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol2/iss1/7>
 - e. Abstract: The Indian Ocean Tsunami of 2004 resulted in grave consequences for South East Asia. Indonesia, in particular, had the highest death toll, losing over 150,000 people. Indonesia's coastal region Aceh was the hardest hit by this disaster. Exploiting exogenous spatial variation at the district level, we use difference-in-difference analysis to estimate the causal effect of the 2004 disaster on subsequent crime rates. We find that after the tsunami, total annual crime rate went down, on average, by 244 crimes per annum.
 7. Hurricane watch: Battening down the effects of the storm on local crop production
 - a. Department: Economics
 - b. Author(s): Nekeisha Spencer, Solomon Polachek
 - c. Year of Publication: 2015
 - d. Link: <https://www.iza.org/publications/dp/9439/hurricane-watch-battening-down-the-effects-of-the-storm-on-local-crop-production>
 - e. Abstract: This study utilizes a panel fixed effects model to explore the economic impact of hurricanes on local crop production in Jamaica using quarterly 1999-2008 micro level data. We find, in general, that hurricanes will have a negative impact on production but not for crops grown below ground. The exceptions for underground crops being negatively affected are yams and potatoes for which water saturated soil reduces output. From these results, implications are obtained regarding issues such as food security, export expansion, and earnings.

8. How Hurricanes Affect Wages and Employment in Local Labor Markets
 - a. Department: Economics
 - b. Author(s): Ariel R. Belasen, Solomon W. Polachek
 - c. Year of Publication: 2011
 - d. Link: <http://www.jstor.org/stable/29729993>
 - e. Abstract: This paper adopts a generalized-difference-in-difference (GDD) technique outlined in Ariel R. Belasen and Solomon W. Polachek (IZA Discussion Paper #2976) to examine the impact of hurricanes on the labor market. We find that earnings of the average worker in a Florida county rises over 4% within the first quarter of being hit by a major Category 4 or 5 hurricane relative to counties not hit, and rises about 1¼% for workers in Florida counties hit by less major Category 1-3 hurricanes. Concomitantly, employment falls between 1½ and 5% depending on hurricane strength. On the other hand, the effects of hurricanes on neighboring counties have the opposite effects, moving earnings down between 3 and 4% in the quarter the hurricane struck. To better examine the specific shocks, we also observe sectoral employment shifts. Finally, we conduct a time-series analysis and find that over time, there is somewhat of a cobweb with earnings and employment rising and falling each quarter over a two-year time period.

9. Gender-based differences in access to and use of loans from rural credit programs for flood adaptation in the farming-dependent char communities of Bangladesh
 - a. Department: N/A
 - b. Author(s): Farha Naz, Philippe Doneys
 - c. Year of Publication: 2011
 - d. Link: <https://doi.org/10.1016/j.wsif.2022.102651>
 - e. Abstract: Recent research on gendered access to credit shows that while women borrowers bear the liability of rural credit programs, the proceeds are often directly invested by their male partners. This paper examines loan access and flood adaptation-related investment activities among char female borrowers. Primary data from a survey of female respondents in 129 households and qualitative data from 6 key informant interviews, 3 focus group discussions, and 18 in-depth interviews reveal that women have limited control over loan investment activities. Men's financial control undermines positive social externalities of women's adaptive capacity from loan use, and loans exacerbate households' gender-related tensions. Although loans foster women's capacity for collective action and flood adaptation, the nexus of gender and microcredit access between partners determines women's access to and use of credit.

Further research should investigate how institutions can increase equitable access to loans to improve both men and women's adaptive capacity to natural hazards.

X. OIL

1. World Oil: The Growing Case for International Oil Policy
 - a. Department: Economics
 - b. Author(s): Neha Khanna, Duane Chapman
 - c. Year of Publication: 2000
 - d. Link: <https://doi.org/10.1111/j.1465-7287.2000.tb00001.x>
 - e. Abstract: Can the economic theory of depletion be reconciled with low petroleum prices? This article uses a revision of the theory, which reflects demand functions that rise in response to increasing world population and income. The magnitude of producers' and consumers' surplus is estimated under both competitive and monopolistic assumptions; the result indicates a present value comparable to or in excess of today's gross world economic product. Game theory suggests a framework that explains the interaction between oil pricing and military policy, and the economic incentives that result in a general pattern of recent market equilibrium crude oil prices often fluctuating with a \$15–20 per barrel range. The analysis concludes that the economic incentives for political instability in the Persian Gulf will increase, and more formal methods of setting the international framework for Persian Gulf oil may be expected.

XI. POLICY

1. Firm Behavior Under Unanticipated Change in Regulation: Power Plant Emissions During the 2018-2019 Federal Government Shutdown
 - a. Department: Economics
 - b. Author(s): Neha Khanna, Ruohao Zhang, Huan Li
 - c. Year of Publication: In-progress
 - d. Link: [10.22004/ag.econ.305182](https://orb.binghamton.edu/ag.econ.305182)
 - e. Abstract: This paper studies the firm's short-run strategic response to unexpected shocks in environmental regulation. Our theoretical model suggests that firms strategically reduce their environmental compliance effort when regulatory stringency declines in the short run. We focus on coal-fired power plants in the United States, and use the EPA's furlough during the 2018 – 19 federal government shutdown as a natural experiment to test our theory. We use two high frequency data sets to measure the pollution: EPA AMPD data set provides daily SO₂ and NO_x emissions, and NASA satellite-based aerosol optical depth (AOD) data indicates the daily PM concentration with fine resolution. Our empirical results imply that during the government shutdown, EPA's furlough causes a negative shock on regulation stringency, and coal-fired power plants significantly increase their PM emissions. On average, the local AOD surrounding the coal-fired power plants is raised by 15.43% during the EPA's furlough by temporally turning off PM pollution control devices. There is no significant change in SO₂ and NO_x, because these two pollutants are under continuous monitoring, so EPA's furlough has small effect on the stringency of SO₂ and NO_x regulation.

2. Beyond community characteristics: a leader's gender and local government adoption of energy conservation practices and redistributive programs
 - a. Department: Public Administration
 - b. Author(s): George C. Homsy, Kristina T. Lambright
 - c. Year of Publication: 2021
 - d. Link: https://orb.binghamton.edu/public_admin_fac/56/
 - e. Abstract: Most research examining factors associated with local government adoption of sustainability practices focuses on the impact of community characteristics. Little is known about whether adoption is also related to the characteristics of the leaders in these jurisdictions. To address this gap in the literature, this exploratory study uses data from a national survey of U.S. local governments (n = 1,672) to examine the potential correlation between adoption of certain sustainability practices and the gender of a jurisdiction's highest

elected official. Our regression models find that jurisdictions led by women were more likely to have adopted redistributive programmes and practices encouraging community-based energy conservation. But, there is no correlation between a local government's adoption of measures promoting government energy conservation and its leader's gender. Future research should explore whether female leaders' greater openness to citizen involvement in the policymaking process and women's socialisation to focus on communal rather than individual interests help account for our findings.

3. High Priority Violations and Intra-firm Pollution Substitution

- a. Department: Economics
- b. Author(s): Binish Rijal, Neha Khanna
- c. Year of Publication: 2020
- d. Link: <https://doi.org/10.1016/j.jeem.2020.102359>
- e. Abstract: We examine the sign and the magnitude of pollution leakage associated with the High Priority Violations Policy (HPVP) under the Clean Air Act. Using 46,012 facility-year observations for 7947 polluting facilities across all industries in the U.S., we find strong evidence of intra-firm pollution substitution associated with the HPVP. On average, a compliant facility increased its toxic air emissions by about 35–56 percent (3600 to 6000 lbs.) if it had at least one other sister facility, within the same 6-digit NAICS industry code and belonging to the same parent firm, concurrently under violation. The magnitude of such intra-firm pollution substitution was stronger towards compliant facilities with no prior history of high priority violation as well as towards those owned by private parent companies. We also find that substitution of pollution from a sister facility under violation increases the risk of violation among currently compliant facilities.

