

ISSUE III | USD | WINTER 2024

MESH

ENGINEERING • SUSTAINABILITY • HEALTH

EARTHING THE COLLECTIVE CONSCIOUSNESS



WASTE
MANAGEMENT
& EDUCATION

URBAN
SYSTEMS

LAND & SEA
GOVERNANCE

Dear Reader,

We feel privileged to present the third edition of the MESH (Masters in Science in Engineering, Sustainability and Health) Magazine. MESH is a higher education online program through the University of San Diego. The program utilizes a systems thinking based approach to global social and environmental issues and encourages a multi-disciplinary process to explore and solve complex problems. Students in this program hail from a variety of backgrounds naturally generating a diversified field. The coursework explores the interconnectedness of resource systems, such as water, waste, food, soil, and energy. Further exploration into how these systems function through social agreements, policy, implementation, and funding yield beneficial contributions to current social and environmental injustices.

This magazine edition is composed of 8 graduate students' work from across the nation. The online accessibility of the program made it accessible to working professionals and continuing education students, with a variety of fields and backgrounds.

With great hope and gratitude, we share the culmination of our learned experiences through individual research papers developed throughout this program. Each capstone project paper represents a unique perspective, discipline, and geography, influenced by the experience of its writer.

**“MAY THE CONTENTS OF THIS MAGAZINE
INSPIRE AND INCITE INTROSPECTION,
COMMUNITY CONVERSATION, AND ACTION FOR
SOCIETY AND THE PLANET.”**

MESH Volume III Editorial Team
Korina Arvizu
Ciara AW
Neda Kabiri
Vanessa Taylor

Messages from Masters in Engineering, Sustainability and Health (MESH) leadership

Willy Oppenheim
MESH Capstone Lead
Instructor and Omprakash
Executive Director

It has been a tremendous honor and privilege to serve as the lead instructor for the MESH Capstone course and to watch this group of students bring their projects into fruition! I am grateful for the dedication of these students, the support of the USD staff and faculty, and the many members of the Omprakash team who make our work possible — especially Chelsea Johnson, Hera Jay Brown, and Kelly Staniunas, the EdGE Mentors who supported this group of students throughout the past three months of their learning journeys.

Throughout the MESH Capstone course, we emphasize the importance of creative, interdisciplinary, data-driven storytelling which highlights a multitude of voices and perspectives in an effort to disrupt hegemonic assumptions and open up space for new ways of knowing and being in the world. Our third edition of the MESH Magazine showcases the fruits of that labor. In the pages that follow, readers will find that the authors have employed a wide range of different approaches to explore an equally wide range of topics. From community gardens to high school classrooms to offshore buoys; from qualitative interviews to energy monitoring to policy analysis to imaginative fiction writing, these students have challenged themselves to look closely, to see things differently, to let go of what they think they know and imagine new possibilities. This magazine is an invitation for readers to do the same. Please enjoy!

Dr. Caroline Baillie
Director of MESH

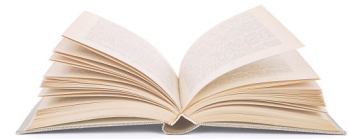
I'm delighted to say a few words in celebration of this, our third edition of the MESH magazine! MESH launched two years ago and we have already graduated two cohorts, each one creating their own special magazine to showcase their wonderful work. This third edition promises to further develop our growing community of practice by sharing the wisdom of our Fall 2024 graduating class. Right at the beginning of their learning journey, each student was tasked with finding a project which they were both passionate about and which would engage them through each and every class of MESH. They were asked to consider their focus area, related to engineering, sustainability and health, through the lens of: waste; water; energy; food; environmental justice; and just transitions. Finally they brought all of this experience and learning together, to conduct an individual and intense case study which is shared through this magazine. I hope you enjoy reading it as much as we loved sharing the learning space with our wonderful graduates!

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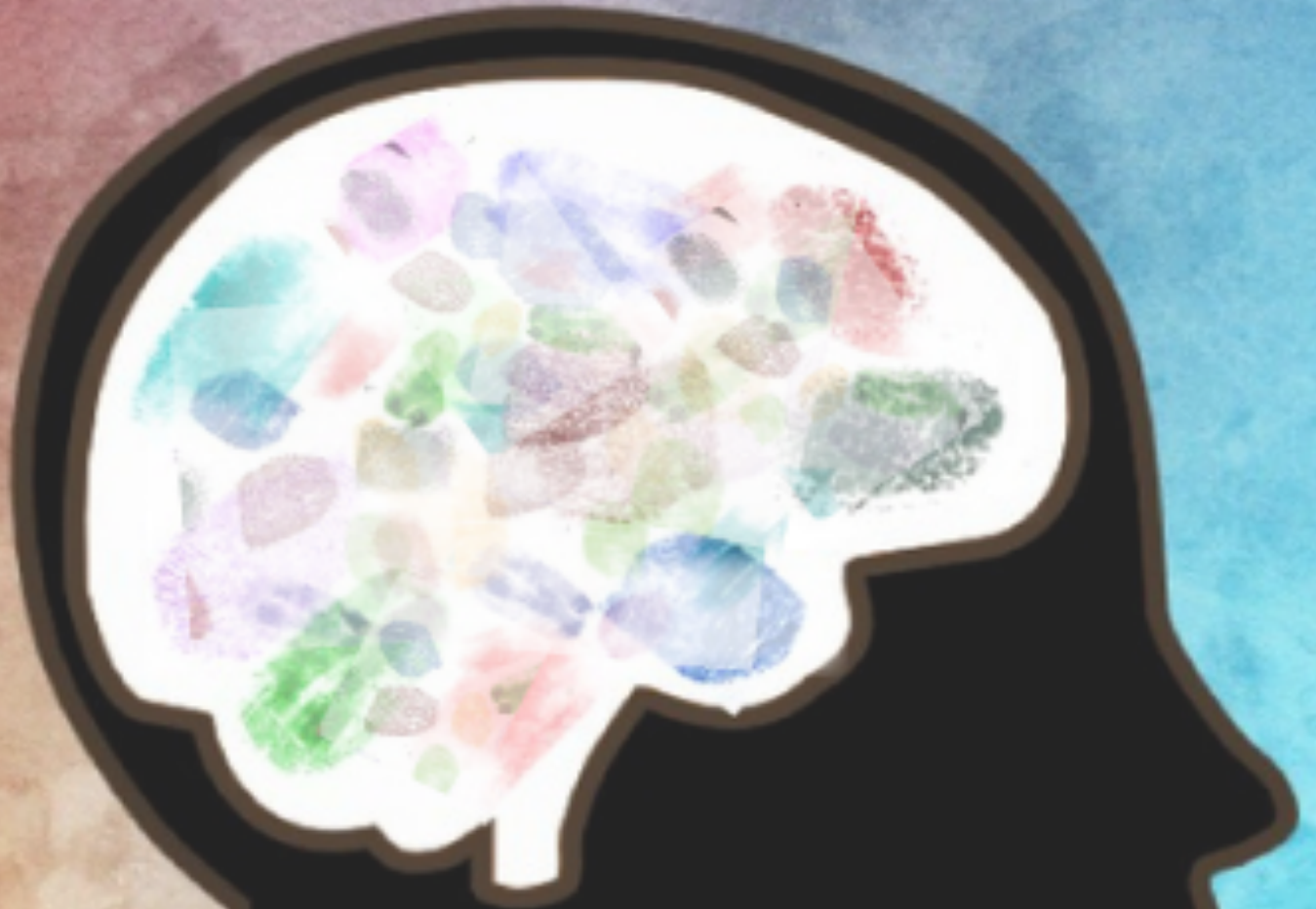
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WE NOW PRESENT...



EARTHING
THE
COLLECTIVE
CONSCIOUSNESS



Illustration by Neda Kabiri

The Disconnect Between Legislation and Implementation: Why Proper Disposal of Commercial Compost is So Hard

A Comparative Case Study Within Orange County

Ciara Aw
December 2024

ABSTRACT

This study examines the disconnect in waste legislation and implementation in Orange County that makes the proper disposal of commercial compost so difficult. Community mapping highlights the different demographics in the County, identifying groups that may bear the brunt of the consequences of excessive consumption and improper landfill utilization if operations continue on the exponential trend they are currently following. Through multiple formats of interviews, field observations, and legal research, thematic and content analysis helps to reveal the most impactful disconnect between state-mandated waste legislation and local waste practices. These disconnects help explain environmental and social justice issues that can lead to unintentional state-sponsored greenwashing and continued improper waste disposal habits. This study is significant because it highlights valuable and underrepresented views of those involved in waste processing. By comparing legislation's objectives with local processing facilities' capabilities, this study provides a much-needed call to action to realign waste goals and operations to make them feasible and sustainable. Through a better understanding of the weakest points in our waste system, we can assign responsibilities to necessary parties to mitigate contamination and work to create a more cooperative society and healthier planet.

INTRODUCTION

It's well-known that waste is an issue that's only going to increase if we don't make a change, so local legislation has begun to target single-use items, specifically ones that are non-recyclable and non-compostable. The first thought is that we can use recycled materials to help reduce landfill waste and lessen our dependence on virgin materials. It's important to note the remanufacturing of recycled paper uses 9% less water, 39% less energy, and emits 58% less greenhouse gases

([Martire, 2020](#)). That doesn't mean it's easy, though. There are a lot of issues with contamination because certain recycling streams require the separation of different materials, and where it gets tricky is certain kinds of plastics. Much of my work is reading through local legislation and figuring out which plastics are accepted by different cities, counties, states, and countries. Polyethylene terephthalate (PET), #1, is the most commonly accepted plastic, while polystyrene (PS), #6, is rarely, if ever, received. However, many consumers don't

know or can't remember the meanings behind these numbers, known as RIC codes (Jain, 2021). This causes problems because if different types of plastics are attempted to be recycled together, they can begin to separate upon being melted during the breakdown process (Secretariat, 2020). The separating of the two different types of plastic would make the end product, the "recycled" plastic, structurally unsound and unusable (Secretariat, 2020). Therefore, haulers won't want to risk accepting any recycling if there is suspected contamination, inadvertently dooming these very recyclable products to end up in landfills (Jain, 2021).

A related issue I've found working in the quick-service restaurant industry is that consumers may care to dispose of packaging properly, but if the correct bin is already full, this completely negates their intent to practice proper disposal methods. One reason for this is during peak hours, there's little time for staff to clean or manage the front-of-house waste stations and soda stations. The increased amount of traffic in the restaurant and staff being unable to leave their stations to make trash runs leads to the bins becoming full. When the bins become full, consumers tend to feel as if they have no other option but to just throw items in any bin they see room. In statistical terms, if the null hypothesis is that the packaging *can* be recycled or composted, two types of errors are likely to occur due to bins being full. If the compost and recycle bins are full, this can result in a type I error; the packaging is placed in the trash when it could have been recycled or composted, and therefore, the improperly disposed packaging isn't recovered. Or, if the trash bin is full, this can result in an even more harmful type II error; the packaging is placed in the recycle when it's not recyclable or the compost when it is not compostable, thereby contaminating the rest of the recycle or compost and contaminating the entire bin.

This contamination is more of a problem if the waste is not sorted in-house because, as mentioned previously, haulers may refuse to take recycling or compost if they believe it's contaminated.

One of the main reasons haulers are cautious about what waste they accept is that continually bringing contaminated waste to partner facilities for processing can damage the relationship and even result in a termination of the partnership (Rubicon, 2023). One way that haulers can reduce the issue of contamination is by only collecting back-of-house composting and recycling. While this has occurred at a couple of my company's local restaurants, there is not much literature about back-of-house versus front-of-house waste streams. Back-of-house waste is valuable because it can be regulated, unlike the waste that is accessible to consumers. The biggest issue is getting staff to participate. Operations for many businesses are busy, and waste is the last thing on employees' minds. To address this, some haulers, such as CalRecycle, will offer training to businesses that are not in compliance to help improve employee understanding and the importance of proper waste practices (CalRecycle, n.d.). Waste broker Rubicon (2023) emphasizes that information and communication are the backbone of the recycling and composting industry, reinforcing that the steps haulers like CalRecycle are taking to provide in-person waste training are steps in the right direction.

LITERATURE REVIEW

California-State Government Environmental Initiatives

Continuing to keep consumers engaged and mindful is helpful. However, there are going to be instances where, no matter what attempts at engagement are made, some

consumers won't care. There have been many different initiatives that have been put into place addressing various aspects of improper waste disposal. To help reduce organics in the landfill, thereby reducing subsequent methane emitted from the rotting food, California introduced Senate Bill (SB) 1383. To attach more responsibility to the end-of-life (EOL) processing of packaging and food serviceware, California recently implemented a trending type of legislation known as Extended Producer Responsibility (EPR). In brief, the EPR legislation in California mandates producers to use only compostable and recyclable packaging by 2032. There will be a fee schedule that is based on tonnage and type of materials used with more readily compostable/recyclable material and lower tonnage, resulting in lower fees. The penalty for selling illegal packaging in the state, or otherwise non-compliance, will be up to \$50,000 per day ([Circular, n.d.-b](#)). The goal of the state initiatives being put into place, whether they're related to recycling or composting, is to standardize waste practices ([CalRecycle, n.d.](#)). Through standardizing alternative waste methods, more materials can be recovered, helping to reduce pollution and methane emissions from landfills. Developing necessary backend markets for recycled material or compost.

Mandating compostable and recyclable packaging is helpful in theory by ensuring businesses are taking accountability for the materials they are pumping into their community. However, it gets more complicated when disposal is attempted. Many haulers and processing facilities are private, and therefore, they have different capacities for accepting material. Athens Services is a vertically integrated waste hauler and processing facility that services some locations for local quick-service restaurants. Although they have some of the

most current organics technology, including equipment to facilitate anaerobic digestion, they won't accept bioplastics ([Athens, n.d.](#)). Bioplastics are plastic like packaging items made from biological materials such as cornstarch and sugarcane. These items are perfect for packaging like cups because they need to be able to hold liquids, and a completely fiber-based cup would immediately begin to disintegrate. An example of a certified compostable cup would be a paper cup with a polylactic acid (PLA) lining made from plant sugars.

These programs have been enacted by government officials who have recognized that expecting consumers to bear the full burden of properly using and disposing of packaging will not solve the issue of recyclables and compostables in landfills. There need to be actions taken to help make waste disposal less complicated, and having producers only provide environmentally responsible packaging helps to mitigate improper disposal. The main issue I've seen left out from regulatory efforts is ensuring that local municipalities can handle the packaging and products that are being enforced.

Although these cups have been shown to break into carbon water and biomass in a reasonable and controlled timeframe as per the American Society for Testing and Materials (ASTM) D6400 standard, PLA cups are not accepted by haulers in many "compostable products only" jurisdictions ([Athens, n.d.](#)). This is often because composters may not be able to tell if cups are truly made from PLA and compostable or if they are just greenwashed to look environmentally friendly ([O'Connor, 2011](#)). There have also been efforts made to address this issue by nonprofits such as Biodegradable Products Institute (BPI). BPI is a recognized third-party organization in

North America that certifies compostable products meet ASTM standards to help composters more easily identify fiber-based products and bioplastics ([BPI, n.d.](#)). The organization has a specific lockup and symbol that must be printed on any item for businesses to claim BPI certification. This kind of initiative works together with newly implemented EPR regulations because producers now need to comply or face hefty fines ([Circular, n.d.-a](#)).

Another organization that helps to identify recyclable and compostable sources is the Forest Stewardship Council (FSC). The FSC certifies products are recyclable or biodegradable, respectively, through its Chain-of-Custody Certification or forest managers through its Forest Management certification ([Forest, n.d.](#)). By offering these two different types of certifications, not only can products be identified for proper disposal, but manufacturers that handle raw materials can be identified as environmentally conscious and help direct producers to products to help them remain in compliance. The FSC logo is small but highly recognized as it is one of the very basic certifications, especially for virgin material.

