

10TH ANNUAL MELON FORUM



senior essays on food & agriculture
2022-2023



Gavrielle Welbel

EARTH AND PLANETARY SCIENCE (B.S.)

Enhanced Rock Weathering in Agricultural Settings: Real-World Analysis of Carbon Dioxide Removal, Crop Yields, and Soil pH
Advisor: Noah Planavsky

Enhanced rock weathering is a potentially promising technology for removal of atmospheric carbon dioxide in order to mitigate the worst effects of climate change. Most work on enhanced rock weathering has focused on adding crushed silicate-based-rock (e.g. basalt) onto manged lands to capture carbon dioxide from the atmosphere and transport it as bicarbonate for permanent storage in oceans. Agricultural fields are a prime location because they are vast even surfaces that experience significant precipitation and can benefit from the rock as a fertilizer. Basalt can neutralize soil pH, increase crop yields, and introduce minerals to the soil. However, there are few empirical constraints on the extent of weathering in working farms. Here we show pH, yield, and weathering outcomes through the most robust on-farm geospatial analysis of enhanced rock weathering deployment to date. Hay and corn yields were boosted, soy yields were consistent, neutral pH was maintained, and there were multiple tons of carbon dioxide removal per hectare of land. This work supports that, at scale, rock weathering could capture gigatons of carbon dioxide while improving crop yields and soil health.



Meredith Ryan

ENVIRONMENTAL STUDIES (B.S.)

The Effects of the War on Agricultural Production in Ukraine Using Remote Sensing and Google Earth Engine
Advisor: Paul Freedman

Beginning in February 2022, the Russia- Ukraine war has had various political, social, and economic consequences. Given that approximately seventy percent of Ukraine's area is used for agriculture, one such effect is the impact on the global food supply chains. This study aims to measure the difference in agricultural yield between previous growing seasons and the 2022 harvest. The research question to be addressed is as follows: To what extent has the Ukraine agricultural yield and growing season (NDVI over time) changed due to the onset of the Russia-Ukraine war?



Kayleigh Larsen

POLITICAL SCIENCE & HISTORY OF SCIENCE, MEDICINE, AND
PUBLIC HEALTH (B.A.)

Don't Bite the Hand that Feeds You: American Food Politics, Activism, and Power, 1964-1973

Advisors: Kelly O'Donnell and Stephen Latham

In September 2022, President Biden convened the first White House Conference on Hunger, Nutrition, and Health in over fifty years. The first – and last – White House Conference on Food, Nutrition, and Hunger was convened in 1969, amid the jarring “discovery” of hunger in America. As our nation looks ahead to end hunger, the successes and failures of efforts that sought to do the same fifty years ago have much to teach us. My senior essay explores three nutrition assistance programs that sought to address hunger in the 1960s and 1970s: the Food Stamps Program, the North Bolivar County Farm Cooperative, and the Black Panther Party’s Free Breakfast Program. These three examples highlight the ways in which food has been leveraged as political power in the US, capturing a tension between state and grassroots uses of “food power.” I argue that, while the US government used “food power” to reinforce American capitalism, individualism, and white supremacy, grassroots organizers used food to contest these very same values, deploying food as a tool of empowerment in marginalized communities. The history of food politics and activism illuminates the ways in which food is a vehicle not only for political ideology, but for political power.



Brianna Jefferson

ENVIRONMENTAL STUDIES (B.A.)

What's for Lunch? Assessing the socio-political discourse in school nutrition standards since 2010

Advisor: Mark Bomford

This essay examines hydroponics as a tool to address environmental justice issues. Minority, and low-income communities in urban regions are disproportionately affected by food apartheid, and urban agriculture such as hydroponics, was created to alleviate issues of food insecurity. As an ethnographic study, various companies in the Northeast and Florida were contacted to give their opinion on what their company was doing for the hydroponic industry, but also for justice issues alike. The objective was to see whether environmental justice was in the mission statement of these large hydroponic companies, and whether they were able to accomplish their goals.