4. Does public ownership of utilities matter for local government water policies?

- a. Department: Public Administration
- b. Author(s): George C. Homsy, Mildred E. Warner
- c. Year of Publication: 2020
- d. Link: https://orb.binghamton.edu/public_admin_fac/55/
- e. Abstract: What differentiates local governments that implement water policies on equity and the environment? Analyzing a 2015 survey of 1,897 U.S. municipalities, we find municipalities that own their water utilities more likely have policies to protect low-income residents from disconnection and to implement water resource management. Respondents from 8% of municipalities

report protecting residents from disconnection. State economic regulation of publicly owned utilities and Democrat-majority municipal governments are positively associated with policies protecting low-income households from shutoffs but bear no association with resource management. Public ownership of utilities and state economic regulation may play a role in meeting water policy goals.

5. Hybrids and Household Behavior: Implications for Miles Traveled and Gasoline Consumption

- a. Department: Economics
- b. Author(s): 2019
- c. Year of Publication: Neha Khanna, Shanxia Sun, Michael S. Delgado
- d. Link: [10.22004/ag.econ.258502](https://doi.org/10.22004/ag.econ.258502)
- e. Abstract: We estimate the impact of gasoline-electric hybrid vehicle ownership on annual miles traveled in order to understand the relationship between hybrid ownership and fuel consumption. When the higher fuel efficiency of hybrid vehicles is able to reduce gasoline consumption in driving, the lower driving cost (e.g., financial cost, environmental cost) of hybrids may lead to rebound effects of driving behavior, which could offset the reductions in gasoline consumption from hybrids vehicles. We measure two types of rebound effects associated with hybrid adoption. The first one is the total rebound effect, in which a hybrid owner drives more after adopting a hybrid vehicle. The second is a social status driven rebound effect, in which the owner of a visually distinct hybrid vehicle drives more to signal his/her environmental consciousness. We focus on issues of identification in light of observable and unobservable factors that influence both hybrid adoption and miles traveled, and develop a matching strategy to account for these factors that allows us to recover causal effects. Despite prior evidence of the status signaling effect of visually distinct hybrid vehicles, we do not find evidence of a statistically significant status-driven rebound effect. However, we find a total rebound effect on miles traveled of about 3 percent of the (average) annual miles traveled that only slightly offsets the reduction in fuel consumption from the higher fuel efficiency of hybrid vehicles. We calculate that hybrid adoption reduces fuel consumption by 34 to 46 percent per year compared to conventional gasoline powered vehicles.

6. Multilevel Governance: Framing the Integration of Top-Down and Bottom-Up Policymaking

- a. Department: Public Administration

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- b. Author(s): George C. Homsy, Zhilin Liu, Mildred E. Warne
 - c. Year of Publication: 2019
 - d. Link: <https://doi.org/10.1080/01900692.2018.1491597>
 - e. Abstract: Scholars embrace multilevel governance as an analytical framework for complex problems, such as climate change or water pollution. However, the elements needed to comprehensively operationalize multilevel governance remain undefined in the literature. This paper describes the five necessary ingredients to a multilevel framework: sanctioning and coordinating authority, provision of capacity, knowledge co-production, framing of co-benefits, and inclusion of civil society. The framework's analytical utility is illustrated through two contrasting case examples – watershed management in the U.S. and air quality management in China. The framework balances local and central actors, which can promote a more effective governance regime.
7. Reframing Rural Planning: Multilevel Governance to Address Climate Change
 - a. Department: Economics
 - b. Author(s): George C. Homsy, Mildred E. Warner
 - c. Year of Publication: 2019
 - d. Link: <https://www.taylorfrancis.com/chapters/edit/10.4324/9781315102375-60/reframing-rural-planning-george-homsy-mildred-warner>
 - e. Abstract: While there is now an established literature examining climate change governance and low carbon transitions at an urban scale, the rural literature is less developed. This chapter will examine the challenges to rural planning that climate change represents. Rural planning requires local government leadership as well as collaboration across agencies and across communities to address climate change. This multisector and multilevel approach is the future of rural planning. We use US data on rural communities and climate change planning as well as case examples to illustrate our theory of multilevel governance. We also argue for rural planning to reframe climate change – currently perceived as involving short-term costs while the benefits are diffuse and often distant in time and place – towards emphasising local gains linked, for example, to economic development. Then we offer a set of short case studies to examine the ways local leaders have reframed issues and engaged in both horizontal and vertical collaborations.
8. Size, Sustainability, and Urban Climate Planning in a Multilevel Governance Framework
 - a. Department: Environmental Science
 - b. Author(s): George C. Homsy

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- c. Year of Publication: 2017
 - d. Link: https://orb.binghamton.edu/public_admin_fac/44
 - e. Abstract: In the United States, the absence of federal leadership on climate change and a strong tradition of localism has created a system in which many greenhouse gas reduction efforts fall to the discretion of municipalities. This often leads to uncoordinated action across jurisdictional boundaries. Despite the widespread notion that cities can lead on climate policy from the bottom up, I find, using a logistic regression analysis of data from 1,837 municipalities, that local governments are more likely to enact climate change policies in an environment where higher levels of government have acted rather than in a decentralized one. Smaller municipalities, in particular, have increased odds of action when engaged when their states act. Using existing regional, state-based initiatives, I present options for a coordination and capacity building framework.
9. Scaling Up the Self, Scaling Down the World: Self-objectification and the Politics of Carbon Offsets and Personalised Genomics
- a. Department: Anthropology
 - b. Author(s): Joshua Reno
 - c. Year of Publication: 2017
 - d. Link: https://orb.binghamton.edu/anthropology_fac/32
 - e. Abstract: Two global initiatives, the Genographic Project and the Carbon Lottery, share an ambition to make abstract, global processes—human evolution and climate change—comprehensible and engaging to non-specialists. Despite their differences, they both do so by means of self-objectifications that scale up the selves of participants and scale down complex, spatio-temporal models of human-world relations. Based on the author’s auto-ethnographic experience as a participant in both initiatives, it is argued that carbon calculators and personalised genomics involves a pragmatics of scale that evaluates and compares users on the basis of their relative expression of, or deviation from, a standard. Furthermore, this is not based on actual resources that participants do or do not possess, but on forms of capitalist exchange that underwrite carbon trading and population genomics, as experts and corporations make fungible intellectual property derived from purportedly rare DNA and sustainable practices, which are typically indigenous and non-western. In fact, for users of these initiatives, the global inequalities that make possible transactions in carbon offsets and genetic ancestry are obscured from view. As a result, though initiatives like the Genographic Project and Carbon Lottery may provide

comprehensible self-objectifications, they potentially make the world more unequal in the process.

10. The Value of Environmental Status Signaling

- a. Department: 2015
- b. Author(s): Neha Khanna, Michael Delgado, Jessica Harriger
- c. Year of Publication: 2015
- d. Link: [10.1016/j.ecolecon.2014.12.021](https://doi.org/10.1016/j.ecolecon.2014.12.021)
- e. Abstract: How much are consumers willing to pay to signal their environmental consciousness? We identify the signaling value of an environmental public good by focusing on hybrid cars and exploiting the physical uniqueness of the Toyota Prius relative to hybrids that look identical to their non-hybrid counterparts. We deploy a quasi-experimental hedonic model to estimate this willingness to pay. We find that, controlling for observable and unobservable factors, the Prius commands an environmental signaling value of \$587 or 4.5% of its value. Our research provides lessons for economists and policymakers, and contributes to the literature on identifying signaling values.

11. Output, Emissions and Technology: Some Thoughts

- a. Department: Economics
- b. Author(s): Neha Khanna
- c. Year of Publication: 2013
- d. Link: <https://doi.org/10.1016/j.econlet.2012.11.007>
- e. Abstract: The principal goal of this article is to identify the implications of a binding emission constraint on a firm's optimal capital–labor ratio and to determine whether it is appropriate to write a firm's production function as an increasing function of its emissions alone. I find that even though a firm's supply curve may be written as a positive function of its emissions, it is not appropriate to write the production technology as an increasing function of only its emissions, except under special circumstances.