Senate Bill 1383

Passing in September 2016, Senate Bill 1383 aimed to address excessive methane emissions coming from landfills as a result of improper disposal of organics, a gas that can be up to 84 times more potent than carbon dioxide ([California Department, n.d.](#)). The main objectives were to reduce organic waste in landfills by 75% and for people to eat at least 20% of currently disposed surplus food, all by 2025 ([California Senate, 2016](#)). This bill does a good job of considering improvements for both the environment and society by not only requiring the reduction of food in landfills but also requiring the

reallocation of food to allow for increased consumption.

However, a progress analysis was conducted in 2020 by CalRecycle in which they found that there was a shortage of needed composting facilities if the state was to stay on target with the 2025 goal by almost 50% ([California Department, n.d.](#)). The largest barrier to developing more facilities or expanding existing ones relates to garnering enough long-term contracts with producers of uncontaminated compost ([California Department, n.d.](#)).

The above-mentioned issue is seemingly contradictory. How can there be a problem acquiring compost feedstocks if there is an issue of too much organic waste in landfills? The answer is that there's no shortage of compost being generated, but there is a shortage of *uncontaminated* compost being generated. There is currently no mandate that ensures haulers and processing facilities will receive uncontaminated compost, meaning there are no fees or citations issued by local government directly to commercial businesses. Haulers can terminate partnerships with businesses not complying with their disposal requirements, but at a commercial scale, no contamination is nearly impossible when it comes to consumer waste as they hold no responsibility for the waste processing.

Senate Bill 54

One way to help accomplish this objective is to assign responsibility to the plastic and other items produced. The development of EPR regulations comes from Objective B of the Environmental Protection Agency's (EPA) strategy to reduce plastic: improving post-use management ([U.S., 2023](#)).

Because responsibility can't legally be assigned to the consumer, the EPA is

supporting producer-heavy legislation. California, Colorado, and Oregon have already mandated that EPR go into effect within the next year, with Maine and Maryland right behind ([Circular, n.d.-a](#)). These regulations vary from state to state and get even more specific because they designate a particular Producer Responsibility Organization (PRO) to build a program based on the regulation. For example, California elected the Circular Action Alliance (CAA) to implement its Plastic Pollution and Prevention and Packaging Producer Responsibility Act, aimed at reducing plastic waste as well as non-compostable and non-recyclable packaging ([Circular, n.d.-b](#)). Meanwhile, Colorado is having CAA implement their Producer Responsibility Program for Statewide Recycling Act, with the main objectives of proper battery recycling and convenient access to recycling for all citizens ([Circular, n.d.-c](#)).

The lack of waste responsibility causing exponential negative impacts has been felt all over the country and prompted a new wave of legislation that has now gained the eyes of those producing single-use packaging. With the passing of EPR legislation in 5 states and the introduction of EPR bills in 10 more, city and county jurisdictions are going to be faced with changing local waste streams. California's EPR Law, SB 54, mandates all packaging to be compostable or recyclable by 2032, forcing those identified as producers to adapt. This assignment of responsibility, while helpful in minimizing the role of consumer action in proper waste disposal, does not consider the capacity of local municipalities. As previously identified, there is a lack of municipalities necessary to process excessive organic waste.

SB 54 has now assigned responsibility for the

end-of-life processing of packaging and single-use items by requiring "producers" to report and pay fees based on the types and volume of materials they use and how readily compostable or recyclable they are. "Producers," in the case of California, is defined as "the person who manufactures a product that uses covered material and who owns the brand or trademark under which the product is used in a commercial enterprise, sold, offered for sale, or distributed in California" ([Sustainable, n.d.](#)). The issue with this definition is that it isn't particularly clear who the producers are if they aren't the manufacturers.

Environmental Professionals and Scholars Rebuttal

The imposition of these environmental initiatives on businesses is under fire for their efficacy by scholars, including Hope Babcock, Professor of Law at Georgetown University. One of her arguments is that corporations have gotten too big and powerful for them to be controlled by legislation ([Babcock, 2010](#)). Often, the fees for noncompliance are cheaper than adapting new, more expensive packaging, thereby incentivizing noncompliance from a monetary standpoint ([Babcock, 2010](#)). This gives businesses a reason to justify their actions; it's the more viable option because they can reinvest more money in the company or their employees.

Businesses are also heavily controlled by their shareholders. If they were to implement packaging that could disrupt customer experience and bring about an inconsistent experience to the brand, shareholders could pull funding ([Babcock, 2010](#)). Babcock (2010) also cites how the EPA does not properly enforce their own regulations, further incentivizing companies to put environmental initiatives on the back burner. This is often a reason that companies may

turn to methods such as “greenwashing,” as they can easily maintain the façade of compliance. This vicious cycle then repeats by confusing consumers at the waste stations on where to put their packaging.

Where state legislation and scholarly viewpoints align is the lack of responsibility that must be picked up by producers. This is partly due to the newness of sustainable initiatives, leaving many key definitions unclear, allowing for exploitation. Bowen and Aragon-Correa (2014) point out that “corporate sustainability” does not have a concrete definition. One method they call on to address this is having environmental regulatory bodies work more closely with scientists to be able to have concrete bounds of “corporate sustainability” as well as clear ideas of what policies may be needed in the near future to help give a better roadmap for tackling environmental challenges (Bowen & Aragon-Correa, 2014). The idea that regulatory environmental bodies were not harnessing the expertise of scientists enough was recently confirmed for me. An Environmental Geoscientist posted about the state of environmental legislation, saying, “Every Environmental Scientist I know personally is unemployed. EVERY ONE” (B., 2024). She went on to point out how organizations she was interested in working for seemed to be uninterested in scientists, instead hiring policy analysts and marketing experts (B., 2024). She begs the question: is this why innovation is at a standstill?

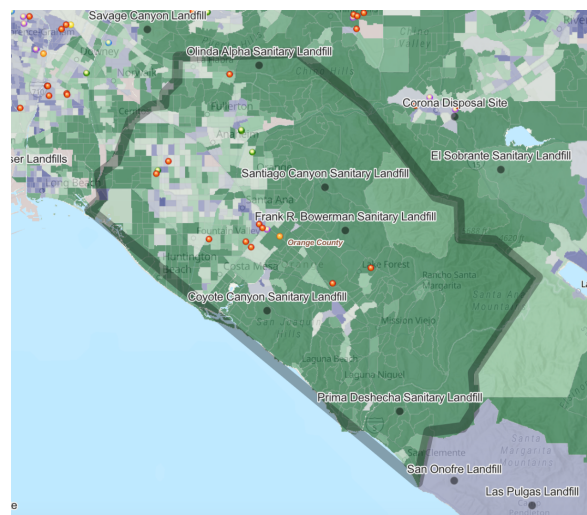
This insight from someone in the field, although singular, could be another reason why current environmental infrastructure is so inefficient. If those within the environmental science space are feeling underutilized, then who are the people making these decisions in the name of better health for our planet and society? Or are the organizations that are appointed to make

these decisions wrong entirely? While there are many questions to further look into, understanding the people and groups behind the governance is just as important as the legislation itself.

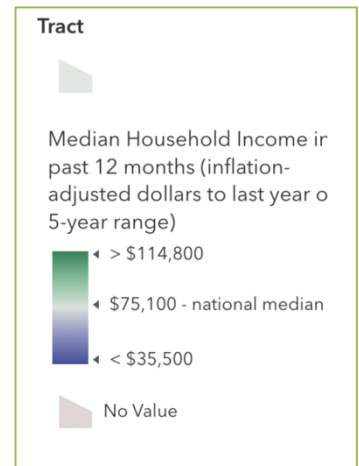
Community Impact

The impacts of improper waste disposal are also disproportionately felt in the Orange County Region. I developed a community map of the county in the context of my project to help better understand the impacts that the waste system has and on who.

Layer 1: Median Household Income



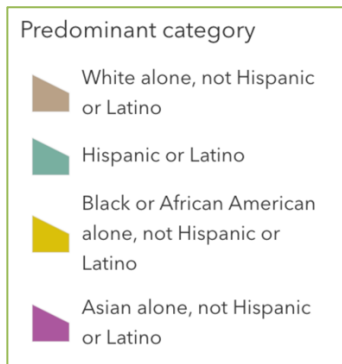
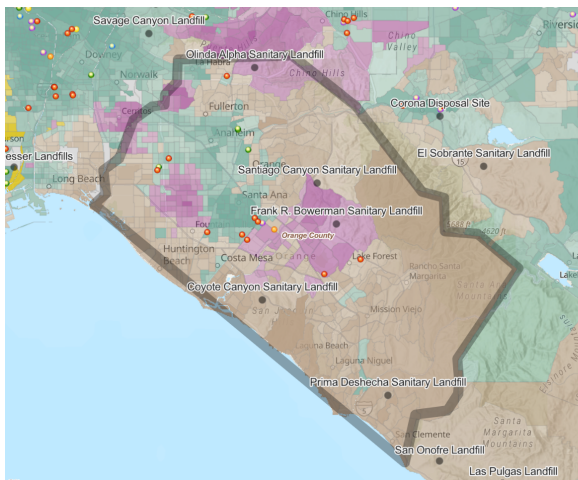
This layer establishes the wealthier communities in Orange County as a base layer for understanding where landfills are close to. After adding this layer, I was slightly



surprised to see that the three active landfills in OC are all in higher-income areas. This could be due to many factors. Some I have

already considered include population density and geography. There could be only a few spread-out homes in those areas with high household incomes. Alternatively, these areas, due to their proximity to sensitive sources such as watersheds, beaches, and highly populated areas, could be the best fit for landfills. In a video detailing the operations of OC landfills, a civil engineer explains that they like to work in a way that's most conducive to the landscape (OC, n.d.).

Layer 2: Race and Hispanic Origin

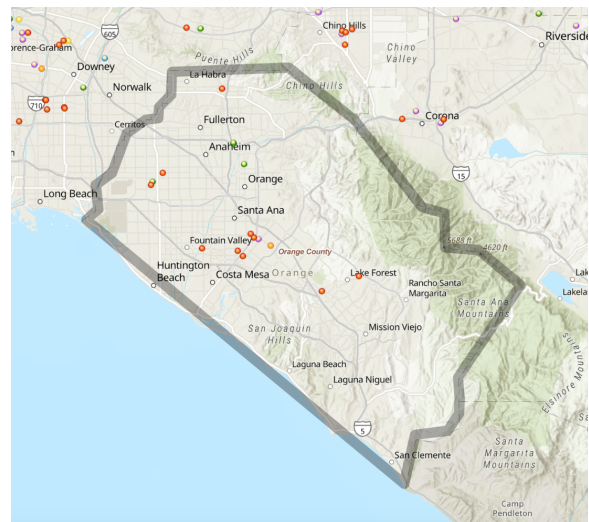


This layer further contextualizes the first. Understanding the income distribution is one factor, but race can't be ignored as an

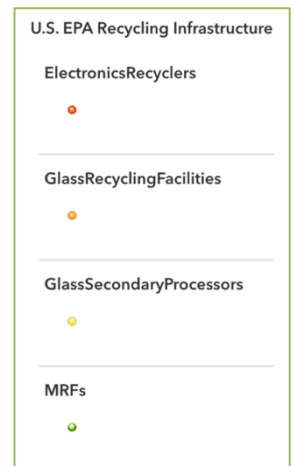
important consideration as well. After the first layer, I was surprised at how the landfills were located in wealthier areas. Then, after adding this layer, I was able to see that not only are two of the landfills in wealthier areas but in predominantly Asian areas. This was interesting to me because a majority of Orange County is predominantly White,

with one significant area of predominantly people of Hispanic or Latino descent. I focused on the Frank R. Bowerman landfill as that one is located in Irvine, an area I already know to be highly populated with people of Asian descent. I found out that that landfill opened in 1990, compared to the other two that opened 20-30 years prior (OC, n.d.).

Layer 3: U.S. EPA Recycling Infrastructure



This layer helped to give more context to the other facilities in the areas that are dedicated to alternative materials and material recovery. By understanding the capacity for types of materials, it helps to give an idea of the importance OC local



government places on material recovery and proper disposal. I was hoping to gain insight into the reasoning behind enacted legislation and possibly see where future legislation is looking (towards more facilities that specialize in composting and recycling, specifically). I also looked into the capacity

of the three landfills for alternative material recovery, and the OC landfills have received multiple awards in this category, most recently being in 2019 for their Organics Management Plan ([OC, n.d.](#)). Although this is a good sign, there is a higher demand for organics processing facilities, as noted by the 2023-2024 OC Grand Jury meeting. By understanding current capacity, demographics/consumer exposure to waste, and consensus on waste, my project aims to supply more knowledge behind the reasoning for a disconnect between the number of mandated organics and recycling versus the capabilities of local municipalities. You can check out my full map with interactive layers [here](#).

By identifying the most common themes of issues being experienced at every point of the product lifecycle, from production to local facility capacity, I hope to provide a better understanding of how a wealthy and educated area in such a technologically advanced state continues to see issues of avoidable methane emissions and plastic build-up in landfills and possible steps that can be taken by Orange County to improve the efficacy of waste infrastructure.

Exposing the Gaps

Government officials, haulers, scholars, and even some businesses are united in the idea that packaging waste is a very avoidable outcome of consumption. The main issue is being able to attach clear responsibility to packaging during the EOL process, leaving it to be an afterthought. Innovative legislation like EPR is being introduced to help try and assign responsibility to the producers, but scholars point out that the environmental regulatory infrastructure is not strong enough yet to fully utilize the potential of the regulations ([Babcock, 2010](#); [Bowen & Aragon-Correa, 2014](#)). On the same note, haulers are finding it's still too difficult to

tell which packaging is compostable or recyclable even in jurisdictions with packaging mandates because without established third-party certification and evidence of businesses providing uncontaminated waste ([Athens, n.d.](#)). There is a disconnect between regulatory bodies and municipalities as well as private waste haulers and processing facilities that can be improved to help increase waste diversion from landfills.

In the Restaurants

At the restaurant level, my work aims to implement more back-of-house (BOH) composting efforts in restaurants by highlighting the feasibility and consequently improved employee morale. I'm also aiming to uncover what the most confusing or challenging issues are for consumers at waste stations to improve front-of-house (FOH) contamination levels in recycling and composting. As discussed, compostable packaging can be especially confusing with a lack of education, identification, and greenwashing caused by imitation packaging. One way I plan on doing this is by giving a greater insight into the hauler's perspective, as I noticed this perspective was not formally represented in the literature I reviewed. This includes gaining a better understanding of what counts as "contamination," the current technology they possess and will possibly acquire, and why commercial food waste poses a challenge for them.

There have been improvements in landfill diversion observed from BOH waste streams. Specifically, after properly training employees and encouraging participation, there was almost no contamination observed because of the nature of a regulated environment. While legislation is pushing for more producer responsibility, I also want to investigate the reasons why proper waste

habits are challenging for consumers. Specifically, seeing the different issues faced that cause such high levels of contamination and result in a loss of material recovery.

In the Legislation

At a legislative level, the research and interviews I conduct will be compared and contrasted to show how the main objectives of political bodies at the city, county, and state levels align. By doing so, I hope to uncover the major inefficiencies in Orange County's waste infrastructure. This is building on the disconnects I discovered working on a sustainability team at the corporate level. Trying to factor in packaging and waste legislation has become almost impossible with the number of contradictions at different levels of the waste system. By specifically focusing on commercial food industry waste, my findings will help to show how complicated navigating competing legislation is for corporate teams and how this can disincentivize them to adopt sustainable waste management strategies.