Raphael Berz

ECONOMICS (B.A.)

An evaluation of the Nutrition North Canada subsidy and implications in imperfectly competitive and remote communities

Advisor: Steven Berry

Food insecurity due to the high cost of food is a serious issue facing Canada's remote northern communities. The Canadian government is addressing the crisis through Nutrition North Canada (NNC), a federal subsidy to northern grocery retailers to support their higher operation costs. Since its implementation, NNC has successfully lowered the prices of many eligible food items, but food insecurity in Canada's north has persisted. There are concerns that grocery retailers have monopolistic power, as there are few competitors and other food channels are increasingly constrained by small, cold and remote market conditions. This paper seeks to determine to what extent the NNC subsidy is passed to consumers and examines variations in pass-through since an indirect subsidy may be inefficient if a monopoly is present and left unregulated. A model of price and subsidy rates with fixed effects finds that approximately 30% of the subsidy in aggregate is passed down, meaning that over two-thirds of the subsidies are captured by the retailer. Pass-through appears to be driven by competition as communities with two retailers have twice the pass-through rates of those with only one. The paper also finds demand is price inelastic, one explanation for the low pass-through. A discrete choice model with random effects estimates an elasticity of -1.2, and an implied markup of 82%. To promote more efficient pass-through of the NNC subsidy, policymakers should continue to emphasize oversight of retailers' use of the subsidy and support alternative food sources (both store-bought and traditional foods) as a form of pseudo-competition. Changing the mechanism from a shipping-based to point-of-sale subsidy would better align incentives and put a downward pressure on price.



Michael Min

POLITICAL SCIENCE & HISTORY OF SCIENCE, MEDICINE, AND PUBLIC HEALTH (B.A.)

For Five Grains of Rice

Advisors: Quan Tran

Creative historical fiction set in late 00s Idaho, examining queerness, religion, race, and ethnicity, cultural heritage, and family, all through the lens of food and different food locations: first in the home, then in the restaurant industry, and lastly in an agricultural context.



Ben Christensen

STATISTICS AND DATA SCIENCE (B.S.)

A Graph-Theoretic Approach to Human Population Clusters as a Function of Geography

Advisor: Emily Erikson

Natural geography, namely topography, climate, and natural resources, have led humans to form civilizations in advantageous regions of the world conducive to human life and societal proliferation. To what extent does geography alone have an effect on global population clusters across nations? We treat the Earth's surface as a network of interconnected nodes with local geographic attributes, using a graph neural network to predict population density as a function of the geo-spatial landscape. We then seek to find meaningful sociological clusters from the latent node embeddings produced by the network, using a scalable community detection algorithm that pools clusters at monotonically decreasing resolutions. These clusters help us explain geopolitical debates and modern conflicts, explore interesting geographic hypotheticals, and facilitate greater comprehension of the vicissitudes of global warming.



Catherine Webb

ENVIRONMENTAL STUDIES (B.A.)

The Shinnecock Kelp Farmers: Embodying Multispecies Care

Advisor: Hi'ilei Hobart

The ongoing process of settler colonialism, whose impact is relatively recent compared to the 13,000-year-old Shinnecock ancestral memory of the land, alters the Indigenous people's ability to steward and maintain a relationship with their aboriginal land. The Shinnecock Kelp Farmers (SKF) are a collective of six intergenerational Shinnecock women who work to revitalize marine life and clean the water in Shinnecock Bay through kelp cultivation. The project exists amongst a complex social geography of antagonists and potential allies in present-day Southampton, New York. The project is not a reaction to prevalent anti-Indigeneity and class inequities, which demonstrate deep-seated anthropocentrism but is a continuation of the care and kinship that has always been present on Shinnecock land. During formal interviews, the SKF describe how they call marine species by name, sing to the kelp, and connect with more-than-human worlds. As Shinnecock women, the SKF embody unique multispecies perspectives, which attend to the meaningful agency of nonhuman life, and model the care necessary to improve collective environmental futures.