12. The Anthropocentric Advantage? Environmental Ethics and Climate Change Policy

- a. Department: Anthropology
- b. Author(s): Nicole Hassoun
- c. Year of Publication: 2011
- d. Link: https://orb.binghamton.edu/philosophy_fac/4
- e. Abstract: Environmental ethicists often criticize liberalism. For, many liberals embrace anthropocentric theories on which only humans have non-instrumental

value. Environmental ethicists argue that such liberals fail to account for many things that matter or provide an ethic sufficient for addressing climate change. These critics suggest that many parts of nature -- non-human individuals, other species, ecosystems and the biosphere have a kind of value beyond what they contribute to human freedom (or other things of value). This article suggests, however, that if environmental ethics are inclusive and also entail that concern for some parts of nature does not always trump concern for others, they have a different problem. For, when there are many things of value, figuring out what to do can be extremely difficult. Even though climate change is likely to cause problems for many parts of nature it will probably be good for some other parts. Inclusive environmental ethicists need a theory taking all of the things they care about into account to provide definitive reason even to address climate change. Without this theory, anthropocentric liberals might argue that we should not accept an inclusive environmental ethic. Although there may be something wrong with this line of thought, it at least raises a puzzle for those inclined to accept these ethics

13. Free Trade and The Environment

- a. Department: Philosophy
- b. Author(s): Nicole Hassoun
- c. Year of Publication: 2009
- d. Link: https://orb.binghamton.edu/philosophy_fac/9/
- e. Abstract: What should environmentalists say about free trade? Many environmentalists object to free trade by appealing the “Race to the Bottom Argument.” This argument is inconclusive, but there are reasons to worry about unrestricted free trade’s environmental effects nonetheless; the rules of trade embodied in institutions such as the World Trade Organization may be unjustifiable. Programs to compensate for trade-related environmental damage, appropriate trade barriers, and consumer movements may be necessary and desirable. At least environmentalists should consider these alternatives to unrestricted free trade if they do not prevent the achievement of other important moral objectives, can efficiently reduce environmental problems, and institutional safeguards can prevent their abuse.

14. Challenge Paper on Air Pollution

- a. Department: Economics
- b. Author(s): Bjorn Larson, Neha Khanna, Guy Hutton
- c. Year of Publication: 2008

- d. Link: <https://www.jstor.org/stable/resrep16379>
- e. Description: While there are many air pollutants, current assessment methods identify fine particulates (PM2.5) as the pollutant with the largest health effects globally. The focus of this paper is therefore particulates. Particulates are caused directly by combustion of fossil fuels and biomass, industrial processes, forest fires, burning of agricultural residues and waste, construction activities, and dust from roads, but also arise naturally from marine and land based sources (e.g. dust from deserts). Particulates, or so called secondary particulates, are also formed from gaseous emissions such as nitrogen oxides and sulfur dioxide.

15. Measuring Environmental Quality: An Index of Pollution

- a. Department: Economics
- b. Author(s): Neha Khanna
- c. Year of Publication: 2000
- d. Link: [https://doi.org/10.1016/S0921-8009\(00\)00197-X](https://doi.org/10.1016/S0921-8009(00)00197-X)
- e. Abstract: This paper develops an index of pollution based on the epidemiological dose-response function associated with each pollutant, and the welfare losses due to exposure to pollution. The probability of damage is translated into welfare losses, which provides the common metric required for aggregation. Isopollution surfaces may then be used to compare environmental quality over time and space. An Air Pollution Index (API) is computed using 1997 data for the criteria pollutants under the Clean Air Act (CAA). The results are compared with the EPA's Pollutant Standards Index (PSI). Two significant differences emerge: unlike the PSI, the API facilitates a detailed ranking of regions by air quality and API values may contradict PSI results. Some regions with PSI values of 100–200 are considered less polluted under the proposed methodology than those with PSI values between 50 and 100. The key reason for the difference is that PSI values are determined entirely by the gas with the highest relative concentration whereas the API value is based on the ambient concentrations of all pollutants.

XII. POLLUTION

1. Computational analysis of a Mn-based electrocatalyst with primary amine substituents in the secondary coordination sphere for CO₂ reduction
 - a. Department: Chemistry
 - b. Author(s): Erin Urban
 - c. Year of Publication: 2022
 - d. Link: https://orb.binghamton.edu/undergrad_honors_theses/13
 - e. Abstract: The purpose of this research was to report the mechanism for the two-electron, two-proton conversion of CO₂ to CO and H₂O using a manganese(I) electrocatalyst, Mn(L)(CO)₃Br (where L = bipyridyl ligand with aryl-amine moieties installed at the 6 position of 2,2'-bipyridine), synthesized by the Jurss group, including any other competing reactions, such as the hydrogen evolution reaction (HER). The “protonation- first” and “reduction-first” pathways were considered for CO₂ RR. Density functional theory (DFT) calculations were performed to determine the redox potentials and Gibb’s free energies for each step in the mechanism for CO₂ RR and HER. Herein, we show that the “reduction-first” pathway is the most favorable in the production of CO, especially under high applied potential (i.e., high overpotential regime used experimentally). Additionally, this work confirms the selectivity of Mn(L)(CO)₃Br for CO production over H₂ formation. Repeating these calculations with a larger basis set and focusing future research on additional functionalized ligands will be an improvement upon this work.

2. Phenological shifts in amphibian breeding influences offspring size and response to a common wetland contaminant
 - a. Department: Biological Sciences
 - b. Author(s): Nicholas Buss, Lindsey Swierk, Jessica Hua
 - c. Year of Publication: 2020
 - d. Link: https://orb.binghamton.edu/bio_students/4
 - e. Abstract: Increases in temperature variability associated with climate change has critical implications for the phenology of wildlife across the globe. Indeed, there have been many examples of warmer winter temperatures (i.e. “false springs”) inducing forward shifts in breeding phenology. Earlier breeding can put wildlife at risk of freeze events during reproduction or vulnerable early life stages. Furthermore, in addition to temperature shifts, wildlife populations commonly encounter a wide diversity of other stressors (e.g. pollutants). As global change is predicted to increase both temperature variability and instances of pollutant contamination, understanding interactions between these stressors will become

increasingly important. Using 14 populations of a widespread amphibian (wood frog; *Rana sylvatica*), we evaluated how differences in breeding phenology (early- versus late-breeding cohorts) across two breeding seasons influenced offspring 1) growth; 2) tolerance to a common wetland contaminant (NaCl); and 3) ability to acclimate to NaCl. Offspring of late-breeding cohort were larger and less tolerant of NaCl compared to offspring of the early-breeding cohort. Additionally, while offspring of the early-breeding cohort were able to acclimate to a lethal concentration of NaCl following sublethal exposure by becoming more tolerant to later NaCl exposure, offspring of the late-breeding cohort became less tolerant to NaCl. Interestingly, the negative effects of late breeding phenology on responses to NaCl only occurred during the colder of the two breeding seasons. Collectively, these results suggest that freeze events in the parental environment following false springs may have cascading consequences on offspring mass and ability to tolerate future stressors.

3. Cooking Fuel Choice, Indoor Air Quality and Child Mortality in India

- a. Department: Economics
- b. Author(s): Arnab K. Basu, Tsenguunjav Byambasuren, Nancy H. Chau, Neha Khanna
- c. Year of Publication: 2020
- d. Link: <https://www.iza.org/publications/dp/13295/cooking-fuel-choice-indoor-air-quality-and-child-mortality-in-india>
- e. Abstract: Indoor air pollution (IAP)—predominantly from the use of solid fuel for cooking—is a global health threat, particularly for women and young children, and one of the leading causes of infant deaths worldwide in developing countries. We estimate the causal effect of cooking fuel choice on infant mortality in India, focusing on children under five years of age using pooled cross-sectional data from the National Family Health Survey (NFHS) over the period 1992–2016. To address the potential endogeneity in the relationship between fuel choice and mortality, we instrument for cooking fuel choice using a speed of change in forest cover and ownership status of agricultural land, which induce significant variations in fuel type. We find that cooking fuel choice has a statistically significant impact on under-five and neonatal mortality, raising the mortality risk by 4.9 percent. We also find that the past literature has overestimated the association between under-five mortality and polluting fuel use by about 0.6 percentage points or equivalently, 152,000 deaths per year nationally. Our result is robust to a set of alternative specifications with the inclusion of various controls and different estimation strategies.