My project aims to bring awareness to the complexity of corporate sustainability. Enforcement hinges on stocking packaging that can't be properly recovered because local facilities do not have the capacity or the trust of their partners or haulers to receive uncontaminated waste. Taking legislative steps is important for ensuring the protection of the environment, but regulations move inevitably slowly. And again, businesses are often incentivized to just take the fine ([Babcock, 2010](#)). By investigating the willingness and perceived feasibility of implementation of BOH composting programs by employees, there may be a way to help increase material recovery and decrease contamination. The next step of my project would be looking into the way different entities pass off responsibility for the waste they create, hence curating the

current issue of "blameless waste." I would like to better understand why, of all things, waste is something every group wants to wash their hands of and how waste legislation can exist while being so contradictory or inefficient. This would involve looking into factors like how much businesses pay in fines versus complying with either waste or packaging laws, noting specific jurisdictions.

Other thoughts before commencing my project are, 'How can we tackle consumer responsibility?'. Education for the consumer paired with a more interactive disposal experience could be a fascinating endeavor to learn more about, but without changing the way waste is understood socially, there will be no intrinsic desire to improve our habits. I'd be most interested to learn about how consumer education on composting and recycling has changed over the years with the advanced knowledge now available and more innovative waste disposal options coming out by the day.

METHODOLOGY

The first part of my project will focus on gaining insight from food service employees about the feasibility they see in implementing FOH composting as both a worker and a consumer. Many of the methods used to assess consumer waste habits are qualitative. One notable framework concerning consumer disposal habits was established by Qi and Roe (2017). They asked consumers to dine for free and then randomly selected a portion of those consumers to receive information on the harmful environmental impacts of food waste and compared the resulting food thrown out to those who received information on a completely unrelated topic ([Qi & Roe, 2017](#)). Their findings revealed that those who were told of the potential harm food waste could have on the environment tended to yield

better disposal practices and reduced food waste (Qi & Roe, 2017). This study stood out to me among the qualitative methods used to analyze consumer habits because it supported a study done by Evans (2014), presented by Warde (2015), which showed that consumers often have good intentions, but distractions can lead to improper waste disposal and confusion (Warde, 2015).

My project aims to build on this claim and the study done by Qi and Roe (2017) by looking into what some of these distractions or barriers could be to help improve consumer understanding and also gauge if the factor of 'the consumer' is too variable to reliably implement FOH composting programs. Along with this, I am looking to see if employees view widespread implementation of BOH composting programs as feasible. This will be indicated by intrinsic employee desire and the perceived impact on operations. Both of these insights are important to help determine where commercial food entities should place their focus and resources. Especially if FOH composting is continuously too contaminated to be accepted by the hauler, this could indicate that businesses need to focus more on offering compostable packaging rather than the compost program itself or trying to influence consumer behavior. I find that to change disposal habits in the food industry; people need to be given the opportunity to think more consciously about their consumption and the potential they have for a positive impact, which I hope I can do through my conversations with food service employees.

Epistemological Origins and Framework

Much of my curiosity when exploring this topic stems from the idea that such a wealthy as Orange County has inconsistencies within its waste system. According to a grand jury report, there are composting requirements for

the State of California as established by Senate Bill (SB) 1383, but there is concern that there aren't enough composting facilities should the county reach the target diverted organic waste (Orange, 2024). To explain how such inconsistent legislation occurs, I will be looking into the county values as dictated by how the projected budget is allocated and what issues continually appear on the ballots or are discussed amongst local government officials. Gaining a better idea of the local government's morale around the importance of proper waste disposal will help to give further insight into the distractions the general population faces that could result in improper disposal practices.

The epistemological aspect of my project stems from my prior recent experience working in the quick-service restaurant industry. As an employee, I was filled with questions: who was responsible for materials improperly disposed of? What tools are other people lacking to be able to make more sustainable choices? I now work on the corporate team for this same quick-service restaurant chain, and I thought many of these questions would be answered, but I still have those same questions in addition to a whole host of new ones. I now understand why there is a lack of recycling and composting training, what the company's concerns are regarding material recovery and sustainability, and just how big of a problem attempting to encourage proper waste disposal can be. Having been the boots on the ground and the corporate support, I want to take it back to the restaurants and gain a better understanding of how they are viewing their situation and how similar or different it was from how I was viewing it: a lost opportunity to reduce our waste. Finding out what barriers exist can allow me to better understand how to facilitate maximum employee participation, ways to potential changes in the restaurant to help improve

consumer participation and the potential for strengthening the restaurant-hauler relationship to bridge the gaps of knowledge and experience.

Method 1: Semi-Structured Interviews

Most of the current qualitative data on disposal habits in the food industry focuses on the consumer and their preconceived notions surrounding waste, failing to acknowledge the role of employees in proper waste disposal, skewing the projected amount of properly disposed of and recovered waste. To address this gap, I have established a semi structured interview process in which I will go to two different quick-service restaurants of the same chain and interview consenting staff members.

Firstly, I asked about the largest barriers they face when it comes to maximizing recycling and composting programs. Secondly, the issues or distractions they have observed consumers experience that could be inhibiting proper waste disposal. Next, the relationship that the employee has with their hauler. And lastly, the connection to recycling and composting in the employee's personal life. I showed the employees the two different styles of waste station signs depicted in Image 1 below: the signage on the left is very specific, depicting every item the restaurant carries, while the signage on the right is more general, referencing the material each item is made of versus the item itself with a reminder to clean recyclables before putting them in the bin. After getting a chance to view both signs at the same time, I asked them which one they feel is easier to understand and more likely to encourage proper disposal habits in a quick-service restaurant environment.

Image 1. Waste Station Signage Styles



Source: Location 1 (left), Location 2 (right)

I conducted 12 interviews at different times over three weeks to ensure that information from all different employees could be represented. This was to reduce the bias of certain shift positions. For example, closers must do a lot more cleaning and, therefore, may experience more issues with compost than openers. After collecting all this information, I used a blend of thematic and content analysis to extrapolate the most common themes from my interviews based on the degree of relevancy to my research.

Method 2: Unstructured Interviews and Legal Research

My research also incorporates the iterations of waste haulers who are the ones that must deal with contaminated waste streams. Waste contamination is a big issue and has been a focus of many environmental activists and even businesses to help improve material recovery and reduce methane emissions from food in landfills. The main issue is that consumer habits are not controllable or fully predictable. Therefore, positive “nudges” to consumers toward greater participation in recycling and composting programs can never be guaranteed to work. This attempt to understand consumer behavior overshadows the role of waste haulers and the impacts of consumer disposal habits. In an article published by the Chief Sustainability Officer of waste broker Rubicon, Rachelson details how contaminated waste streams are hurtful to haulers and, therefore, any suspicion of contamination (even if not present) could result in refusing to service a location's

recycling and/or compost ([Rachelson, 2023](#)).

The hauler perspective was not represented in any peer-reviewed literature, which I believe is necessary for fixing the functionality of the waste infrastructure and improving material recovery. To see how the issues experienced by the haulers compare to barriers for employees, I attempted to get in contact with the hauler that services the same two locations where I will be conducting interviews. I was unable to directly get a representative from any of the big three hauling companies in Orange County, but I did manage to get in contact with two representatives from the City of Irvine and a public affairs officer from CalRecycle.

Representing the back-end processing voices of waste is necessary because working on one side of the problem only yields certain methods of improvement. Haulers preemptively refusing to accept recycling and compost even when there is a chance consumers are practicing proper disposal habits is representative of a broken system lacking communication throughout the supply chain. By bringing more perspectives on the issues of proper waste disposal to light, we can help educate everyone involved in the life cycle of a product and about the potential they possess to help better align local waste efforts with consumer practices.

RESULTS & DISCUSSION

Municipality Capacity & Capabilities

After reaching out to the city waste coordinators in Orange County, I found that there is extreme variation in waste disposal processes for every city and every hauler. While both city representatives I spoke with said, ASTM D6400, the three main haulers, Waste Management, Republic Services, and CR&R, all show that they only accept yard waste, food waste, and food-soiled paper. I

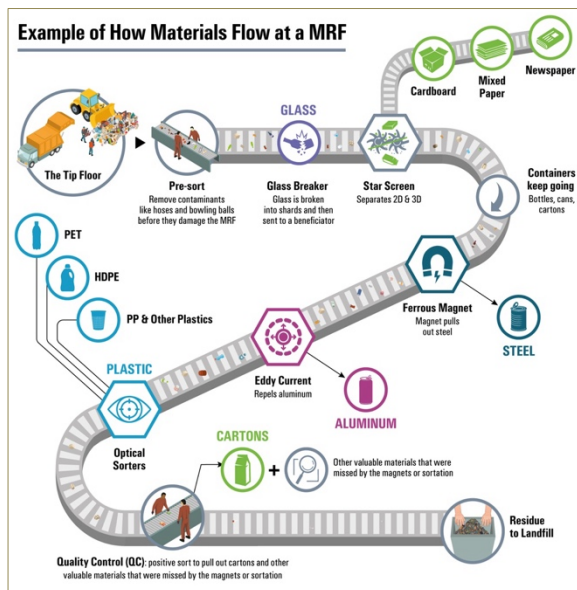
believe this is because trying to convey to the consumer that only “ASTM D6400 certified compostable packaging” is accepted in the organics stream would result in confusion for multiple reasons. The first is that any container that may appear compostable would likely be put in the compost bin improperly, increasing contamination. The second is that many people won’t understand the significance or how to check if an item is certified, leaving them to also throw away items that may not be compostable in the organics bin.

The narrative around waste needs to be changed as there are so many different ways to recycle and compost depending on your location and the hauler servicing that area. For standardized programs state- or even county-wide, these items should be made obviously known as compostable and recyclable with clear signage. For items consumers are unsure about, there needs to be one message for locals: *put it in the trash*.

This message is not pushed enough, with many consumers putting things in the recycling or compost bin because they are “trying,” unintentionally contaminating the alternate waste streams. Aside from this messaging helping to reduce contamination, there is also still an opportunity for the material to be recovered through material recovery facilities (MRFs). MRFs sort recyclables in preparation for repackaging and selling them back to producers ([Leahy, 2023](#)). There is even further classification of MRFs, with the two most common being dirty and clean. Clean MRFs handle only single-stream recycling, while dirty MRFs sort through trash in the hopes of gathering recyclables that were thrown in the wrong bin ([Leahy, 2023](#)). In areas where there are dirty MRFs, the message to consumers of throwing items in the trash is even more helpful because the MRFs will help to

recover the recyclables. The biggest issue with this is that dirty MRFs are more expensive to run, according to Rubicon's Circular Economy Senior Manager, Meredith Leahy. With the need for hand sorting of smaller items like utensils and flexible items like plastic bags, there is much more labor and machine maintenance required. The fundamentals of MRF sorting can be observed in Figure 1. To see a detailed breakdown of the ease of recoverability by material, check out The Coalition for Sustainable Packaging's resources [here](#).

Figure 1. Example of How Materials Flow at a MRF



Source: [The Sustainable Packaging Coalition & The Recycling Partnership](#)

By better-educating consumers through school programs and public outreach, the message to consumers of putting it in the trash would start tackling the unmandated issue of contamination in waste streams while also getting everyone on the same page with how to properly manage your waste. To ensure we are still making efforts to divert compostables and recyclables from landfills, there needs to be more of a focus on

developing the infrastructure for advanced waste processing facilities.

Organics Processing Infrastructure and Developing End Markets

It's been recognized that responsibility can't be fully placed on the consumer for dealing with proper waste disposal because of how complicated the system is and the issue with greenwashing that unfortunately occurs. Greenwashing can trick people into thinking they are consuming sustainable products, illegally swaying their purchasing choices. This recognition has resulted in multiple states, including California, establishing EPR legislation to help assign this responsibility to producers (the brands). This legislation, however, affects many more local agencies than just the brands selling their products. With all packaging required to be recyclable or compostable by 2032, there is an expected decrease in landfill waste and an influx of alternatively processed materials.

City Perspective of Legislation

I was fortunate enough to be able to conduct an unstructured interview with two representatives for the city of Irvine who manage waste along with other sustainability initiatives for the city. I asked about any thoughts or concerns they had with the influx of alternative packaging that would be coming in due to SB 54 as opposed to the established infrastructure. They indicated they were looking forward to the compliance by producers because it was creating a standard process for waste disposal, specifically at the commercial level for businesses that have multiple different streams, like the food industry. They were unconcerned with the influx of compostable packaging despite the minimal processing facilities as they stated the end product markets would be developed by the producer payments.

Immediately, I disagreed with this perspective because producers will not be directly funding infrastructure development. While they will be paying fixed membership fees to the PRO and variable fees on the tonnage and type of material they are using, the PRO is ultimately responsible for funding the processing of these materials. The issue with this is that the fee schedule does not start until 2027 (Circular, n.d.-b). On top of this, producers will likely continue to use packaging soon to be out of compliance with the 2032 compostable and recyclable packaging materials mandate, stalling organics processing because there is not enough product to compost. The infrastructure to accommodate the influx of compostables will be nowhere near ready by 2032 if development does not begin soon due to the amount of funding, planning, and permits needed. The city representatives did note that these end markets would not be developed without some kind of incentive, and in their perspective, the producer fees will be able to develop these markets enough.

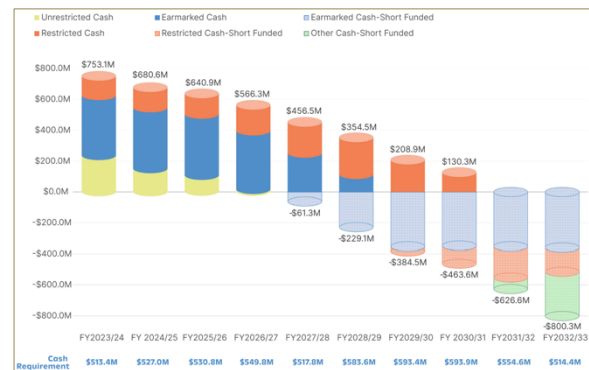
The next thought I had was, “Perhaps there’s a middle-ground solution”. For instance, local jurisdictions could start the development of organics processing infrastructure and end product markets, allocating funds, getting construction permits approved, and starting the builds. This way, when the PRO does start collecting fees from producers, they can take over the building projects and greatly reduce the amount of time for the establishment of these facilities. Not to mention, hundreds of people will need to be hired and trained to work the facilities after they are built, tested, and approved for operation.

County Needs

I investigated the waste management entity in Orange County, OC Waste & Recycling (OCWR). According to their 2023 Annual

Report, OCWR requires funding and stable revenue streams to develop proper expanded infrastructure for processing organics. As of right now, its greatest source of revenue is gate fees charged to haulers, who are the customers of their landfills (OC, 2023). With the dramatic decline in waste the landfills would be seeing, Figure 2 shows how OCWR calculated their projected revenues and expenses for the following 10 years.

Figure 2. Total Forecasted Cash Balances



Source: OC Waste & Recycling 2023 Annual Report

With revenues continually decreasing and system expenses continually decreasing, OCWR would need more funding from the state and CalRecycle to be able to start and complete projects involving the development of a robust organics processing infrastructure to support SB 54. The other option OCWR highlighted in their report was to designate publicly owned and operated processing facilities to take the cost burden off itself, making development feasible (OC, 2023).

Another claim made by the county entity is that there is legislative backing needed to develop end-product markets for processed compostable products, such as facilities that can turn methane generated by anaerobic digestion into renewable energy. From my stance as someone who has worked in the

restaurant and the corporate environment in the food and beverage industry, this point supported my view that legislation would be needed. Without the end product market demand, producers will continue to use the haulers that meet their needs. This means the hauler that services the producers' locations consistently and at a competitive price. Utilizing haulers and processing facilities that go the extra mile to put trash through MRFs for improved material recovery or utilizing processing facilities that generate renewable energy is much more costly. Therefore, producers would not be the ones developing the end markets for the by-products of recycled and composted items.