Caroline Beit

HISTORY OF SCIENCE, MEDICINE, AND PUBLIC HEALTH (B.A.)

Behind Bras and Bars: A Legal History of Breastfeeding in American Prisons

Advisor: Marco Ramos

The crisis of maternal health care in U.S. carceral facilities and the concomitant effects it has on children born to incarcerated mothers, requires that more be done to protect the health of both incarcerated women and their children (Sufirin). Permitting breastfeeding in carceral settings is a possible mitigation strategy to combat the negative outcomes associated with incarceration during the perinatal period and is a food justice issue (Boquien). Tracing the lego-historical roots of current lactation policies in prisons from the 1970s to today—how they have moved through the courts and been challenged by incarcerated people, their children, and activist groups—paints a picture of the U.S. carceral system’s response to incarcerated women during the perinatal period. Using a legal-historical lens to permits further exploration of questions such as: 1) what is the role of the state in providing support for children of incarcerated parents, 2) what is the effect of perinatal issues on the criminal justice system, and 3) what responsibilities do incarcerated parents have towards their children? This research centers on the 1986 5th circuit of appeals case *Southerland v. Thigpen* which argued for the right to breastfeed in prisons from the perspective of the child, and was rejected on the basis of “The accommodation of nursing prisoners ... is not compatible with the objectives of the penal system.” Analysis of this case, the resulting jurisprudence, and its historical implications is aided by archival research centering on women’s prison records and criminal justice activist groups. Moreover, historical public health campaigns promoting breastfeeding demonstrate tensions between who should be permitted to breastfeed and American society’s hesitation to permit so called deviant mothers to do the same. Findings suggest that the hostile environment of confinement especially harms incarcerated mothers and their children. The current status quo in the U.S. wherein incarcerated individuals are effectively legally barred from accessing breastfeeding support, whether through directly feeding their children or pumping has strong historical roots in the American tradition of denying so called ‘deviant mothers’ full participation in the rights and responsibilities of parenthood (Kedrowski and Lipscomb).



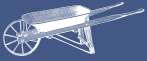
Lucie Warga

ENVIRONMENTAL STUDIES (B.A.)

What's for Lunch? Assessing the socio-political discourse in school nutrition standards since 2010

Advisor: John Wargo

The National School Lunch Program (NSLP) was established in 1946 with the aim of ensuring that all children in the US have access to a nutritious meal while at school. Over time, the program has evolved, with changes being made based on stakeholder input and the needs of children. One of the most significant changes has been the implementation of nutrition standards that schools must follow in order to receive reimbursement through the Healthy, Hunger Free Kids Act (HHFKA) in 2010. These standards, which require fruit and vegetables and limit the levels of fats and sodium in school meals, are intended to promote healthy eating habits and prevent diet-related health conditions. But, dietary advice is tightly intertwined with politics in the US, and many scholars critique dietary science and its effects on health. This essay analyzes the history of the NSLP and dietary standards in the US, with a focus on the nutrition standards introduced since the passage of the HHFKA. Using USDA documents and congressional hearings, the paper explores how historical factors continue to impact the implementation of dietary standards and how these standards have evolved over time.



YALE
SUSTAINABLE
FOOD
PROGRAM

The Melon Forum provides a space for graduating seniors to share their culminating academic work in food systems study. The event borrows its name from Yale's beloved Mellon Forum, which bring together seniors in their residential colleges to present their theses. Convening students from a range of disciplines and departments, the Melon Forum celebrates food systems scholarship at Yale College. It is supported by a generous gift from the Northern Greening. The Yale Sustainable Food Program serves as a hub for creative and critical work on food and agricultural systems topics that are entangled with pressing problems of global significance. On the farm, in the classroom, and around the world, we aim to grow food-literate leaders.

For more information, visit
www.sustainablefood.yale.edu

Cover image

Studie af to netmeloner, halveret og kvadreret
[Study of two netmelons, halved and quartered], 1755

Johanna Fosie (Danish, 1726–1764)
Statens Museum for Kunst

Brochure design

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