4. Local Air Quality Impacts of Shale Gas Development in Pennsylvania

- a. Department: Economics
- b. Author(s): Ruohao Zhang, Huan Li, Neha Khanna, Daniel Sullivan, Alan Krupnick, and Elaine Hill
- c. Year of Publication: 2020
- d. Link: <https://www.rff.org/publications/journal-articles/satellite-detection-air-pollution-air-quality-impacts-shale-gas-development-pennsylvania/>
- e. Abstract: This paper estimates the impact of shale gas development on local particulate matter pollution by exploiting a quasi-experimental setting in Pennsylvania where some wells experienced pre-production and/or production activities whereas some others were permitted but not spud between 2000 – 2018. We measure local PM pollution using daily aerosol optical depth (AOD) over a 3 kilometers circular area around every shale gas well. Using a spatial difference-in-differences model, we find that both shale gas pre-production and production activities increase daily AOD significantly, by 1.35% – 2.19% relative to the baseline. The effect of pre-production is slightly larger than production activities, but both effects attenuate with distance from the centroid well. Accounting for airborne spillovers, fracking increases AOD by 1.27% – 5.67%, which translates to 0.017 $\mu\text{g}/\text{m}^3$ –0.062 $\mu\text{g}/\text{m}^3$ increase in PM 2.5 concentration. This increase in PM 2.5 is associated with 20.11 additional deaths.

5. International Tourism as a Threat to Public Health in Thailand

- a. Department: Anthropology
- b. Author(s): Liam G. Lane
- c. Year of Publication: 2020
- d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol6/iss1/10>
- e. Abstract: From its unique history, Thailand has embraced its independence and benefited from its cultural and natural beauty. Transitioning from an agricultural to industrial economy due to the emergence of a strong tourism industry, Thailand has experienced a period of intensive urbanization that has re-shaped Thai lifestyle. Materializing as regional and social disparities, these consequences of industrialization have seemingly divided Thai society, separating those who benefit from the tourism sector while marginalizing those who do not. Additionally, this transition has threatened public health statuses within Thailand, and considering the current tourism trends seen over the past 20 years there is a great need for action and sustainable measures to ensure human health is not adversely affected even more. In this paper, I analyze the history of international tourism in Thailand and argue how this industry has negatively

impacted current health statuses (specifically focusing on environmental health, non-communicable diseases, dietary transitions, and medical tourism). Through a review of current literature, this paper highlights the variability of health statuses and the interconnectedness of socioeconomic factors in influencing health and well-being among populations. Policies and programs are not discussed in this paper.

6. Air pollution & asthma prevalence: Hotspot analysis on environmental injustice in Buffalo, New York
 - a. Department: Sustainable Communities
 - b. Author(s): Zuveria Shaguphta
 - c. Year of Publication:2019
 - d. Link: https://orb.binghamton.edu/dissertation_and_theses/118
 - e. Abstract: This research aims to focus on the historical impacts of segregation in these communities (with Census Bureau data) and whether we see that these are the areas with continued segregation and a disproportionate number of TRI facilities. The third part of this research will be to investigate the presence of asthma in these neighborhoods as documented by the New York State Health Department. Asthma is a chronic disease in which the airways are inflamed due to some kind of external factor causing this reaction. Literature shows that there is a relationship between outdoor air pollution from combustion of fossil fuels (in particular, emissions by TRI facilities) and the onset of asthma. Although this research was taken place in New York State, there are similar patterns seen across the United States. Further research may help solve such problems that underprivileged people are facing.

Hot Spot Analysis was done using the NAD 1983 which measured in meters for the Getis Ord GI* hotspot analysis. This analysis includes several maps that were created using ArcGIS® software by Esri. ArcGIS® and ArcMap™. An Optimized Hot Spot Analysis was the method chosen, and Global Moran fishnet grid were used. In the hotspot analysis, the northern part of Buffalo shows the highest confidence interval of 99%, which means that there is a statistically significant higher amounts of TRI facilities located in these ZCTAs compared to the rest of Buffalo. The bottom half of Buffalo, as seen on the map, still shows a significant concentration with the hotspot showing a 95% confidence level. Black majority zip codes consisting of 46-80% had three out of the four zip codes with a hotspot confidence interval of 99%. That means 75% of the zip codes have a confidence interval of 99% higher of TRI facility siting compared to the White majority zip codes that have a 40% of their zip codes with the same confidence interval. The

average asthma rate of the predominantly Black population zip codes is 156-186 per 10,000. Compared to the White majority zip codes that had an asthma rate of 56-96 per 10,000. We can clearly see a substantial difference in asthma rates between the predominantly White zip codes and the predominantly Black zip codes. A difference rate of 100-90 per 10,000 is here. The rate is doubled, if not more. The zip codes with predominantly White people are, 14216, 14222, 14206, and 14210. Here we can see that the asthma rate is 71-110 and 34-71 per 10,000. These are the lowest rates shown by the map. We can see a vivid contrast with these zip code areas and asthma rates. They are drastically on the lower end.

7. Nitrogen biogeochemistry in Binghamton, NY, a medium-sized urban ecosystem
 - a. Department: Biological Sciences
 - b. Author(s): Stephanie Craig
 - c. Year of Publication: 2016
 - d. Link: https://orb.binghamton.edu/dissertation_and_theses/68
 - e. Abstract: Humans have altered nitrogen (N) cycling on a global scale, and elevated nitrogen levels are characteristic of urban ecosystems. The major reasons that N is higher in cities include imports of food, fuel and fertilizer. High N export from both point- and nonpoint-sources is common in large cities. While N cycling has been studied in large urban areas, less is known about its cycling in medium-sized cities, such as Binghamton, N.Y. We found that point-source N exported from the Binghamton-Johnson City Wastewater Treatment Plant (B-JC WWTP) was greater than nonpoint-source N exported from eight urban streams to the Susquehanna River, which runs through the Binghamton area. The point-source N fluxes we measured from the B-JC WWTP were high because its function was impaired during the study, causing major environmental impacts on the Susquehanna River. Nonpoint-source N exported from eight urban streams was low, and comparable to N exported from streams of forested watersheds in the region. In an experiment in a roadside ecosystem, experimental deposition of N and road salt (NaCl) did not affect N cycling in roadside soils. However, NaCl negatively impacted C mineralization and soil respiration in situ. In a final experiment, we found that the microbial community of urban stream sediment had the capacity to substantially reduce NO₃⁻ through denitrification.

8. Effects of nitrogen and phosphorus additions on nitrous oxide emission in a nitrogen-rich and two nitrogen-limited tropical forests
 - a. Department: Biological Sciences

- b. Author(s): Mianhai H. Zheng, Tao Zhang, Lei Li, Weixing X. Zhu, Wei Zhang, Jiangming M. Mo
 - c. Year of Publication:2016
 - d. Link:https://orb.binghamton.edu/bio_fac/4
 - e. Abstract: Nitrogen (N) deposition is generally considered to increase soil nitrous oxide (N₂O) emission in N-rich forests. In many tropical forests, however, elevated N deposition has caused soil N enrichment and further phosphorus (P) deficiency, and the interaction of N and P to control soil N₂O emission remains poorly understood, particularly in forests with different soil N status. In this study, we examined the effects of N and P additions on soil N₂O emission in an N-rich old-growth forest and two N-limited younger forests (a mixed and a pine forest) in southern China to test the following hypotheses: (1) soil N₂O emission is the highest in old-growth forest due to the N-rich soil; (2) N addition increases N₂O emission more in the old-growth forest than in the two younger forests; (3) P addition decreases N₂O emission more in the old-growth forest than in the two younger forests; and (4) P addition alleviates the stimulation of N₂O emission by N addition. The following four treatments were established in each forest: Control, N addition (150 kg N ha⁻¹ yr⁻¹), P addition (150 kg P ha⁻¹ yr⁻¹), and NP addition (150 kg N ha⁻¹ yr⁻¹ plus 150 kg P ha⁻¹ yr⁻¹). From February 2007 to October 2009, monthly quantification of soil N₂O emission was performed using static chamber and gas chromatography techniques. Mean N₂O emission was shown to be significantly higher in the old-growth forest (13.9 ± 0.7 μg N₂O-N m⁻² h⁻¹) than in the mixed (9.9 ± 0.4 μg N₂O-N m⁻² h⁻¹) or pine (10.8 ± 0.5 μg N₂O-N m⁻² h⁻¹) forests, with no significant difference between the latter two. N addition significantly increased N₂O emission in the old-growth forest but not in the two younger forests. However, both P and NP addition had no significant effect on N₂O emission in all three forests, suggesting that P addition alleviated the stimulation of N₂O emission by N addition in the old-growth forest. Although P fertilization may alleviate the stimulated effects of atmospheric N deposition on N₂O emission in N-rich forests, this effect may only occur under high N deposition and/or long-term P addition, and we suggest future investigations to definitively assess this management strategy and the importance of P in regulating N cycles from regional to global scales.
9. Homsy, G. C. (2018). Size, Sustainability, and Urban Climate Planning in a Multilevel Governance Framework.
 - a. Department: Environmental Science