Figure 2 made it clear that the organics processing infrastructure would not be feasible for OC Waste & Recycling (OCWR) to develop without establishing a stable revenue and receiving funding from the state. OCWR did receive a few grants in the year 2023, with the total amount just short of \$3.4 million ([OC, 2023](#)). However, starting FY 2027, OCWR has no access to unrestricted cash (Figure 2). The only cash they'll have is earmarked and restricted cash, both cash types that indicate the money has already been allocated for a specific project or purpose.

To see how the local government is adapting to this upcoming legislation, I looked into OCWR's approved budget for FY 2024/2025, which began October 1, 2024. I found the beginning balance of this year is 26.2% lower than the previous year, meaning they are starting with less money in reserves for excess projects. The plus is that the projected expenditures have also decreased, but disproportionately, by only 8.7% ([County, 2024](#)). And while the projected budget from FY 2023/2024 ended up being an overestimate by almost 31%, the approved budget for FY 2024/2025 being lower than

the projected FY 2023/2024 makes me believe the county is not accounting for organics processing facility development to fall on OC Waste & Recycling.

Whether they are projecting that costs associated with this type of development will be incurred at a later time, or perhaps they are not considering those costs at all, I feel as though there should be a much greater emphasis on this issue. With the immense fine that is going to be facing producers for noncompliance, it's almost certain the large influx of recyclables and organics could cause system stress. I would like to look into the producer's inclination toward alternative packaging to project the tonnage and types of materials that would be circulating in Orange County by 2032. One factor that could completely change my position on how big the issue of developing a more robust infrastructure would be is the increase in the use of reusables. If the majority of producers indicated they were going to ditch single-use packaging entirely, the infrastructure development needed to support this change would be completely different at the restaurant level versus the county level.

State Perspective of Legislation

I was able to get in contact with a public affairs officer from CalRecycle, the organization responsible for managing and implementing statewide waste legislation in California. Their response to my questions about their concerns or thoughts on the implementation of SB 54 was that "it's not CalRecycle's role to have an opinion on the law." While I understand this position, I would hope to look into this more in-depth by speaking with more CalRecycle contacts and seeing what measures they are attempting to ensure are in place to establish the necessary facilities for current and future legislation.

I was able to establish that CalRecycle's

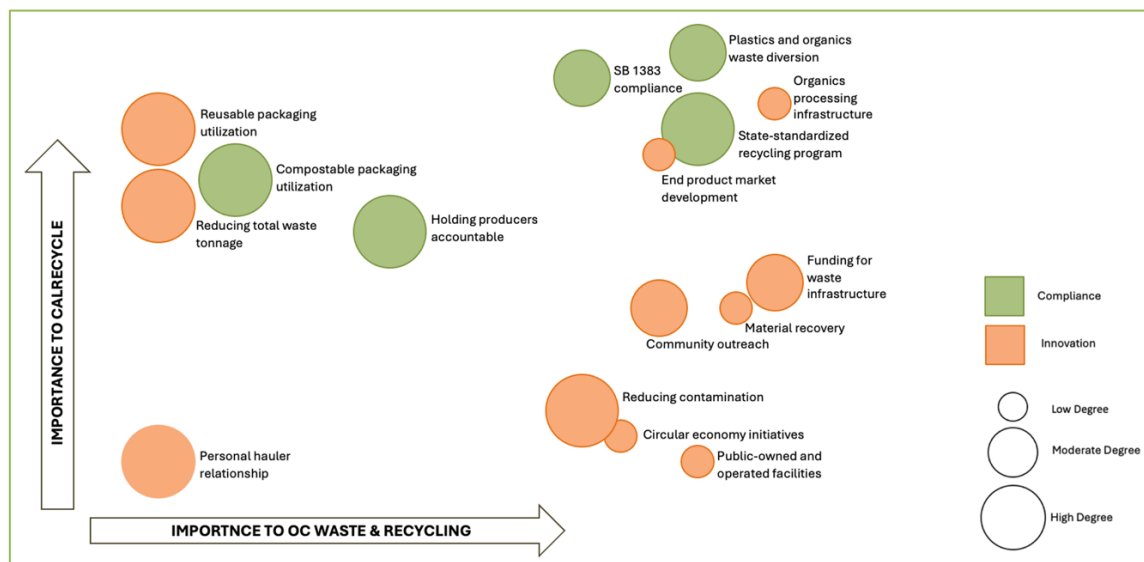
main goal is to reduce plastic pollution, reduce the number of organics in landfills, and ensure implementation of legislation goes as smoothly as possible. I also established that OCWR’s main goal is to divert recyclables and organics from their landfills, but they are going a step further to implement circular economy initiatives, an objective that is too complicated and advanced to be mandated at the state level. These circular economy initiatives involve ensuring there are renewable energy facilities to utilize the methane emissions generated from industrial composting and landfill by-products to create natural gas to be used by the community ([OC, 2023](#)).

Responsibility for Achieving Objectives

While having slightly different objectives

makes sense because of the varying scale and responsibilities of CalRecycle and OCWR, my research has seemed to find a gap in the feasibility of achieving each entity’s objectives. To better illustrate this, I highlighted the most common themes from the objectives brought to my attention at the city, county, and state levels, compiling them into a matrix that examines the importance of each object to CalRecycle and OCWR in Figure 3. I then further classified the objectives, citing those that are mandatory as “compliance” related objectives and those that are beneficial but not directly mandated as being “innovation” related objects. Lastly, I added the degree of control that the front-line workers and producers have in impacting these objectives to better indicate where the responsibility of achieving each objective may start.

Figure 3. Objectives Matrix



Source: CalRecycle Representative and [OC Waste & Recycling 2023 Annual Report](#)

Some expected observations: CalRecycle values all compliance-related objectives, and there is room for restaurants and producers to contribute to this compliance.

Some unexpected observations: The highest valued objectives by OCWR are those that producers have little control over and involve advancing the infrastructure of processing

solid waste forward.

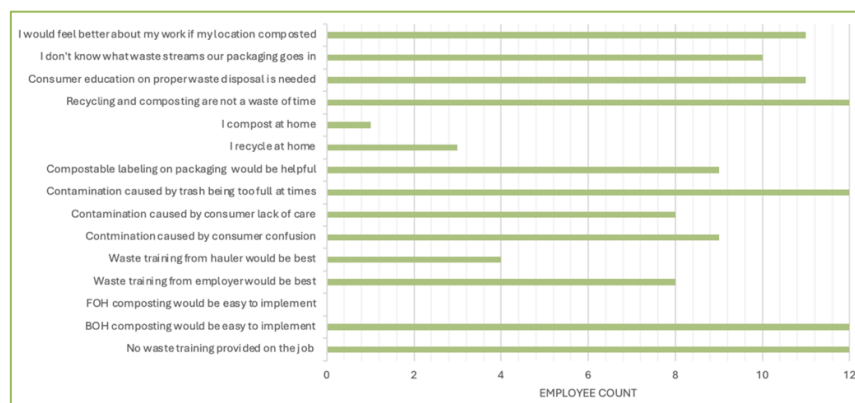
When looking closer at the objectives CalRecycle and OCWR both place high importance on, such as plastic and organics waste diversion and organics processing infrastructure, it sparks the question of, ‘what methods does each entity believe are needed to achieve these objectives?’. As I discussed previously, the objectives of CalRecycle and OCWR may not be perfectly aligned, but that’s to be expected as CalRecycle operates at a state level and must account for varying capabilities while OCWR is concerned with the needs specific to the county. This difference in objectives is supportive of the narratives I have observed through my conversations and research surrounding the apparent lack of responsibility for development because of unclear methods. OCWR feels more legislation is needed for end product markets, CalRecycle is most concerned about implementing the new legislation as it is already a very complicated task. CalRecycle will need to review the PRO’s proposed plan to see if there is a method that assuredly develops the end markets necessary to accommodate the new expected waste

streams. Without properly assuring that local jurisdictions can accommodate this change, SB 54, despite its intentions, would be nothing more than state-sponsored greenwashing.

Employee Testimonies

My interviews with employees seemed to confer with the intention of the legislation that is being implemented. The overall findings are that the consumer can’t be given the responsibility to properly dispose of their waste. Although education and standardized systems will help reduce contamination, the consensus from my employee testimonies is that FOH compost programs are not currently viable without a fully compostable packaging suite. Because consumer actions are so variable and quick-service restaurants, do not currently staff personnel to sort FOH waste, the ultimate responsibility needs to fall on employees and the BOH waste streams as these are controlled. I already mentioned the roles producers, in general, can play, but there is also room to improve waste disposal efforts and practices at the employee level.

Figure 4: Interview Themes



Source: Location 1 and Location 2 employee interviews

Currently, both Location 1 and Location 2 for the chain I studied have signs that indicate there is a spot for “compost” in the FOH. This is because it’s required in the state of California for any food producers to offer FOH locations for compost, per SB 1383. However, both of these locations are landlord-managed, meaning that the restaurant chain has no control over the waste services that are offered. Again, this issue of state sponsored greenwashing is brought up because the state seems to benefit from saying, “All food producers are required to have compost streams for consumers,” yet there is no mandate on landlords providing hauling services for these waste streams.

From speaking with the employees, it was also made clear to me that there was no formal waste training done when they were hired. I was surprised that 83% of the employees I interviewed were unsure which bins their own packaging went in (Figure 4). Although this is not technically a necessity because there is no hand sorting required, meaning the waste training wouldn’t need to be extensive, it’s important that employees know the difference between FOH and BOH practices and can help them develop more comprehensive disposal habits outside of work.

There are a couple of key differences in the FOH and BOH waste streams. In the BOH, only cardboard is recycled, while in the FOH (depending on the jurisdiction and what the hauler accepts), the recycling stream could include glass, aluminum, and plastic. BOH compost can also differ from the FOH, only consisting of organics. The compost bins need special liners that can be industrially composted. After explaining the simplistic training that would be required, it was a common consensus that implementing BOH composting at both locations would be

appreciated by the employees and easy to encourage participation.

Field Notes

The common themes I extrapolated from the interviews I conducted also found that the greatest barrier to composting and recycling at home was that it wasn’t offered as a service or that it wasn’t easily accessible (Figure 4). Most employees said they would want to participate if they could, slightly going against my preconceived thought that the majority of consumers don’t care. Although this sample size is relatively small, it did give me hope that consumers are at least attempting to be mindful. This was confirmed in the observations I made during my field visits to the restaurants. I was able to go only twice when the restaurants were busy, but I observed conscious consumers during the lunch rush and when there was no one else around.

Location 1

At Location 1, there were four people who all got up and threw their trash away at the same time. Three of them seemed to pay no mind to the signage that specified a bin for landfill, a bin for recycling, and a bin for compost, yet there was only one bin under all three signs. But the last person had left a glass bottle they had been drinking from on top of the waste station. This was something I commonly saw when working in the restaurant, as many people know bottles, especially glass bottles, should not go into the bin for the landfill. However, they seem to be confused when they look in the recycling bin and see organics or the recycle bin is too full to fit the bottle, so they leave it on top.

Another consumer went to leave with all their trash in one bag, but when they saw only one bin was out, they stood at the waste station

and looked confused. They looked for a long while and ended up simply leaving their takeout bag with everything in it on top of the waste station, almost as if they had given up.

This seemed similar to the earlier action I observed of the person leaving their glass on top. I began to think, "So there are people who care, but they are just confused." This echoed sentiments from my first employee interview that contamination in the recycle and compost waste stream is largely due to confusion, versus the second employee interview, where they believed it's more an issue of lack of care. After looking into Location 1 further, I found their waste is landlord-managed. The employee working the shift let me know that they bring all but one of the bins in early since they don't have compost or recycling, so they only need one bin because it all "goes to the same place anyway."

Not only does mandating signage without proper infrastructure cause greater confusion among consumers, but it's also reinforcing poor habits for employees who have to manage waste that could potentially be carried over to their personal lives. As it has been observed, the simple disconnect between legislation and implementation can cause a cascade of negative waste habits to be developed that contribute to. Contamination and feed the loop of consumer confusion.

Location 2

I arrived during the lunch rush, and the heavy traffic was reflected directly by a line at the soda machine right next to the main waste station. With people lined up around the corner, waiting to fill their drinks and grab utensils, it seemed as though everyone in the area felt pressured to move quickly. Most people didn't even look at the signage for the waste station before throwing whatever trash

they had out in the leftmost (closest to the soda machine) bin. Conveniently, it was recycling, and most of this mindless trash was straw wrappers, which are paper, so generally, the waste was being disposed of properly. This was an issue a couple of times, however, when people went to throw away food and did not look at the signage.

The first waste station interaction that occurred in which the consumer seemed to put thought into what they were doing was when a young adult went to put all their trash in the compost but paused after seeing the signage and put their tin foil in the recycle instead (as specified on the signage). Although it was busy and it seemed this person had a preconceived thought about where they were going to dispose of their trash, they chose to think critically about their waste and use the signs provided as intended.

Fourteen minutes later, I saw a person who had been dining in go to one of the supporting waste stations in the corner. They stood there and separated every item they had based on the signage that was present. This made me feel similarly to how I felt at Location 1, that there were people who care, and perhaps they are trying, but now my question becomes how can we override consumer's preconceived assumption of what's compostable and what's recyclable since it's different in every jurisdiction?

I learned that Location 2 was also landlord-managed, but they had both recycling and landfill services. I also looked further into implementing a composting program, and it would entail that there is enough space in the outdoor tote area to add 1 to 3 totes for compost. While this is possible, it would also have to be paid for by the restaurant itself, not incentivizing the adoption of composting.

Live Learning

To delve deeper into the intention behind SB 54 in California, I attended an information session with a food serviceware manufacturer to gain some clarity on what the expectations are for the implementation of SB 54, which is set to take effect in January 2027. The information provided by this information session was congruent with that of the conversations being had with the Food Packaging Institute (FPI) that brand owners are to be considered “producers.” While we are finally going to have a responsible party for the type and quantity of single-use materials being used, the actual recovery rate of material doesn’t seem to be looking so positive. Many producers have already begun incorporating compostable packaging, such as the chain I studied, but the statewide legislation doesn’t take into account existing municipality capabilities at the local level.

In the case of Orange County specifically, there are three main haulers: CR&R Environmental Services, Republic Services, and Waste Management (WM). All three of these haulers accept commercial compost, but the extent of compostable packaging noted as “acceptable” is food-soiled paper, e.g., paper napkins, paper plates, etc. This doesn’t include items like BPI-certified compostable cups, which utilize a bioplastic (RIC code 7) lining, as my case study chain does. And even though CR&R states plastics 1-7 can be accepted as recyclables, the paper straw that is part of the drink unit is supposed to be put in the compost. And with waste disposal already being confusing and many consumers unconcerned with their waste, we can’t assume they will participate in this sort of separation.

Another interesting hurdle I was made privy to during the SB 54 Webinar was the current definition of “compostable” in the state of

California. Per Assembly Bill 1201, passed in October 2021, the use of the labeling “compostable” must satisfy the USDA National Organic Program’s definition of “compostable” ([California Assembly, 2021](#)). This bill helps to ensure harmful additives are not used in compostable materials manufacturing by limiting chemicals like PFAs, also known as “forever chemicals” ([California Assembly, 2021](#)).