- b. Author(s): S. Hughes, E. K. Chu, & S. G. Mason (Eds.), *Climate Change in Cities* (pp. 19–38). Springer.
 - c. Year of Publication: 2018
 - d. Link: https://doi.org/10.1007/978-3-319-65003-6_2
 - e. Abstract: In the United States, the absence of federal leadership on climate change and a strong tradition of localism has created a system in which many greenhouse gas reduction efforts fall to the discretion of municipalities. This often leads to uncoordinated action across jurisdictional boundaries. Despite the widespread notion that cities can lead on climate policy from the bottom-up, I find, using a logistic regression analysis of data from 1837 municipalities, that local governments are more likely to enact climate change policies in an environment where higher levels of government have acted rather than in a decentralized one. Smaller municipalities, in particular, have increased odds of action when their states act. Using existing regional, state-based initiatives, I present options for a coordination and capacity building framework.
10. Input and output of dissolved organic and inorganic nitrogen in subtropical forests of South China under high air pollution
- a. Department: Biological Sciences
 - b. Author(s): Yunting T. Fang, Per Gundersen, Jiangming M. Mo, Weixing Zhu
 - c. Year of Publication: 2008
 - d. Link: http://orb.binghamton.edu/bio_fac/18
 - e. Abstract: The nitrogen (N) emissions to the atmosphere and N deposition to forest ecosystems are increasing rapidly in Southeast Asia, but little is known about the fates and effects of elevated N deposition in forest ecosystems in this warm and humid region. Here we report the concentrations and fluxes of dissolved inorganic (DIN) and organic N (DON) in precipitation, throughfall, surface runoff and soil solution for three subtropical forests in a region of South China under high air pollution over two years (2004 and 2005), to investigate how deposited N is processed, and to examine the importance of DON in the N budget. The precipitation DIN input was 32–34 kg N ha⁻¹ yr⁻¹. An additional input of 18 kg N ha⁻¹ yr⁻¹ as DON was measured in 2005, which to our knowledge is the highest DON flux ever measured in precipitation. A canopy uptake of DIN was indicated in two young conifer dominated forests (72–85% of DIN input reached the floor in throughfall), whereas no uptake occurred in an old-growth broadleaf forest. The DON fluxes in throughfall were similar to that in precipitation in all forests. In the younger forests, DIN was further retained in the soil, with 41–63% of precipitation DIN leached below the 20-cm soil depth.

Additionally, about half of the DON input was retained in these forests. The N retention in two young aggrading forests (21-28 kg N ha⁻¹ yr⁻¹) was in accordance with the estimates of N accumulation in biomass and litter accretion. In the old-growth forest, no N retention occurred, but rather a net loss of 8-16 kg N ha⁻¹ yr⁻¹ from the soil was estimated. In total up to 60 kg N ha⁻¹ yr⁻¹ was leached from the old-growth forest, indicating that this forest was completely N saturated and could not retain additional anthropogenic N inputs. We found that the majority of DIN deposition as well as of DIN leaching occurred in the rainy season (March to August) and that monthly DIN concentrations and fluxes in leaching were positively related to those in throughfall in all three forests, implying that part of the N leaching was hydrologically driven. Our results suggest that long-term high N deposition has caused elevated N leaching in all three forest types although most pronounced in the old-growth forest where wood increment was negligible or even negative. N availability even exceeded the biotic N demand in the young aggrading forests, with intensive rain in the growing season further enhancing N leaching in these forests.

11. Pollution Leakage as an Indirect Effect of Voluntary Pollution Abatement

- a. Department: Economics
- b. Author(s): Binish Rijal, Neha Khanna
- c. Year of Publication: in progress
- d. Link: in progress

XIII. PRESERVATION

1. The Rise of Cheap Nature

- a. Department: Sociology
- b. Author(s): Jason W. Moore
- c. Year of Publication: 2016
- d. Link: https://orb.binghamton.edu/sociology_fac/2
- e. Abstract: We live at a crossroads in the history of our species – and of planetary life. What comes next is unknowable with any certainty. But it is not looking good. Environmentalist theory and research tells us, today, just how bad it is. Mass extinction. Climate Change. Ocean acidification. To these planetary shifts, one can add countless regional stories – runaway toxic disasters on land and at sea; cancer clusters; frequent and severe droughts. Our collective sense of " environmental consequences " has never been greater. But consequences of what? Of humanity as a whole? Of population? Of industrial civilization? Of the West? Of capitalism? How we answer the question today will shape the conditions of life on Earth – for millennia to come. Once we begin to ask this question – What drives today's disastrous state of affairs? – we move from the consequences of environment-making to its conditions and causes. And once we begin to ask questions about human-initiated environment-making, a new set of connections appears. These are the connections between environment-making and relations of inequality, power, wealth, and work. We begin to ask new questions about the relationship between environmental change and whose work is valued – and whose lives matter. Class, race, gender, sexuality, nation – and much, much more – can be understood in terms of their relationship with the whole of nature, and how that nature has been radically remade over the past five centuries. Such questions unsettle the idea of Nature and Humanity in the uppercase: ecologies without humans, and human relations without ecologies. Far from merely a philosophical difference, the uppercase Nature and Humanity that dominant Anthropocene does something unintentional – but deeply violent. For the story of Humanity and Nature conceals a dirty secret of modern world history. That secret is how capitalism was built on excluding most humans from Humanity – indigenous peoples, enslaved Africans, nearly all women, and even many white-skinned men (Slavs, Jews, the Irish). From the perspective of imperial administrators, merchants, planters, and conquistadores, these humans were not Human at all. They were regarded as part of Nature, along with trees and soils and rivers – and treated accordingly. To register the bloody history of this Human/Nature binary is a moral protest. It is also an analytical protest. For capitalism does not thrive on violence and inequality

alone. It is a prodigiously creative and productive system too – at least until recently. The symbolic, material, and bodily violence of this audacious separation – Humanity and Nature – performed a special kind of " work " for the modern world. Backed by imperial power and capitalist rationality, it mobilized the unpaid work and energy of humans – especially women, especially the enslaved – in service to transforming landscapes with a singular purpose: the endless accumulation of capital. Some of us have begun to call this way of thinking world-ecological (Moore, 2015a).

XIV. SUSTAINABILITY

1. Direct and Indirect Effects of Voluntary Pollution Abatement Programs: Evidence from Ohio's Tox Minus Program
 - a. Department: Economics
 - b. Author(s):Neha Khanna, Michael S. Delgado and Georgie Stokol
 - c. Year of Publication: in progress
 - d. Link:10.1007/s10640-011-9533-3.
 - e. Abstract: We examine whether voluntary pollution abatement programs in which there is no program-specific participation incentive are effective in reducing emissions below what they would have been otherwise. We use data on facility participation in the 33/50 Program and emissions reported to the US EPA's toxic releases inventory (TRI) between 1991 and 1995 for a sample of facilities whose parent firms committed to the program. By focusing on participation by individual facilities we avoid the influence of firm level incentives under the program. The mandatory disclosure of emissions data to the TRI avoids the potential bias evident in voluntarily disclosed data. We find that while facilities with larger total emissions were more likely to participate, there is no evidence of greater participation by facilities that account for a higher share of a parent firm's 33/50 emissions. Although emissions of the 33/50 chemicals fell over the years, we find that participation in the program was not associated with the decline in the 33/50 releases generated by these facilities and the reductions seemed to have occurred for reasons unrelated to the program.

2. Facility Participation in Voluntary Pollution Prevention Programs and the Role of Community Characteristics: Evidence from the 33/50 Program
 - a. Department: Economics
 - b. Author(s):Martina Vidovic, Neha Khanna
 - c. Year of Publication: in progress
 - d. Link:https://www.researchgate.net/publication/251627664_FACILITY_PARTICIPATION_IN_VOLUNTARY_POLLUTION_PREVENTION_PROGRAMS_AND_THE_ROLE_OF_COMMUNITY_CHARACTERISTICS_EVIDENCE_FROM_THE_3350_PROGRAM
 - e. Abstract: The advent of voluntary pollution prevention programs has raised the question of their impact on the distribution of pollution. Do these programs enhance or alleviate the current inequity in the distribution of pollution in the US? This paper examines the evidence from the 33/50 Program. The participation decision of a facility is modeled as a probit function of various community characteristics such as income, race, educational status, housing

tenure, and propensity for collective action. Several firm level variables identified in the currently published literature as having a statistically significant influence on the participation decision of the firm are included as control variables. Preliminary results suggest that a facility's decision to participate in the 33/50 Program is generally not influenced by these community characteristics. However, there is some tentative evidence to suggest that the probability of participation increases with median household income of the zip code in which the facility is located, and decreases with the percentage of the zip code population below the poverty line. It is unclear whether more polluting facilities are more likely to participate in the Program.