According to the USDA National Organic Program, there are two categories compostables fall into: organic and non-organic. Therefore, two different waste streams could be used to define “compostable” under AB 1201: organic or non-organic. And currently, California is utilizing the classification of ‘organic compostables’ ([California Assembly, 2021](#)). The USDA also has a list of accepted items for each stream of compost, and currently, there is no food packaging included in the ‘organic compostables’ approved list. If this remains true, all compostable packaging will be banned by January 2026, according to the information session on food serviceware. CalRecycle can delay this initiative for up to 5 years, but as you can imagine, this seems completely counterproductive to SB 54, which is one of the biggest concerns in the food industry and for the state at present. I plan on following along with the evolution of California’s definition of compostability and seeing how producers and food serviceware manufacturers begin responding to this.

SUMMARY

This project’s objective was to investigate the reasons why proper waste disposal, specifically related to commercial organics, is so challenging in Orange County. This study examined the role of waste producers and handlers, local governmental officials, and state government officials to help reduce

the negative impacts of improper waste disposal on residents of Orange County, focusing on those located closest to landfills. To highlight the main proponents behind operational inefficiencies, this study assesses the alignment or misalignment of each party's perspectives, thereby exposing the weak points in established and future legislation as well as lacking infrastructure. There was a lack of formal waste training for employees that contributed to the improper waste management most observed by city officials, as well as a conflict between state-mandated services and the services landlords are mandated to provide. By engaging employees in waste training and aligning state mandates with local mandates for building landlords, the county can be unified in waste efforts. This helps to reduce confusion, more easily educate consumers, and decrease waste stream contamination levels while helping to achieve the state legislation objective of standardizing alternative waste stream processes.

In addition to aligning the mandates on all levels, there needs to be organics processing infrastructure developed to help support these mandates if materials are to be recovered and not simply turn into a state-sponsored greenwashing initiative. Increased connectedness amongst different levels of government can help to allocate funding as well as develop and approve building permits with enough time to construct, test, hire, and train all necessary facilities and staff. By identifying the disconnect between implementation and legislation, power is given back to the consumer to make more educated choices that improve the current waste system, like avoiding single-use packaging and keeping the community and environment healthier by improving material recovery.

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Instructional Shifts & Literature for a Just, Sustainable Future

Kevin Myron
November 2024

ABSTRACT

This study explored how integrating climate justice literature into secondary science education through a Freirean participatory approach can deepen students' understanding of climate change. Using *How to Change Everything* by Naomi Klein as a central text in a 9th-grade Earth and Environmental Science class, students engaged in critical discussions, reflections, and student-led sensemaking. The results revealed shifts in students' perspectives from viewing climate change as a purely scientific issue to understanding its historical, economic, and social dimensions. Key themes from student reflections and observations included recognizing systemic inequities, critical awareness of greenwashing and economic systems, appreciation for Indigenous perspectives, and a growing sense of agency in addressing climate justice. This study also examined the challenges and opportunities of transitioning from traditional, hierarchical instructional models to participatory, justice-oriented teaching. The findings demonstrated the potential of climate justice literature and student-centered pedagogy to move climate education to a more relevant and empowering learning experience for secondary students.

INTRODUCTION

Climate change is one of the most pressing global issues that will disproportionately impact vulnerable populations and our current youth. Climate change education in high schools often remains narrowly focused on scientific concepts. This focus leaves students needing more tools to critically engage with the socio-political connections to this climate crisis. It is a direct disservice for public education not to prepare youth as they will need to be equipped to understand and confront the realities of climate change. Traditional educational models, often characterized by a "banking" approach where instructors are the sole authorities depositing knowledge into passive students, limit meaningful engagement and critical thinking opportunities. These methods prevent students from growing their own voices as advocates for change. The disconnect

between the current educational approach and the need for actionable climate literacy limits students' ability to comprehend and prepare for climate-related challenges in the future.

This MESH project explored how integrating climate justice literature into high school science curricula can transform and expand students' understanding of climate change. Science as a study doesn't exist outside of sociopolitical influences. Especially in science courses at the secondary level, students should be challenged to analyze and reflect on the field itself critically rather than just rote predefined scientific concepts. The study leveraged the text *How to Change Everything (Young Person's Guide to Protecting the Planet and Each Other)* by Naomi Klein and Rebecca Stefoff to expose readers to the complexities and opportunities the climate crisis holds for society. This

project was implemented with a 9th-grade Earth and Environmental Science course. The text was used to guide opportunities for critical reflection, discussion, and student-led sensemaking, aimed to expand students' understanding of the climate crisis and climate justice.

Another critical point of this MESH project was the intentional instructional shift toward students becoming active participants in their learning rather than passive recipients. This study challenged hierarchical models of instruction and instead promoted a participatory framework for climate education. In doing so, the project aimed to foster a better understanding of climate justice. Further, it aimed to empower students to articulate the complexities of the climate crisis beyond the scientific concepts.

Research Question: *How does engagement with climate justice literature through a critical constructivist approach influence students' understanding of and attitudes toward climate justice?*

The literature review will cover dominant trends in existing literature at the intersection of climate education, pedagogy, and climate justice literature. Ultimately, this project seeks to bridge the gap between traditional climate change education in secondary science courses and the need for justice-focused interconnections within science that expand student understanding of climate justice.

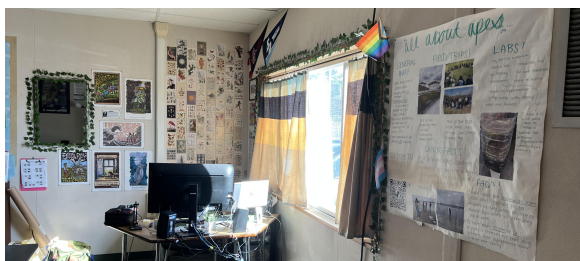


Figure 1. The teacher workstation in the classroom serves as the location for this project. Surrounding the desk are several pieces of artwork by [Ricardo Levins Morales](#) and others fitting for an environmental science classroom.



Figure 2. This is a wide shot of the classroom where the study occurred. Around the classroom are various artworks by artists on what a green new deal means to them. You'll note that while I teach science courses, I do not teach in a traditional science classroom. This is a portable, modular classroom that you'll find commonly across California schools. While space is tight, I still aim to provide the same lab experiences and opportunities for critical reflection through climate justice literature.

KEY GAPS IN EXISTING CLIMATE JUSTICE EDUCATION

Climate Justice and Education

Climate justice is more than a popularized term within the field of climate change. It embeds the broader social and political contexts that make climate change a threat multiplier for communities. The same communities that are least responsible for driving climate change will experience the brunt of the effects ([Tietjen, 2022](#)). These impacts are compounded by structural inequities driven by capitalism, systematic racism, and colonialism. Education on climate change at the secondary level can not be limited to scientific concepts. Instead, the unequal power structures and intentional decisions by those in power (corporations and political leaders) must be a part of the

discussion. Integrating climate justice into secondary science education is crucial and will enable students to critically examine the socioeconomic and political systems at play.

There has been significant progress in integrating and emphasizing the importance of climate literacy throughout K-12 schooling. However, the emphasis falls short of integrating climate justice and principles of environmental justice. Anderson points out that climate education in many schools focuses on climate change's technical and scientific aspects ([Anderson, 2012](#)). This sidelines the realities and power structures that have led to this global issue. Morales-Doyle critiques this larger pattern across science education, where the emphasis on content knowledge often overshadows the need for critical, interdisciplinary thinking ([Morales-Doyle, 2024](#)). Furthermore, teachers, while possibly well-intentioned, reduce their role to being recruiters for the field they teach rather than educating students to use science tools to evaluate and address complex societal issues. Stevenson, Nicholls, and Whitehouse emphasize the need for climate literacy to be tied to environmental justice in education ([Stevenson et al., 2017](#)). Doing so can empower students to take meaningful action in their daily lives and future careers for the betterment of their communities. Fostering a deeper understanding of the connection between climate change and social justice can inspire real-world activism and leadership, which are crucial across the diverse industries students may enter after completing their education. This approach starkly contrasts traditional technical teaching of climate change, where science teachers often view themselves as recruiters for their specific discipline.

Critical Pedagogy in Climate Education

At the core of this literature review are the educational philosophies of Paulo Freire and Okhee Lee. Freire's educational philosophy critiques the traditional "banking" model of education in which teachers are positioned as the sole authority on knowledge. In the context of secondary education, teachers deposit technical, scientific knowledge that students are expected to memorize and regurgitate on assessments without critical reflection. Freire's work in critical pedagogy challenges teachers to require active learning, where students and teachers co-construct knowledge through dialogue and reflection ([Freire, 2000](#)). Gruenewald expands on Freire's critical pedagogy to include place-based education ([Gruenewald, 2003](#)). Gruenewald highlights the importance of empowering students to critically reflect on their relationship with the environment and the broader cultural and political systems that impact places beyond the classroom. In doing so, students will have a deeper, more meaningful engagement with environmental and science concepts.

Next Generation Science Standards (NGSS) adopted by the state of California are based on the National Research Council's Framework for K-12 Science Education and set the expectations for what students should know and be able to do. Building on Freire's critical pedagogy and Gruenewald's place-based education, Lee contends that STEM education should aim to incorporate societal challenges and justice into instruction. This aligns with Morales-Doyle's push for social justice science instruction that contextualizes science concepts as necessary tools to address issues in our communities ([Morales-Doyle, 2024](#)). Phenomena, in the context of NGSS, are complex observable events or issues that can be investigated and explained through investigation. Lee separates the

usage of phenomena into three areas: traditional, contemporary, and future. As described by Lee, traditional approaches align with previous critiques that sanitize science to just the technical concepts ([Lee & Grapin, 2022](#)). In a contemporary approach, as NGSS aims for, phenomena are used to situate students as scientists and engineers to explain the event or issue presented. Lee argues that the future of STEM education lies in student advocacy. Students make sense (importance of sensemaking described below) of a phenomenon connected to a larger, pressing societal challenge. Rather than limiting students' perception of being a scientist or engineer in the classroom, they are informed, responsible citizens who leverage scientific knowledge to solve the issue. Further, students examine the disproportionate impacts on communities and develop solutions that advocate for equitable, just solutions. This requires situating students as co-constructors of knowledge and solutions to build and empower advocacy skills.

Another component this MESH project sought to integrate is constructivist learning and sensemaking, which are critical for building meaningful student engagement. Constructivist learning is an educational approach grounded in the idea that learners construct knowledge actively rather than passively receiving it. Students are challenged to interact with new ideas and critically reflect on how the new information shifts their understanding within the context of their lives. In the context of this project, constructivist learning was applied through activities that position students as co-constructors of knowledge. These practices required students to actively engage with the material to build their understanding. This contradicted common secondary science education that requires students to simply

memorizing scientific facts about climate change.

Sensemaking involves the process of students reflecting on and connecting new knowledge with their own lived experiences. The sensemaking process is a key to constructivist learning and is particularly crucial for grappling with complex, interdisciplinary issues like the climate crisis. Quartz emphasizes that sensemaking enables students to come to terms with the scope of climate change. This will support them in becoming equipped with the advocacy skills necessary to take action on climate solutions ([Quartz, 2022](#)). This project's sensemaking occurred through community-led circles, critical reflection assignments, and peer-led discussions. These activities allowed students to examine the socio-political dimensions of climate change alongside scientific concepts. Students could see conceptual knowledge directly involved in the issues of the climate crisis. Stevenson, Nicholls, Whitehouse, and Morales-Doyle argue that rote learning (focusing only on scientific concept instruction) limits the development of critical consciousness and skills. This approach directly supports the research question by equipping students with the tools to examine climate justice critically.

Literature in Climate Justice Pedagogy

This MESH project aimed to incorporate literature to make sense of climate justice. The text utilized, *How to Change Everything* by Naomi Klein, exposed students to climate justice through youth activism, resistance, indigenous ecological knowledge, and environmental justice leaders. These texts expanded students' understanding of the climate crisis beyond scientific concepts. This text offers narratives that connect climate change and social justice. Klein's text is particularly tailored to younger audiences and aims to inspire youth activists. The text

aims to walk students through how we got to the climate crisis, its effects, and where we should go as a society to address it. The author does not shy away from sharing powerful examples of environmental injustices to show students exactly how climate change is a threat multiplier. Klein emphasizes large and small-scale actions, from collective action to protest to grassroots movements, to drive meaningful change.

One of the key components of constructivist learning is sensemaking, so students integrate new conceptual knowledge with their personal experiences. Literature can play a vital role in fostering these interdisciplinary connections. Diverse narratives, such as those in the *How To Change Everything* text, enabled students to reflect on how these issues impact their own communities, similar to the stories in the text. The integration of climate justice literature goes beyond just building knowledge. It also offers critical reflection opportunities, a central tenet of Freirean critical pedagogy. Students can become more aware of how power and environmental justice intersect. Students' understanding of climate justice will be enhanced by using literature as both a tool for sensemaking and critical reflection. Students need to understand the scientific concepts of climate while also grappling with the sociopolitical interconnections. Thus, they are prepared to take informed, justice-oriented action in their communities as citizens.

Gaps in the Literature

There's increasing research around climate justice education and climate literacy. One dominant trend is the separation of scientific literacy (teaching only concepts) from activism in climate education. Existing literature often focuses on teaching scientific aspects of climate change and climate justice or encouraging activism without integrating

them. Morales-Doyle and Monroe et al. all point to how current science education emphasizes scientific knowledge over critical thinking ([Morales-Doyle, 2024](#); [Monroe et al., 2019](#)). This severely limits the potential for students to become agents of change ready to address the issues at the root of climate change. Traditional pedagogy also situates students as passive recipients in the classroom rather than providing space for them to co-construct knowledge. Freire critiques this banking model, and there has since been increasing attention paid to critical pedagogy. Yet, there is still a limited exploration of how literature and critical pedagogy in secondary science can shape students' perspectives on climate justice.

Contribution to Literature

This project aimed to address existing gaps in climate education by integrating critical pedagogy with climate justice literature to create a more comprehensive and holistic approach for secondary students. It repositions students as learners and as future leaders. They actively engaged in reflection and critical analysis of the complexities of the climate crisis. Through the usage of climate justice texts, students led discussions and examined systemic inequalities. The project emphasized critical inquiry and reflection over rote memorization through participatory instructional methods. By doing so, the project challenged students to move beyond being passive learners in alignment with Freirean teaching and empowered students to become advocates. Ultimately, this project led to an increasing number of youth equipped to address the interdisciplinary challenges of the climate crisis.

METHODOLOGY

The central research question guiding this MESH project is: *How does engagement with climate justice literature through a critical*

constructivist approach influence students' understanding of and attitudes toward climate justice? This study explored how integrating climate justice literature from diverse perspectives into a secondary science course can affect student perceptions of the socioeconomic and political dimensions of climate change. The research addressed the gap between traditional siloed climate change education and the need for a justice-oriented, interdisciplinary approach. This process sought to empower students to co-construct knowledge while critically examining the systems contributing to the climate crisis.

Epistemological Framework

The study is grounded in critical pedagogy and critical place-based education, with an emphasis on Freirean principles of learning. These frameworks inform both the instructional strategies used in the classroom and the analytical lens applied to student reflections and discussions. Critical pedagogy, rooted in Paulo Freire's work, challenges the traditional "banking model" of education, where teachers deposit knowledge into passive learners. Instead, it promotes active learning where students critically reflect on their realities and co-create knowledge through peer discussion. This aligns with critical constructivism for students to sensemake new knowledge. Then, connect the new information to their lived experiences. Gruenewald's critical place-based education builds on this framework as students connect environmental concepts to their personal, local contexts ([Gruenewald, 2003](#)). In alignment with Lee's argument, this project also aimed to encourage students to view themselves as informed citizens capable of confronting the complexities of the climate crisis. These methods were also part of a larger effort to confront the hegemonic, power dynamics in traditional education systems.