3. Public Pressure, Greenwashing and Heterogenous Effects of Voluntary Pollution Abatement

- a. Department: Economics
- b. Author(s): Ruohao Zhang, Neha Khanna
- c. Year of Publication: in progress
- d. Link:
https://ruohaozhang.weebly.com/uploads/1/3/1/0/131057686/vep_draft_2020_0501.pdf
- e. Abstract: With widespread environmental awareness, polluters face abatement pressure from two sources: formal regulation pressure and informal public pressure. While the impact of formal regulation on plant emissions is well understood, the role of public pressure in reducing pollution is less clear. We build a conceptual model highlighting the role of public pressure in environmental regulation in the context of voluntary pollution abatement. The launch of a voluntary pollution abatement program changes both regulatory pressure and public pressure albeit differently for participants and non-participants. Our theory describes these changes as well as the plant's emission choices. We show that the effectiveness of a voluntary pollution abatement program depends on the risk of participating firms being labelled greenwashers: a higher risk yields fewer program participants who free-ride thereby increasing the effectiveness of the program. Our model, which provides a consistent framework for reconciling the mixed empirical results on the effectiveness of voluntary pollution abatement programs, is supported by data from the EPA's 33/50 program.

4. Lessons from Rapa Nui (Easter Island, Chile) for Governance in Conditions of Environmental Uncertainty
 - a. Department: Anthropology
 - b. Author(s): Carl P. Lipo, Pamela A. Mischen, Terry L. Hunt
 - c. Year of Publication: 2021
 - d. Link: https://doi.org/10.1007/978-3-030-47150-7_2
 - e. Abstract: The effectiveness of governance depends on the knowledge upon which decisions are based. Knowledge veracity is particularly significant when future conditions are uncertain. In the context of global climate change, communities around the world, including the residents of Rapa Nui (Easter Island, Chile), face tremendous uncertainty in resource availability. In the context of these looming challenges, prehistoric Rapa Nui is often treated as a warning about human-induced ecological catastrophe. With contemporary populations of the island wrestling about issues of governance, it is vital that researchers carefully validate their knowledge about the island's past. Despite the claims of traditional narratives, new empirical research on Rapa Nui indicates that the traditional "collapse" narrative has no basis. Instead, the island is now known to have been sustainable from its prehistory until European contact. These findings point to the potential of alternative action models and new governance structures.

5. Triumph of the Commons: Sustainable Community Practices on Rapa Nui (Easter Island)
 - a. Department: Biological Science
 - b. Author(s): Robert J. DiNapoli, Carl P. Lipo, Terry L. Hunt
 - c. Year of Publication: 2021
 - d. Link: <https://doi.org/10.3390/su132112118>
 - e. Abstract: The history of Rapa Nui (Easter Island) has long been framed as a parable for how societies can fail catastrophically due to the selfish actions of individuals and a failure to wisely manage common-pool resources. While originating in the interpretations made by 18th-century visitors to the island, 20th-century scholars recast this narrative as a "tragedy of the commons," assuming that past populations were unsustainable and selfishly overexploited the limited resources on the island. This narrative, however, is now at odds with a range of archaeological, ethnohistoric, and environmental evidence. Here, we argue that while Rapa Nui did experience large-scale deforestation and ecological changes, these must be contextualized given past land-use practices on the island. We provide a synthesis of this evidence, showing that Rapa Nui populations were sustainable and avoided a tragedy of the commons through a

variety of community practices. We discuss this evidence in the context of Elinor Ostrom’s “core design principles” for sustainable communities and argue that Rapa Nui provides a model for long-term sustainability.

6. Student environmental conservation and awareness on college campuses

- a. Department: Environmental Science
- b. Author(s): Olivia Lopes DaSilva
- c. Year of Publication: 2021
- d. Link: <https://orb.binghamton.edu/student-sustainability-resources/14>
- e. Abstract: In the midst of a climate crisis, it’s crucial to question how our younger generations view their role in environmental conservation, activism and awareness, and how they implement greener values into their day-to-day lives. This research analyzes student perspectives on their role in environmentalism on their college campuses and if it’s changed through the Covid-19 pandemic. Additionally, this research questions how universities and higher education play a role in shaping these views and ideals among their student body. Through a series of interviews and surveys dispersed to students at both Binghamton University and SUNY Stony Brook, I will draw comparative conclusions regarding student views on their role in making a difference through environmental awareness and activism. This includes both day-to-day actions as well as involvement in campus initiatives, education, and promotion of these ideals. I will also investigate the impact that universities themselves have on these views through promotion of greener ideals, support for student led initiatives, and other influences. My results will demonstrate the level of awareness of environmental issues among college students, and if they have a willingness to address them and work towards change through both university and student led initiatives. My results could show if and how the Covid-19 pandemic has influenced student action in recent months. Overall, this study is important in analyzing how my generation values our planet and how they work towards and promote more eco-friendly values and lifestyles on their campuses.

7. An analysis of Binghamton University’s potential for green roofs

- a. Department: Environmental Science
- b. Author(s): Tyler Linnehan
- c. Year of Publication: 2021
- d. Link: <https://orb.binghamton.edu/student-sustainability-resources/4>
- e. Abstract: N/A

8. Why I Save Seeds: The Cultural, Environmental, and Global Impact of Seed Saving
 - a. Department: Environmental Science
 - b. Author(s): Neyda V. Gilman, Jennifer Embree, Amelia LoDolce, Christina Zawerucha, Anandi Premlall, et al.
 - c. Year of Publication: 2021
 - d. Link: <https://orb.binghamton.edu/library-sustainability-resources/1>
 - e. Abstract: As awareness about the human impact on the environment continues to grow, many have highlighted the long-practiced tradition of seed saving. Seed saving provides both individuals and communities with a method of continuing cultural traditions, preparing for climate-related stressors, and cultivating biodiversity. In this workshop four panelists will discuss their experiences with seed saving and share their expertise on its importance and impacts on culture and the environment both globally and locally. Topics that will be discussed include creating a heirloom seed bank in Fondwa, sharing seeds as a way to save culture and biodiversity, and community food systems.

9. Simply Sustainable: Resources and Strategies for Living a More Sustainable Life, One Step at a Time
 - a. Department:
 - b. Author(s): Neyda V. Gilman, Jennifer K. Embree, Mona Porter, Sophia Murphy, Adam Flint, et al.
 - c. Year of Publication: 2021
 - d. Link: https://orb.binghamton.edu/library_resources/7
 - e. Abstract: This panel session discussed sustainability-related steps that individuals can make in their own lives to live more sustainable lifestyles. The panel included five individuals: Josias Bartram, Library Director from the Broome County Public Libraries, Sophia Murphy & Mona Porter, undergraduate students from Binghamton University representing Binghamton's Student Chapter of Zero Hour, Kate Miller-Corcoran, Development and Communications Manager at VINES, and Adam Flint, Director of Clean Energy Programs at the Network for a Sustainable Tomorrow (NEST). The event was moderated by Neyda V. Gilman and Jennifer K. Embree from the Binghamton University Libraries.

10. Good News for Environmental Self Regulation? Finding the Right Link
 - a. Department: Economics
 - b. Author(s): Neha Khanna, Yanbing Wang, Michael S. Delgado and Vicki Bogan
 - c. Year of Publication: 2019
 - d. Link: <https://doi.org/10.1016/j.jeem.2019.01.009>

- e. Abstract: We investigate the stock market response to firm disclosure of positive environmental information and the link from that information to environmental outcomes. We classify environmental media releases by informational content and value relevance and assess the abnormal stock returns of each type of event. While announcements of future environmental activities lead to the largest favorable stock market reactions, there is no guaranteed link from this type of information to environmental outcomes. Further analysis of the abnormal returns shows that the magnitude of the stock market reaction depends on firm financial characteristics across all event types rather than on firm environmental performance. Our results indicate that the ability for voluntary environmental information disclosure to induce environmental self-regulation is limited to the extent that firms are able to follow through with their announcements of planned environmental activities.