Theoretical Framework

The theoretical framework of this project was grounded in critiquing the interconnection between capitalism, colonialism, and climate justice. These concepts were introduced into the classroom using *How To Change Everything* to foster critical thinking and discussion. This project sought to confront the exploitative practice that prioritizes profit over people. These ideas were embedded into the project to help students better critically examine the root causes of climate change. Expanding student understanding beyond the technical, scientific causes was a central part of the theoretical framework. Another piece of the framework was Paulo Freire's anti-oppression pedagogy and critique of societal structures. Freire's framework asserts that societal and educational structures perpetuate inequality ([Freire, 2000](#)). This includes the compulsory education system that is too frequently complicit in maintaining these hierarchies of learning. This project disrupted the traditional, hierarchical teacher-student dynamic and allowed students to examine the systemic roots of climate injustice with their peers. Students were able to co-construct critiques on capitalism and colonialism that have contributed to environmental and climate degradation. Based on Freire's pedagogy, these instructional methods aimed to push back on those structures and allow students to learn and critique the socioeconomic connections to the climate crisis amongst their peers.

Methods

This study involved 9th-grade Earth and Environmental Science students engaging with *How to Change Everything* by Naomi Klein and Rebecca Stefoff. The text is structured into three sections—"Where We Are," "How We Got Here," and "What To Do Next"—providing a comprehensive exploration of climate change and justice.

Students independently read text sections and engaged with text-dependent and opinion-based questions designed to scaffold their understanding of the material. To work towards a constructivist and participatory learning experience, students first worked independently to form their initial responses. They then participated in small group discussions sharing their ideas. Following these discussions, students recorded their

final ideas in written responses. Over time, the questions shifted in complexity from text-dependent to analytical. Students were encouraged to construct knowledge collaboratively through this process. The progressive increase in complexity was necessary to build student skills in reading comprehension, discussion, critical reflection, and analysis.

Friday, November 1st

1. **Get Ready:** Finally Friday! Take out your chromebook, and send one person to grab your table's books from the back, please! (Psst...New seats on Monday)
2. Science in the News
3. **6.11 How to Change Everything?** by N. Klein - Chapter 7
 - a. Chapter 7
 - b. How can we (as the upcoming generation) challenge and change the systems around us that have created climate change?

Friday, November 1st

Read pages listed below independently.

A. Use sticky notes | Page 193-202, 205-209

1. Describe the basic idea of Carbon Capture & Storage (CCS). *Be sure to explain both parts!
2. Identify two drawbacks of CCS.
3. Describe geoengineering and explain one example.
4. **Your Opinion** → Do you think human tinkering is the solution? Explain (2-3 sentences).
5. **Advanced Option:** Page 224-229 - How is Greenburg an example of sustainable living?

B. Flag using a sticky note where you find any qualitative or quantitative data & a quote/section!

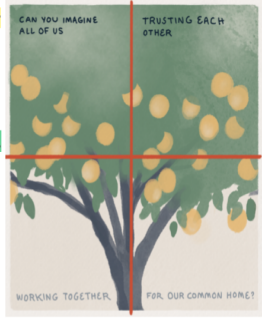
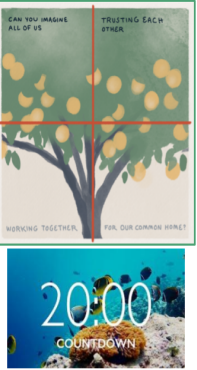



Figure 3. Instructional slides used during the usage of *How To Change Everything*. Each day using the text begins with a reminder of the larger driving question, “How can we (as the upcoming generation) challenge and change the systems around us that have created climate change?”

Analysis of Student Reflection

The class comprised 31 students in a 9th-grade Earth and Environmental Science course. Over 14 weeks, students spent each Friday of the week reading and co-constructing knowledge through discussion and reflection. Each week, students focused on one chapter and completed a reading guide throughout the class period to document their ideas flowing through discussion with their peers. For student work to be included in this project for analysis, both the student and the family must have approved participation. A total of 11 students’ reflections were included in the study. Student reflections completed

during week 7, week 8, and week 10 were utilized within this project. These specific reflections were chosen for their depth and alignment with critical points in the curriculum. Students were also familiar and more confident in their written reflection skills at this point in the term. Synthesis of the key themes across each reflection, including quotes, was used to determine the results sections and student takeaways.

RESULTS

The analysis of student reflections reveals that integrating climate justice literature into secondary science can shift how students engage with climate crisis. Below, the results

are organized around key themes supported by direct quotes and analysis from student reflections.

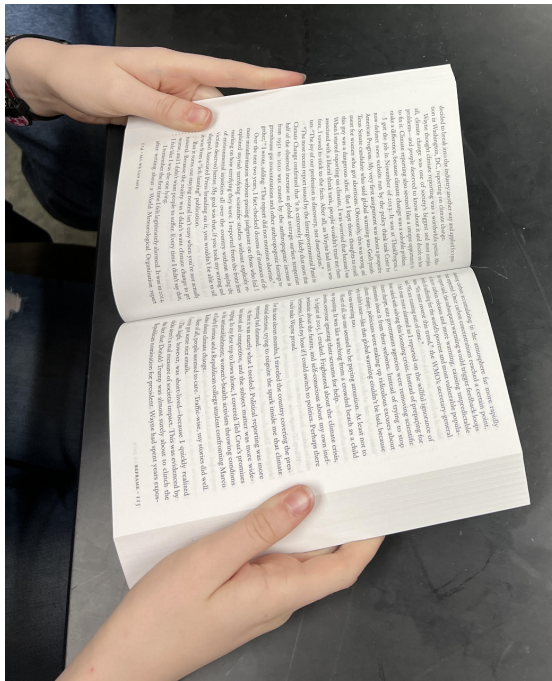


Figure 4. Students read passages on *How to Change Everything*. Then, they facilitate a peer-led discussion to drive the sense-making that connects what they learn in the classroom to the world around them.

Historical Context of Climate Change

Students' reflections demonstrated an expanded awareness of the historical roots of the climate crisis. Students were introduced to industrial practices and colonial exploitation that have driven environmental degradation. Before engaging with the literature, many students saw climate change as a recent issue tied to modern technology (simplified to just burning fossil fuels by cars and factories). Students connected past events like the Industrial Revolution to the present crisis through *How to Change Everything*. One student reflected, "I always thought climate change was mostly a modern problem, but reading about how it started with things like the Industrial Revolution

made me see it's been happening for a long time. It's not just about technology but also about how we've been using resources for hundreds of years." This indicates a shift in understanding where students began to see the climate crisis as a systemic issue. It also led students to see the importance of addressing the underlying historical causes rather than just today's effects. Another emphasized, "Learning about how the climate crisis has been building up for so many years made me realize that this isn't just a new problem we can solve quickly. It's something that has been ignored for too long, and now it's a lot harder to deal with."

Greenwashing and Corporate Impacts

Students engaged critically with the concept of greenwashing and expressed frustration over realizing that some corporate practices aim to appear environmentally friendly but are not. Nearly all students were unfamiliar with this term. This critique marked a shift from viewing climate change as an environmental issue, and students shared this critique, saying, "I used to think companies were trying to help when they said they were 'going green,' but now I see it's often just a way to look good without really doing anything. Like, they tell people to save energy, but they're still burning fossil fuels." The literature encouraged them to question the motives behind corporate advertising by showing several examples of greenwashing. Climate change was not just a scientific concept driven by increasing greenhouse gasses but is now being viewed to intersect with intentional choices by those with power. Another student added, "It feels like companies care more about money than the planet. It's frustrating because they're the ones who have the power to make a difference, but they're not." These reflections indicate how integrating literature into

science education can foster critical thinking capitalism.

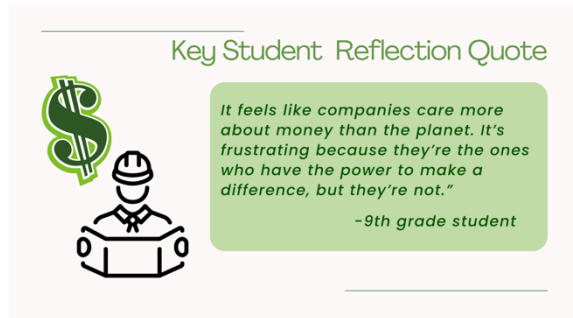


Figure 5. Student reflection demonstrates student’s growing ability to critique the economic system leading corporations to focus on profit.

Indigenous Perspectives

Students learned about varying ways to value the environment and resources around them. Their reflections revealed that students were struck by the differences between exploitative approaches to resource extraction and Indigenous practices emphasizing reciprocity. One student reflected, “Reading about how Indigenous people believe in taking only what you need and giving back to the land made me think about how different that is from how companies just take and take. It makes me wonder why we don’t learn more from their way of thinking.” There is great value in bringing diverse perspectives to sustainability and caring for the environment. It requires students to critically evaluate how they view, as well as the broader society, resources around them. Another student expressed, “I didn’t realize how much we could learn from Indigenous practices. It feels like they’ve been doing what’s right for the planet all along, and we’re only just starting to catch up.” These reflections highlight how including Indigenous perspectives broadens students’ understanding of sustainability. Historical

exploitation of the environment, driven by self-fulfilling interests, is directly contrary to Indigenous philosophies. These philosophies between industrial revolutionaries and indigenous communities were unknown prior to students, as evidenced in their reflections. Students, as a result of exposure to these ideas, were encouraged to think deeply about how historical patterns of exploitation continue to influence present-day environmental challenges. To enact true change, the historical and philosophical views that enabled the current-day climate crisis must be explored with students to identify the root causes.

Empowering Acts of Resistance

Klein includes several stories of youth activism, two of which were particularly impactful. The text explored the Juliana v. United States case and the Standing Rock Protests, which resonated with students. For example, one student shared in their reflection, “I thought it was amazing that kids could sue the government for not doing enough about climate change. It made me realize that we don’t have to wait until we’re adults to make a difference. We can start now.” Another student reflected, “Hearing about how Indigenous people fought to protect their water from a pipeline made me see that it’s possible to stand up against big companies. It’s not easy, but it’s important.” These reflections highlight how the literature helped students see themselves as potential change agents. Further, they do not need to wait until they’re older to act. This directly aligned with the study’s goal of moving away from passive learning. Students became empowered with their new knowledge to take action.



Figure 6. Student reflection demonstrates students seeing acts of resistance and real-world activism to advocate for justice.

The teaching methods employed in the classroom also played a critical role in deepening student engagement with these narratives. After reading about the *Juliana v. United States* case, students were shown a short video featuring the plaintiffs, which brought the abstract story to life. Seeing youth their own age speaking out against systemic inaction on climate change had a clear impact in the classroom. Discussions became more animated as students recognized the potential for people like them to lead meaningful acts of resistance. One group of students began brainstorming ways they could take action in their own school community. Specifically, they discussed calling attention to waste and plastic pollution on campus. This sparked an exchange of ideas about how to raise awareness and behavioral change to reduce waste. This was a small glimpse of how the participatory Freirean approach in the classroom empowered students to translate discussion into actionable ideas.

Critical Engagement with Geoengineering

In the “What We Do Next” section from *How to Change Everything*, students were introduced to geoengineering, which may play a significant role in addressing the climate crisis. Students were prompted to answer, “Some scientists advocate

geoengineering to solve our climate crisis. Since human tinkering with the planet created climate change, do you think human tinkering is the solution?” One student reflected, “No, because if geoengineering caused climate change, how would it fix it? Geoengineering would only do more harm to the earth because that’s how we started, so that’s not how it will end.” It’s important to note that this questioning differed from previous instructional methods that focused only on reiterating scientific concepts and text-dependent questions. Then, they engaged in peer discussions to co-construct their opinions.

Students were encouraged to examine the implications of geoengineering and consider the consequences. Several students pulled prior knowledge about greenwashing to inform their opinions. They often expressed concerns about unintended consequences and the ethics of further manipulating the environment. This response shows us that students could articulate an understanding of the difficulties inherent in geoengineering. Further, it reflects a critical perspective on using the same interventionist, technological mindset that contributed to environmental harm as a solution. Another student expressed a similar concern: “I don’t think geoengineering is the solution for climate change because it is too risky. We are treating the Earth as an experiment, but we only have one planet. We don’t 100% know the outcome of every single experiment, so we risk hurting an entire ecosystem.” This reflection shows students’ awareness of geoengineering’s unpredictability and ethical concerns. By framing the Earth in this way, students conveyed a strong sense of caution about the risks of further intervention. As many students have learned as a slogan from peers, social media, or climate protest imagery, “there is no planet B.”

Further Connections to Greenwashing

During class discussions, students also connected their concerns about geoengineering to prior discussions on greenwashing and corporate responsibility. Several students noted that corporations could exploit geoengineering technologies to portray themselves as climate-conscious without making meaningful changes. Some students even voiced skepticism about how companies might utilize technologies like carbon capture to shift responsibility away from reducing emissions. This opened many students' eyes and ears as an audible "Ohhh" could be heard across the classroom. One student noted, "It made me think that companies would just use carbon capture as a way to say they're 'green' without actually changing what they're doing." This response highlights how students applied their initial understanding of greenwashing to geoengineering. Moreover, it reflects a developing critical consciousness about corporate motives and the economic system that values profit overall. Another student expanded on this perspective, expressing, "Human tinkering with the planet has created climate change. I think that it could help be a solution if we use it in the right way because that might be the only way to solve this big problem. But if we use it in the wrong way, it could cause devastating drawbacks that become irreversible." This student's view similarly illustrates how these youth once again build their critical thinking skills and apply them to new contexts connected to the climate crisis.

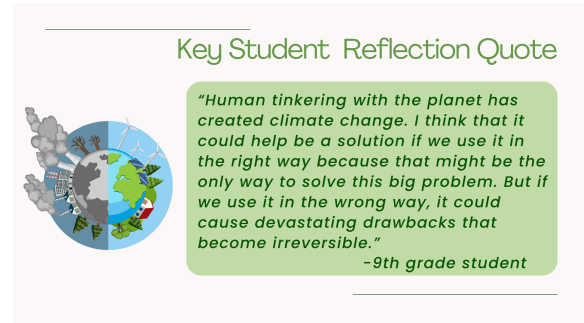


Figure 7. Student critique highlights awareness of opportunities and limitations of new technology aimed at addressing the climate crisis. Students show a growing ability to articulate how corporate and economic influences could perpetuate the environmental impacts.

Connecting Climate Justice to their Community

As students concluded the section "What We Do Next" in *How to Change Everything*, their reflections revealed their ability to connect climate justice concepts to their communities. This included urban heat islands, plastic pollution, air pollution, limited green spaces, and water pollution that students shared identifying in their local area. These reflections emerged as students engaged in small group discussions, as described in the methods section. For instance, during a class discussion, one student reflected, "In my community, I have noticed many similar situations that we discussed in *How to Change Everything*. The first encounter I experienced was when the book mentioned fires and extreme weather increasing due to climate change. Near the SDSU campus, multiple wildfires occurred in the past few weeks due to hot temperatures and drier conditions." This insight was later documented in the student's written reflection. Similarly, another student tied urban heat islands to their personal experiences during a peer-led discussion, stating, "For my family, the issue of urban

heat islands is significant because materials like blacktop and concrete absorb heat, and that heat keeps temperatures higher at night.” This verbal reflection was also seen in their written activity document. It emphasizes the value of providing time for students to directly connect concepts to their local environment. This was in alignment with Freire and Gruenwald’s pedagogy framework.