11. Foundation for Measuring Community Sustainability

- a. Department: Anthropology
- b. Author(s): Pamela A. Mischen, George C. Homsy, Carl P. Lipo, Robert Holahan, Valerie Imbruce, et al
- c. Year of Publication: 2019
- d. Link: https://orb.binghamton.edu/anthropology_fac/43
- e. Abstract: In order to understand the impact of individual communities on global sustainability, we need a community sustainability assessment system (CSAS). While many sustainability assessment systems exist, they prove inadequate to the task. This article presents the results of a systematic review of the literature on existing sustainability assessment systems; offers a definition of a sustainable community; provides a multi-scale, systems approach to thinking about community; and makes recommendations from the field of performance measurement for the construction of a CSAS.

12. Changing car culture: a case study at Binghamton University

- a. Department: Geography
- b. Author(s): Daniella Madubuike
- c. Year of Publication: 2018
- d. Link: https://orb.binghamton.edu/dissertation_and_theses/68
- e. Humans have altered nitrogen (N) cycling on a global scale, and elevated nitrogen levels are characteristic of urban ecosystems. The major reasons that N is higher in cities include imports of food, fuel and fertilizer. High N export from both point- and nonpoint-sources is common in large cities. While N cycling has

been studied in large urban areas, less is known about its cycling in medium-sized cities, such as Binghamton, N.Y. We found that point-source N exported from the Binghamton-Johnson City Wastewater Treatment Plant (B-JC WWTP) was greater than nonpoint-source N exported from eight urban streams to the Susquehanna River, which runs through the Binghamton area. The point-source N fluxes we measured from the B-JC WWTP were high because its function was impaired during the study, causing major environmental impacts on the Susquehanna River. Nonpoint-source N exported from eight urban streams was low, and comparable to N exported from streams of forested watersheds in the region. In an experiment in a roadside ecosystem, experimental deposition of N and road salt (NaCl) did not affect N cycling in roadside soils. However, NaCl negatively impacted C mineralization and soil respiration in situ. In a final experiment, we found that the microbial community of urban stream sediment had the capacity to substantially reduce NO₃⁻ through denitrification.

13. Capacity, sustainability, and the community benefits of municipal utility ownership in the United States

- a. Department: Public Administration
- b. Author(s): George C. Homsy
- c. Year of Publication: 2018
- d. Link: https://orb.binghamton.edu/public_admin_fac/48/
- e. Abstract: Most literature on utility sustainability focuses on internal operations; this misses the role that utilities could play within a community. This study measures the impact of municipal ownership of water and electric utilities on the sustainability policymaking of local governments. I find that municipalities with government-owned water utilities adopt more sustainability measures than those with investor-owned service. Similarly, municipally-owned electric utilities have higher levels of energy sustainability in the community, but not in government operations. The utilities provide fiscal and technical capacity to municipalities. This study brings potential community benefits to the discussion of private investment in public service delivery.

14. Agriculture, Climate, and Capitalist World-Economy: Rethinking the Global Crisis

- a. Department: Environmental Science
- b. Author(s): Dayne Feehan
- c. Year of Publication: 2017
- d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol3/iss1/6>

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- e. Abstract: Our relationship with nature has been constantly changing throughout modern history. The ways in which we interact with extra-human natures in order to grow food and build empires has radically and successively transformed since the sixteenth century. With these transformations, the perception of our interactions with extra-human natures has changed as well. The modern perception of Humans versus Nature is challenged with a new ideological framework. This paper introduces the world-ecological framework, which recognizes the relationships of human and extra-human natures as deeply intertwined and dialectical histories. The world-ecological framework is contrasted with the modernist ontology in the debate of naming our current epochal era: Anthropocene versus the Capitalocene. Thinking through the global crisis using the world-ecological framework exposes the influence of capitalism on agriculture and climate. This paper uses the world-ecological framework to examine capitalist agriculture's relationship to climate change as well as illustrate the limits and threats this relationship poses to the capitalist world-ecology.
15. Reforestation in southern China: revisiting soil N mineralization and nitrification after 8 years restoration
- a. Department: Biological Science
 - b. Author(s): Weixing X. Zhu, Qifeng F. Mo, Zhi'an A. Li, Bi Zou, et. al.
 - c. Year of Publication: 2016
 - d. Link: https://orb.binghamton.edu/bio_fac/3
 - e. Abstract: Nitrogen availability and tree species selection play important roles in reforestation. However, long-term field studies on the effects and mechanisms of tree species composition on N transformation are very limited. Eight years after tree seedlings were planted in a field experiment, we revisited the site and tested how tree species composition affects the dynamics of N mineralization and nitrification. Both tree species composition and season significantly influenced the soil dissolved organic carbon (DOC) and nitrogen (DON). N-fixing *Acacia crassicarpa* monoculture had the highest DON, and 10-mixed species plantation had the highest DOC. The lowest DOC and DON concentrations were both observed in *Eucalyptus urophylla* monoculture. The tree species composition also significantly affected net N mineralization rates. The highest rate of net N mineralization was found in *A. crassicarpa* monoculture, which was over twice than that in *Castanopsis hystrix* monoculture. The annual net N mineralization rates of 10-mixed and 30-mixed plantations were similar as that of N-fixing monoculture. Since mixed plantations have good performance in

increasing soil DOC, DON, N mineralization and plant biodiversity, we recommend that mixed species plantations should be used as a sustainable approach for the restoration of degraded land in southern China.

16. Voluntary Pollution Abatement and Regulation

- a. Department: Economics
- b. Author(s): Neha Khanna, Michael S. Delgado
- c. Year of Publication: 2015
- d. Link: [10.22004/ag.econ.200993](https://orb.binghamton.edu/ag.econ.200993)
- e. Abstract: We consider private provision of an environmental public good and the link between voluntary pollution-abatement markets and the optimal level of mandatory environmental regulation. We show that voluntary abatement markets react to the level of mandatory abatement imposed and that an optimal regulatory policy must account for that reaction. We consider several assumptions about consumer behavior and find that the voluntary market's reaction to regulation depends on the motivating behavior of consumers. Whether the optimal level of mandatory abatement is higher than the level provided by traditional settings depends on the direction and magnitude of the voluntary market's reaction to changes in mandatory abatement.

17. Morality of a Carbon Tax: Transition to a Sustainable Economy

- a. Department: Geological Sciences and Environmental Studies
- b. Author(s): Timothy Lamendola
- c. Year of Publication: 2015
- d. Link: <https://orb.binghamton.edu/alpenglowjournal/vol1/iss1/4>
- e. Abstract: A carbon tax is needed to address the negative externalities caused by carbon emissions. Increased carbon dioxide concentrations in the atmosphere have a direct and negative impact on net social benefit to current and future generations. Our current human population has a moral obligation to future generations and, therefore, is responsible for excess burning of fossil fuels. This essential carbon tax is needed to help wean humans off their fossil fuel reliance. One should not be concerned with the economic losses this could cause because an economy based off unlimited growth is unsustainable and must be altered. A new, sustainable economic system must be developed in order to ensure continued human prosperity. This sustainable economic system will utilize a carbon tax and also includes features proposed by Jackson (2009) in Prosperity without Growth such as a reduced work week, a transition into a service economy, and increased public investment. This paper will include a defense of

the morality of a mandatory carbon tax, a discussion of its potential socio-economic benefits, and the argument that a sustainable economy is possible if swift actions are taken.

18. Powering sustainability: municipal utilities and local government policymaking

- a. Department: Public Administration
- b. Author(s): George C. Homsy
- c. Year of Publication: 2015
- d. Link: https://orb.binghamton.edu/public_admin_fac/19
- e. Abstract: Sustainability policymaking presents numerous challenges to local governments. Municipal leaders, especially in smaller cities and towns, report that they lack the fiscal capacity and/or technical expertise to adopt many environmental protection policies. This paper investigates whether the more than 2,000 municipally-owned utilities have the potential to mitigate those problems. Data from two surveys of local governments in the United States (n=861), modeled in a pair of negative binomial regressions, finds a positive correlation between those cities with municipal power companies and those with an increased number of community-wide sustainable energy policies. Follow-up interviews with officials reveal the potential mechanisms driving sustainability by local governments that own power companies. These mechanisms are the increased capacity that publicly-owned utilities provide by virtue of income generated and access to energy-specific grants as well as the local nature of their operations, which allows a better fit of sustainable energy measures to local circumstances.