The participatory structure of these discussions was instrumental in fostering these connections. Students facilitated their own conversations and built on each other’s observations, co-constructing knowledge. This dual focus on literature and participatory learning empowered them to see the relevance of climate justice in their own communities. Students also demonstrated a broadened understanding of climate justice by recognizing how environmental issues they identified in their community affect vulnerable populations. This theme emerged across reflections as students connected their local challenges to global inequities explored in the text. One student reflected, “I didn’t know that the effects of climate change were not the same for everyone. *How to Change Everything* helped me understand how other communities can be at a higher penalty rate than others with more resources and power.” Another student linked their understanding of droughts to worldwide patterns of inequality, stating, “*How to Change Everything* helped me understand that it isn’t just my community that is being affected by droughts and water conditions, but everyone around the world is.”

Students’ reflections also revealed an emerging solutions-oriented mindset. They proposed various actionable solutions (i.e., increasing green spaces, adopting clean energy, implementing water treatment technologies, and mitigating urban heat

island effects through lighter-colored roofs and roads). Each of these solutions demonstrates an ability to reevaluate their surrounding community for issues and propose direct solutions to mitigate their impact. For example, one student suggested, “A climate solution I’d like to see in my community is putting more plants around. This solution would help address hotter temperatures by having a higher albedo to reflect sunlight.”



Figure 8. Student quote shows student’s ability to identify local environment issues and solutions that better the environment and health for all.

Students also showed a growing critical consciousness. Their reflections often included larger probing questions about the systems that require reevaluation to address climate change and their generation’s role. One student asked, “Why don’t companies that produce a lot of greenhouse gasses get shut down?” A different student shared, “Why is profit and money allowed to take priority over environmental and human health?” Another reflected, “*How to Change Everything* helped me understand that we are the generation to do something about the problem.” These reflections highlight how students begin to see themselves as active participants, not passive recipients of knowledge.

Student-Led Discussion in Developing Understanding and Agency

The participatory approach also fostered a sense of agency amongst the students. It empowered the majority included in the study to recognize their ability to identify causes and solutions in their own community. I intentionally did not assert my views or opinions throughout the study to push away from traditional hierarchical learning structures. Instead, I allowed free discussion amongst their peers and the whole class, guided by central questions based on the text. This allowed for organic discussion and progression of knowledge led by students in the course, not me as their instructor. Students voiced (through discussion and written reflection) a sense of empowerment and expressed their own opinions across various topics explored in the text. The reflections suggest that students would not have arrived at the same depth of understanding if the lesson had been limited to a straightforward explanation of geoengineering or climate change. In the five previous terms instructing this course, this is the first time I've seen a greater level of ownership and empowerment connected to students' learning about environmental issues and solutions. The Freirean approach fostered a critical engagement with climate solutions, and the growth is evidenced by the many written responses explored throughout the results section.

Moving Towards Inclusive, Participatory Education Methods

Implementing a Freirean, participatory approach was and continues to be a challenging learning experience for me as an instructor. It has shifted how I view classroom authority and even my role as an educator. Moving from being the primary knowledge holder to a facilitator of student-driven learning was initially uncomfortable.

A mindset shift was required to adopt and practice a more flexible, student-led approach. My previous teacher credential program centered on structured instruction and clear assessment criteria. Through this process, I've started my journey of adapting my teaching to support a more equitable learning environment where students are encouraged to express their perspectives and take greater ownership of their learning. Throughout this experience, I realized that facilitating a participatory classroom requires more patience than I anticipated and an openness to uncertainty. As students became more engaged in leading discussions, I learned the importance of stepping back, listening, and allowing space for student-led inquiry. Most often, this led conversations into areas I didn't expect, and this shift challenged me. I was never a part of a class in high school that allowed for such student-led experiences. Further, how I was instructed through my university teacher credential program emphasized clear, defined learning objectives set by the instructor. This shift meant being prepared to explore unfamiliar or unplanned territory based on students' interests and questions. I am striving to create a more inclusive, responsive classroom that confronts the inequities perpetuated by traditional education models. As Morales-Doyle critiques, science teachers specifically need to break conventional expectations that science classes serve only to develop engineers and scientists. Moreover, science teachers should not serve as recruiters to the industry. It emphasizes compliance and regurgitation of predefined knowledge aimed at moving students into collegiate studies. This degrades opportunities for students to see science as a tool to address issues in their local community and drive collective action through evidence-based practices no matter their career.

This teaching experience has made me much more mindful of my own role in the classroom and my awareness of the need for self-reflection in my role. I realized that my expectations and assumptions influenced how I initially approached classroom discussions on climate justice. Coming from a middle-class family with strong academic support, I had certain assumptions about my students' motivation and engagement that did not hold true. But as I got to know them better, I saw the need to make the material more relevant and accessible to their unique experiences. Teaching can't be seen as imparting knowledge to students. Instead, it must be seen as a collective learning experience in the classroom that includes teachers. This journey reminded me of the importance of continuous learning in teaching and how I think about communicating about climate justice. Through this process, I am developing not only as a teacher but also as a learner with students.

DISCUSSION

Students' Growth in Climate Justice

Student reflections and observations throughout the project highlighted the transformative learning that integrating climate justice literature and Freirean participatory teaching in secondary science education can support. This approach shifted students' perspective away from seeing the climate crisis as a purely scientific issue. Students began to show a deeper understanding of the historical, social, and systemic roots of climate change. The results suggest that this combination can better foster critical thinking and a sense of agency that is often lacking in secondary science instruction. One significant outcome was students' broadened understanding of the historical roots of climate change. Too often, the issue of climate change is taught through

a climate reductionist lens. This leaves students with the perception that the climate crisis is a carbon math equation resulting from individual carbon emissions. If we are to remove "X" amount of carbon from the atmosphere and reduce "X" amount of emissions, then warming will not exceed thresholds, and we've averted impacts. This is not where climate change education should lead students' thinking.

How to Change Everything explores how industrial practices and historical colonial exploitation are connected to current environmental degradation. Moreover, students were educated on the shift in how humans framed the environment, from common indigenous views of respecting the environment to those of [Francis Bacon](#). Bacon viewed nature as something for humans to control and use the resources to their advantage. This historical framing empowered students to see that the climate crisis is not a modern problem nor a simple scientific issue. Rather, it is a systemic issue with deep roots in exploitative practices thrust upon the environment and communities with lower socioeconomic status.

Introducing concepts such as greenwashing deepened students' critical engagement with the economic system. It also improved their analysis of corporate actions in response to the climate crisis. Many students perceived corporate environmental efforts as advertised before engaging with the text. However, the literature and participatory discussions challenged this perception. Students could better critically analyze corporate motives and question "green" marketing campaigns. They were able to better question and criticize the claims of corporations regarding greenwashing after being exposed to examples in the text. In doing so, we can better cultivate a comprehensive

understanding of the drivers of environmental issues. Moreover, our education system can empower better-educated citizens capable of critically analyzing larger economic systems that prioritize profit at the expense of environmental and public health.

The Freirean emphasis on dialogues and open-ended questions proved essential in fostering these outcomes. Students were able to better articulate their perspectives as weeks progressed over the project. The classroom became accustomed to peer-led discussion and minimized teacher authority to co-construct their knowledge from the text. This process challenged them to grapple with the complexities of the climate crisis while also improving their critical analysis skills as a collective. Previously, students may have taken the technological advances and corporate statements around the climate crisis at face value. But now, their skeptical view of corporations' motives for technological solutions to the climate crisis shows their ability to connect prior knowledge around greenwashing. This observation occurred after probing discussions amongst students, as not all students came to the same conclusion on geoengineering. Allowing space for peers to share their concerns and ideas moved the whole class's perspective to a more critical lens of geoengineering. As the teacher, I did not interject and empowered voices around the room to chime in in agreement or contrast. This is another example of how the combination of climate justice literature and participatory teaching practices successfully transformed students' engagement with the climate crisis.

It's important to note that for teachers looking to replicate these practices, critical reflection and thinking around these large, complex issues like the climate crisis are needed to plan instructional support. These

higher-level thinking routines require time, practice reflecting, and examples of appropriate discussion. Further, the instructor must include themselves in the critical reflection process on how their understanding of the climate crisis shifts and their own instructional practices. I include myself as the instructor in this, too. Sharing my own thoughts and experiences in the "I" is contrary to undergraduate and teacher credential experiences. I was taught to remove myself from my research in past experiences and in the classroom. I wasn't required to think critically about my own role and experiences nor the built environment around me influenced by capitalism and colonial impacts. For this reason, this project required continual reflection on both the students' part and the instructor (me).

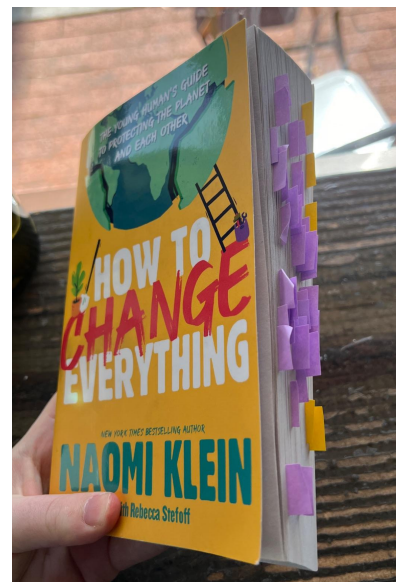


Figure 9. My personal copy of the *How To Change Everything* text with various sticky notes of key ideas and personal reflections on the material explored with students.

This project's outcomes extend beyond the development of student critical thinking and climate literacy. Students were engaged as future agents of community change. The combination of climate justice literature and

participatory teaching enabled students to see themselves as a larger collective effort to address the climate crisis. It was exciting to see these ideas develop, as evidenced by students' written reflections and my own observations. Students, throughout the course of this project, were shocked. They were further shocked to learn that not many youths around the country are not taught about these concepts. This teaching process was also not limited to intellectual growth. Students were encouraged to reflect deeply on the ethical and justice connections around climate change and how they could help confront them. The reflections explored in the results section show student progress in approaching climate solutions with a critical lens.

This project contributes to a collective effort striving to equip students with the tools to critically analyze the world around them and connect their understanding of climate justice. In doing so, students can recognize their own capacity to act and lead change. Students are not only becoming informed citizens but also developing the skills to collaborate and advocate for sustainability solutions. As they continue to engage in these critical discussions and reflections in this course and future courses, they are taking steps toward becoming citizens actively involved in just transition. They will see themselves as part of a shared effort to challenge climate injustices and demand action on the climate crisis. Even though the context of this project occurs within the classroom, the potential for impact extends beyond it. Students will be empowered to lead and participate in broader climate justice movements and advocate for sustainable solutions in their own communities.

Reflecting as a Human and, Subsequently, a Teacher

Reflecting on my positionality as a white, college-educated male from a multi-

generational college-graduate family, I recognize the privilege that has shaped my experiences. I grew up with academic support from family and teachers, and I had minimal outside responsibilities. I could focus solely on my academic ambition with little need to navigate barriers and other responsibilities. I was also deeply entrenched in an achievement-based school culture that built intrinsic motivation. As I reflect more critically, I would argue I learned how to succeed in the educational system built around me rather than truly achieving advanced marks. However, many of the students I work with are from backgrounds where such stability is less accessible. Over half qualify for free or reduced lunch, and many face responsibilities beyond schoolwork. Further, many do not have an intrinsic academic motivation driven by course grades. While I am bound to provide grades, I must build coursework and discussion in a way where point values are not deemed the “why” by students. These factors contribute to the ways they experience and interpret the climate crisis. The climate crisis and other environmental issues are not concepts you can score well on an exam and forget. How I shape instruction around these topics directly informs how students perceive and address the climate crisis as they move forward in life.

This awareness of my personal privilege helped inform my approach to this project and my interpretation of students' responses. As shared previously, many students struggle with connecting course material, and many students read below grade level. This leads to some inaccessibility to the key topics discussed in the text. While the peer-led discussion helped some students to a stronger understanding, several most likely were still struggling as a result of reading level (i.e., English language learners and students with learning differences). I recognized this

disconnect during the project, and it prompted me to consider how I can better align the curriculum with students' lived realities and increase support. Adjustments will be made in the next class to include discussion sentence supports, key vocabulary sheets, and rotating discussion leaders to increase structure. This project also deepened my understanding of climate justice by confronting me with perspectives shaped by barriers I have not faced. The students' insights often prompted me to think about solutions beyond systemic and community-level changes that are out of touch to them. Instead, I had to ponder how to expose them to solutions that reflect their daily lives and community. Solutions can not solely be based on an abstract, distant future. Students need and deserve opportunities to directly contribute to climate solutions in their environment.

At my high school campus, we work towards developing a multi-year, cross-disciplinary pathway for environmental sustainability. During the development, I have to consider how sustainable practices can be more accessible and relevant to those who may face structural disadvantages. Thus, this project has become a study of student engagement with climate justice and a learning process for me. Further, this project and reflection work revealed how much my background influences my understanding and teaching of climate-related topics. In my previous years, I completed coursework and discussions that heightened my awareness of my social location and how it might influence my teaching practices and values. However, I failed to consider how it directly influences how I see and teach climate-related issues.

This experience also encouraged personal reflection on my own education journey. As a secondary student, I was never taught about climate change or solutions. Those topics

were only explored in an elective Advanced Placement Environmental Science course. The vast majority of students at my high school had no access to that information. I graduated, as did the majority of the senior class, with limited to no knowledge about the climate crisis. Then, in my collegiate studies as a biology major, I was also only taught about climate change in one unit of one course across the entire span of my studies (which was an elective course). Once again, I graduated college with a short exposure to the concepts of the climate crisis and minimal exploration of the solutions. Those solutions were also only taught from a scientific, technical view. Universities around the country are beginning to recognize the need for all students across all majors to learn about the climate crisis, such as the University of California San Diego, which will require all students to take a climate change course ([Gammon, 2024](#)). As teachers, we can not ground our expectations in instruction and learning outcomes from our own experiences in the education system. This only further perpetuates the hierarchical learning and passive receipt models that continue to stifle the critical thinking skills of our students. Reimagining our future as a just, sustainable future requires reimagining our instructional practices to disrupt hegemonic learning structures. This project takes one small but important step forward in this direction.

Imagine a future where all students graduate with the ability to critically analyze local environmental issues, propose evidence-based solutions, and collaborate with their communities to build a just, sustainable future. To realize this vision, we must prioritize participatory, inclusive climate justice education and empower students to become active participants in shaping a more sustainable world.

LIMITATIONS AND FURTHER OPPORTUNITIES FOR PRAXIS

This study highlighted the potential of Freirean, participatory teaching to foster critical engagement in climate education. Integrating climate justice literature into secondary science education broadened students' understanding of climate change and better cultivated critical thinking skills. It empowered them to question and critique some of the socio-political connections to the climate crisis. A Freirean approach offers a model for educators seeking to move beyond content mastery and instead move toward critical inquiry. This method could transform climate education to graduate students as informed, responsible citizens capable of addressing environmental and social justice. Nonetheless, this approach has limitations. The reflections, while key to the study, limited my ability to assess all students' understanding because their writing skills vary across the class. Many students struggle to fully articulate their ideas at the 9th-grade level, so it can be assumed that there are key themes from students not included in this study. Moreover, there are opportunities to push further into participatory instruction. This study stopped short of allowing students to bring forward their own analysis questions connected to their local community. Allowing students to research, investigate, and connect their newfound knowledge from the text would allow for more powerful application in line with Freirean critical teaching and Grunewald's place-based education. Providing opportunities for verbal, rather than written, reflections on what they will learn will provide more modes of expression that would reveal student thinking that is not apparent or within reach of many students. Additionally, this study could have incorporated principles of Community-Based Participatory Research (CBPR) by actively involving students in the

research process. Students would have supported the research process by brainstorming the reflection questions and interview process. This would further shift the focus beyond merely analyzing their reflections on climate change and my own predefined questions. Due to time constraints, this portion of the study was not able to be included. However, incorporating CBPR would be especially helpful in bridging the gap between the instructional and research methods to better reveal students' perceptions of climate justice and the instruction. Students co-creating the classroom instruction and the research framework would more strongly apply the project's focus on participatory involvement and commitment to justice.