19. Cities and Sustainability: Polycentric Action and Multilevel Governance

- a. Department: Public Administration
- b. Author(s): George C. Homsy, Mildred E. Warner
- c. Year of Publication: 2014
- d. Link: <http://journals.sagepub.com/doi/abs/10.1177/1078087414530545>
- e. Abstract: Polycentric theory, as applied to sustainability policy adoption, contends that municipalities will act independently to provide public services that protect the environment. Our multilevel regression analysis of survey responses from 1,497 municipalities across the United States challenges that notion. We find that internal drivers of municipal action are insufficient. Lower policy adoption is explained by capacity constraints. More policy making occurs in states with a multilevel governance framework supportive of local sustainability action. Contrary to Fischel's homevoter hypothesis, we find large

cities and rural areas show higher levels of adoption than suburbs (possibly due to free riding within a metropolitan region).

20. The Problem of Debt-for-Nature Swaps from a Human Rights Perspective

- a. Department: Philosophy
- b. Author(s): Nicole Hassoun
- c. Year of Publication: 2012
- d. Link: https://orb.binghamton.edu/philosophy_fac/15
- e. Abstract: At first blush, debt-for-nature swaps seem to provide win-win solutions to the looming problems of environmental degradation and extreme poverty. So, one might naturally assume that they are morally permissible, if not obligatory. This article will argue, however, that debt-for-nature swaps are sometimes morally questionable, if not morally impermissible. It suggests that some criticisms of traditional (economic) conditions placed on loans to poor countries also apply to the (environmental) conditionality implicit in such swaps. The article's main theoretical contribution is to suggest a general argumentative strategy for posing a challenge to the moral acceptability of many seemingly innocuous, or even apparently good, policies in the real world. Its discussion of how we should respond to seemingly tragic dilemmas (e.g. between protecting nature and respecting human rights) may also be of general interest.

21. Is Voluntary Pollution Abatement in the Absence of a Carrot or Stick Effective? Evidence from Facility Participation in the EPA's 33/50 Program

- a. Department: Economics
- b. Author(s): Martina Vidovic, Neha Khanna
- c. Year of Publication: 2012
- d. Link: <https://link.springer.com/article/10.1007/s10640-011-9533-3>
- e. Abstract: We examine whether voluntary pollution abatement programs in which there is no program-specific participation incentive are effective in reducing emissions below what they would have been otherwise. We use data on facility participation in the 33/50 Program and emissions reported to the US EPA's toxic releases inventory (TRI) between 1991 and 1995 for a sample of facilities whose parent firms committed to the program. By focusing on participation by individual facilities we avoid the influence of firm level incentives under the program. The mandatory disclosure of emissions data to the TRI avoids the potential bias evident in voluntarily disclosed data. We find that while facilities with larger total emissions were more likely to participate, there is no evidence of greater participation by facilities that account for a higher

share of a parent firm's 33/50 emissions. Although emissions of the 33/50 chemicals fell over the years, we find that participation in the program was not associated with the decline in the 33/50 releases generated by these facilities and the reductions seemed to have occurred for reasons unrelated to the program.

22. Can Voluntary Pollution Prevention Programs Fulfill Their Promises? Evidence from the 33/50 Program

- a. Department: Economics
- b. Author(s): Martina Vidovic, Neha Khanna
- c. Year of Publication: 2007
- d. Link: <https://doi.org/10.1016/j.jeem.2006.10.001>
- e. Abstract: We examine incentives for firm participation in the EPA's 33/50 Program and the impact of this Program on firm emissions. We use a sample of manufacturing firms from 19 industry groups that were invited to participate in the Program in 1991. We find that while the Program may have attracted some of the most polluting firms, the decline in emissions observed between 1991 and 1995 was the result of an independent trend rather than a direct consequence of the Program as argued by an earlier study published in this Journal.

23. On The Economics of Non-Renewable Resources Economics

- a. Department: Economics
- b. Author(s): Neha Khanna
- c. Year of Publication: 2001
- d. Link: <http://www.eolss.net/ebooks/sample%20chapters/c13/e6-29-03-01.pdf>
- e. Abstract: This paper presents an overview of the key economic results associated with the use of non-renewable resources. The basic Hotelling model of resource depletion is discussed, followed by several extensions. The fundamental result is that scarcity rent rises at the discount rate, and that, at equilibrium, marginal benefits from extraction must equal the marginal economic cost. If marginal extraction cost is determined by the remaining stock of the resource, then the result is that the scarcity rent rises at the discount rate less the percentage increase in marginal cost caused by the marginal reduction in remaining reserves. The versatility of the Hotelling model is clearly brought out in the various qualitatively distinct outcomes possible for the equilibrium production and price trajectories. Production may be monotonically increasing, decreasing, or inverted unshaped. The equilibrium price trajectory is determined by the interaction between the marginal extraction cost and the scarcity rent. Typically,

it is increasing throughout the production horizon. However, if the marginal cost is declining rapidly, it may exceed the scarcity rent in the early part of the production horizon and price will decline. Eventually, however, it must rise as scarcity rent rises sharply. The results obtained under the Hotelling model are robust to the assumption of market structure – both monopoly and perfect competition yield qualitatively similar outcomes, though, of course, the price and quantity paths are different. The paper concludes with a case study of the global oil market, using a particular extension of the Hotelling model that is applicable in this case. Several qualitatively different scenarios are presented, each of which is consistent with the crude oil production and price trajectories observed since the early 1970s.

24. Which US municipalities adopt Pay-As-You-Throw and curbside recycling?

- a. Department: Public Administration
- b. Author(s): Raymond Gradus, George C. Homsy, Lu Liao, Mildred E. Warner
- c. Year of Publication: 2019
- d. Link: https://orb.binghamton.edu/public_admin_fac/46
- e. Abstract: This study investigates the drivers of curbside recycling program adoption and Pay as You Throw (PAYT) program adoption in 1,856 US local governments using a 2015 survey. While 50% of municipalities and counties adopt curbside recycling programs, we find that the adoption curbside recycling is limited by capacity constraints; local governments with lower per capita expenditures and more poverty are less likely to implement curbside recycling. PAYT programs are less common overall (10% of municipalities) and less common in richer communities and more common in communities with higher education levels. Local official political affiliation is not significant in either model. Both programs are less likely in rural places. Our results point to the need for local governments adopting such innovations to address equity, capacity constraints, and efficiency concerns.

XV. WASTE

1. Waste and Waste Management

- a. Department: Anthropology
- b. Author(s): Joshua Reno
- c. Year of Publication: 2015
- d. Link: https://orb.binghamton.edu/anthropology_fac/1
- e. Abstract: Discard studies have demonstrated that waste is more than just a symptom of an all-too-human demand for meaning or a merely technical problem for sanitary engineers and public health officials. The afterlife of waste materials and processes of waste management reveal the centrality of transient and discarded things for questions of materiality and ontology and marginal and polluting labor and environmental justice movements, as well as for critiques of the exploitation and deferred promises of modernity and imperial formations. There is yet more waste will tell us, especially as more studies continue to document the many ways that our wastes are not only our problem, but become entangled with the lives of nonhuman creatures and the future of the planet we share.

2. From Biopower to Energo-politics in England's Modern Waste Technology

- a. Department: Anthropology
- b. Author(s): Joshua Reno, Catherine Alexander
- c. Year of Publication: 2014
- d. Link: https://orb.binghamton.edu/anthropology_fac/4/
- e. Abstract: Two energy-generating technologies in Britain which transform waste into a resource are compared. One is the (in)famous Combined Heat and Power incinerator in Sheffield, the other a forgotten biological digester in Devon utilizing anaerobic microbes. Both sites are early exemplars of experimental and biopolitical waste disposal technologies—incineration and anaerobic digestion—now regarded as leading alternatives for reducing the United Kingdom's dependence on landfill and fossil fuel; both sites also inspired public resistance at critical moments in their development. The analysis here relates how activists and technicians struggle to demonstrate competing truths about alternative energy. Through comparison, it becomes clear that, beyond the validity of specific truth claims, energo-politics mediates the formation of technological legacies. Examining the traces energy facilities leave behind—whether in the landscape or online—we ask what it means that various claims made about some technical operations endure, while others fade into obscurity.