Another limitation lies in the power dynamics of the teacher-researcher role. A Freirean education approach encourages a more equitable learning environment that does not perpetuate systemic oppression pervasive in our society. However, the reality of classroom management requires reinforcement of authority to address behavior expectations. Without reinforcing these expectations, student learning can be impeded across the classroom. In a 9th-grade course, students are building skills in academic perseverance and self-control. This necessitates frequent check-ins during instruction. Balancing the roles of teacher and researcher remained challenging. Moving forward, I plan to implement regular reflective practices. Continuing to document my observations, teaching practices, and reactions as I instill more critical teaching practices will be key. I hope to ensure that future usage of Freirian teaching methods remains in alignment with its values and that my classroom instruction does not overshadow students' voices, which can lead to more authentic, powerful learning opportunities.

Lastly, it remains challenging to isolate the differences between the effect of participatory methods and climate-justice literature. The instructional methods were interwoven with the usage of the text. Future research could explore the usage of climate justice, student-led discussions without the usage of a text. This might reveal if critical reflection would still take place. This emphasizes the need for research into how participatory methods combined with content instruction (outside of literature usage) can foster critical agency.

SUMMARY

This project investigated how climate justice literature and participatory and critical constructivist teaching methods can enhance students' engagement with and understanding of climate change. Using *How to Change Everything As* a foundational text, students in a 9th-grade science class connected climate issues to systemic issues. Written reflections further demonstrated an awareness of the historical and systemic roots of the climate crisis. This newfound understanding would not have occurred in a traditional, conceptually-focused secondary science course. The participatory approach also fostered a sense of agency that empowered students to identify issues and solutions in their own community. However, the study also highlighted challenges in balancing Freirean principles of critical education with the realities of a traditional educational system. The findings emphasize the importance of integrating justice-oriented approaches using climate justice literature into science education to equip students with the tools needed to confront the complexities of the climate crisis. Further attention should be paid to the instructional framing and self-reflection required by the teacher to effectively institute the teaching practices of this study. Moreover, the progressive release

of responsibility to students to articulate their own questions and connections is required to move further toward true Freirean, participatory instruction and critical place-based education.

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Roots of Resilience: Learning from the Experiences of Urban Farmers

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ABSTRACT

This capstone project examines the potential of urban agriculture as a community-driven pathway to address food apartheid and build resilience against climate change. Through semi-structured qualitative interviews with two urban farmers in San Diego County, I explored the challenges they face, their successes, and their perspectives on creating more equitable food systems. Key findings revealed that bureaucratic hurdles, financial constraints, and lack of accessible land significantly hinder urban agriculture projects. However, strategic collaborations, community-led initiatives, and targeted policy interventions can pave the way for transformative change. This research lays the groundwork for a policy brief aimed at reducing barriers to urban farming while fostering community empowerment and resilience.

INTRODUCTION

Each year, we produce enough food globally to feed the entire population one and half times over (World Health Organization, 2022). However, we also have a growing number of people experiencing hunger. How can these two experiences exist simultaneously? When will we reckon with our global cognitive dissonance? Hunger is a complex, systemic problem and there is no single “silver bullet” to fixing it. In the Global North, hunger is often due to the lack of access to food. We see inequity play out with the issue of food access creating a false dichotomy between those who “have” and those who “have not”. This false dichotomy is the result of structural inequality rooted in environmental racism.

Structural inequalities, such as those exacerbated by environmental racism, lead to the creation of “food deserts” and “food swamps” (Hoffman, 2023). Food deserts are defined as areas of poor access to healthy foods (Stowers et al., 2020). Stowers et al.

(2020) define food swamps as areas where there is an abundance of unhealthy food retailers. These terms describe areas where economic and racial disparities limit access to nutritious and affordable food, thus perpetuating cycles of poverty and poor health. Why is it that certain communities in the country are cut off from healthy foods and dietary choices which can lead to higher instances of non-communicable “lifestyle” diseases?

This capstone project seeks to explore a transformative pathway from community food insecurity toward food sovereignty by examining the role of urban farming and community gardens. Food sovereignty is a term coined by the peasant farmer social movement La Via Campesina and is defined as “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Wittman, 2011). Decentralizing the food supply and putting

control back into the hands of community members has the potential to revitalize communities in California that experience food apartheid, or as defined by Gripper et al. (2020) as “the racist structures, systems, and institutions that have led to an inadequate, inequitable, and unjust food environment for Black Americans and other marginalized groups”. I prefer the term “food apartheid” to “food deserts” because it acknowledges that inequities in food access are not a natural effect (i.e., a desert) but rather the result of structural inequities. Urban agriculture is a method of growing food in urban settings that can promote food sovereignty in areas experiencing the impact of food apartheid by putting community members in control of the means of production.

Urban agriculture through methods such as community gardens and urban farms are a grassroots strategy for cultivating resilience when the food supply is challenged by extreme weather events due to anthropogenic climate change. Rather than relying on agribusiness to grow food, transport it, and sell it to communities experiencing food apartheid at a reasonable price, communities have the potential to grow their own food and control the distribution of it locally through urban farms. This arrangement allows communities to have power over whether or not they operate these farms within the capitalist hegemony or to venture outside of its constraints. Urban farms also have the co-benefit of creating climate resilience. Turning vacant spaces into community green spaces can improve air quality (Jayasooriya et al., 2016), cool communities to reduce the impacts of urban heat (Qiu et al., 2013), and create porous soils that absorb stormwater (Kumar & Hundal, 2016). Community gardens can serve as “third spaces” for gathering and forming social connections in addition to their utilitarian benefits (Dolley, 2018).

This capstone project seeks to understand what barriers currently stand in the way of communities on the frontlines of climate change and food apartheid. Conversations with established urban farmers, aspiring farmers, and community members, can help paint a throughline of challenges, successes, and hopes for a statewide program that supports urban farming. Using the information from these conversations, I plan to draft a policy brief that legislators, advocates, farmers, and communities can use to decrease the barriers for urban farming projects. I originally thought that dedicated funding in the California state budget for urban farming initiatives focused within frontline and under-resourced communities would be the biggest need. The interviews I conducted challenged this assumption and shed light on the manifold issues that pose barriers before funding is even a consideration. A byproduct of the interviews I conducted is the laying of the groundwork to form a coalition of frontline urban farmers across the state. This policy brief will be informed by their experiences and the contents shaped by what was learned through the intersections in the first-hand accounts. By addressing the shared issues and identifying solutions, this capstone project seeks to contribute to a more equitable and resilient food system, providing a model that can inspire similar efforts elsewhere.

LITERATURE REVIEW

Climate Change & Food Systems Resilience

Climate change threatens every aspect of our way of life and is a pressing issue that must be addressed in an intersectional way. Scientists predict that global warming of 2°C would have catastrophic ripple effects of extreme weather events (Watts, 2018). In 2024, many scientists agree that we have already reached at least 1.1°C of warming (Bergen, 2024). Global food systems are at

threat from climate change and bring into question the future of agricultural productivity (Adams et al., 1998; Mahato, 2014; Malhi, Kaur, & Kaushik, 2021). If agricultural yields are decreased due to catastrophic events such as flooding or droughts or if they are threatened by higher humidity and more frequent rains, the food supply may face challenges it is unable to recover from. The impact of such changes varies depending on the geographical location of the region. Wealthier nations may see impacts ranging from a mild positive effect to a 6% production decline while poorer nations, such as India, may see a decrease of 30% to 40% by 2080 (Mahato, 2014). Climate change compounds with the pre-existing vulnerability of food insecurity. The United States Department of Agriculture (USDA) defines food insecurity as households that are “uncertain of having or unable to acquire enough food to meet the needs of all their members because they had insufficient money or other resources for food” (USDA, 2024).

Food security is not only an issue of food production and availability but also an issue of access on multiple levels. From the perspective of physical access, lack of grocery stores that carry fresh, healthy foods can pose a barrier to food security (Wolfson et al., 2019). Cost can also be a prohibitive factor to food access when healthier options are not affordable. Research from Villianatos et al. (2010) on food access and affordability in Los Angeles showed that areas that had more convenience/liquor/corner stores than grocery stores sold healthy foods at a higher price. In order to eat healthfully in areas facing food apartheid, communities must pay a higher premium which is often a prohibitive factor when low-income communities are at higher risk (Villianatos, 2010). Programs such as the Supplemental Nutrition Assistance Program, or SNAP, aim

to offset the cost factor but do not offer much of an improvement when an area may be experiencing issues with physically accessing fresh foods (Shannon, 2014). If convenience stores and fast food are the only food purchasing options nearby, folks will be left with few options on where to use their SNAP benefits if they are eligible for them (Shannon, 2014). Low-income areas can be subject to becoming food swamps, or an area that has many more high-calorie junk food options than healthy ones (Stowers et al., 2017). Researchers Stowers, Schwartz, and Brownell (2017) found that food swamps are strong predictors for rates of obesity—even more so than food deserts—with low-income, ethnic-minorities facing higher concentrations of fast-food establishments in their neighborhoods compared to White ones. Simultaneously, if there are grocery stores in the area, low-income communities lack access to healthy, organic choices (Gundersen & Ziliak, 2018). This is yet another form of environmental racism that manifests in the form of food apartheid (Jensen, n.d.).

Food apartheid coupled with the climate crisis puts vulnerable communities at higher risk during extreme weather and climate disasters. “Frontline communities” are hit first and worst by climate disasters and tend to be primarily low-income, Black, indigenous, or Latine (Patsche, 2024; Sanders, 2020). Frontline communities share many demographic characteristics with food insecure communities which could lead to broad overlap between the two. Solutions and mitigating approaches must address the root causes of both issues in order to adequately solve the structural problems.

Climate Change & Community Resilience

Do frontline communities know that they are vulnerable to the climate crisis if they have not experienced a major disaster? In what

ways does climate change present itself in frontline communities? Ethnographic studies such as those done by Orlove et al. (2019) highlight how frontline communities speak about and experience climate change. They primarily see a disruption in their livelihoods and well-being while noticing socioeconomic changes (Orlove et al., 2019). The ethnographic research tells us that people pay attention and ask questions when their lives are impacted. But what questions are they asking? And what conclusions are they drawing? Orlove et al. (2019) found that people at the frontlines of glacial retreat in the US, Italy, and Peru discussed their experiences in a community frame rather than a climate frame. They talked about how glacial retreat and government intervention impacted their communities and the people around them with little mention of greenhouse gas emissions. The climate frame places human action in the context of climate change while the community frame contextualizes human action within societies. This difference is subtle but monumental in understanding how to engage in conversations about climate change and resilience with frontline communities.

In order for communities to be resilient to climate change, they must adapt. However, adaptation is a privilege afforded to the rich while poorer folks are forced to deal with the consequences. Tactics such as planned retreat, retrofitting homes with climate-friendly appliances, and moving away from vulnerable areas all require capital to achieve. Fazey et al. (2017) provide the following ten essentials for community resilience to climate change (Table 1).

Table 1. Ten essentials for effective community resilience initiatives in the context of climate change and a 1.5°C world

Essentials

1. Enhance adaptability and flexibility for managing change and work with diverse resources and capacities;
2. Take account of shocks and stresses, direct and indirect impacts and anticipated and unanticipated change by enhancing specified and generalised resilience;
3. Work horizontally across sectors to avoid counter intuitive outcomes and to find novel solutions that simultaneously address multiple concerns;
4. Work vertically across social scales to ensure engagement in carbon reduction and to address issues of power, control and ensure support;
5. Reduce carbon emissions through transformative and proactive change;
6. Build narratives of climate change to enhance climate literacy and inspire hope and action;
7. Engage directly with futures to release creativity, imagination and change;
8. Focus on climate disadvantage and reducing inequities to overcome injustices of climate change and climate action;
9. Focus on processes and pathways through encouraging participation, learning and empowering forms of change.
10. Focus on transformative, rather than adjustment or reform kinds of change (Adapted from Fazey et al., 2017).

Food Systems & Community Resilience

Urban agriculture can be an effective mean for building community resilience. A robust, localized food system can help frontline communities mitigate the longer-term

stresses of climate change rather than simply respond to the shocks (Essential 2). Urban agriculture has the potential to inspire transformative change (Essential 5) by providing food access to communities experiencing food apartheid. Community engagement through gardening, workshops, and on-farm education can help build community frames for climate change narratives (Essential 6) while community controlled systems can address issues of power (Essential 4). Community gardens and farms can inspire creativity (Essential 7) and empower climate action (Essentials 8 & 9). Climate change poses a threat to global food systems that would drastically impact the poor and those who already struggle with food security. Community resilience means being able to mitigate shocks from the global food supply through supplementation by means of local food systems. Urban farms and gardens tend to be rooted in agroecology, a sustainable way to produce food that considers the whole ecosystem, which can provide co-benefits to the community. Urban agriculture is “mitigating greenhouse gas, mitigating urban heat island effect, controlling flood, enhancing biodiversity” (Ebissa et al., 2023) and community control of food systems can push for food sovereignty.

Urban Agriculture as Justice



Figure 1. *Crops grow in neat rows at an urban farm nestled in a previously empty plot next to an affordable housing community and an elementary school (not pictured).*

Food sovereignty is antithetical to global imperialism and the capitalist machine.

Rather than prioritizing short-term profit it is counter-hegemonic because it centers long-term sustainability and community well-being, or people over profit. Food sovereignty is based on the belief that everyone has the right to access nutritious food, irrespective of their class, race, gender, or ability. The presence of high rates of food insecurity in wealthier nations such as the United States points to a fundamental flaw in how we view food. A neoliberal perspective allows the free market to run its course during disaster. Price gouging leaves those with little with even less and survival becomes inherently linked to privilege. While food sovereignty is a goal to strive for, is it possible while still entrenched in neoliberal systems of power?

Urban agriculture projects sit at a slippery precipice of society. They are inspired by a need that is not being met within a community. However, filling the gap with an community-based or nonprofit urban agriculture project can push back the safety net further. Funding for urban agriculture nonprofits is mainly through grants which they must compete for against other nonprofits doing similar work. McClintock (2014) argues that such processes dilute the mission and services that the organizations offer since they are allotted such small portions of their operating budgets through grant programs. In order to challenge capitalism, urban agriculture must move beyond providing food security, building community, and opposing the industrial agribusiness towards reclaiming “the commons”, or the shared resources a society has access to (McClintock, 2014). American ecologist Garrett Hardin (1968) asserts that “freedom in a commons brings ruin to all”. Our current capitalist alignment allots those with capital free reign over the commons while those without face the impacts of their choices (i.e., environmental racism). Communitarianism is

a theory that believes that “local communities, rich or poor, are the primary and proper bodies of agency in the production of collective behavior necessary for social change” (Pride, 2016). The communitarianism model is challenged by Marxism when the actions are isolated, localized, and de-politicized. Food access, climate justice, and resilience are all deeply political concepts that require grounding in the political conditions that created the issues and the current political moment.

Climate models, data, and statistics do not inspire action. We are inundated daily with information and our human minds do not attend to this information in the same way as we do for narratives (Zak, 2015). Neuroscientist Zak (2015) studies oxytocin – a neurochemical dubbed the “love molecule” that promotes human connection – and found that “compelling stories cause oxytocin release”. Tapping into the human element is an effective form of communication that inspires and can drive action. Through this capstone project, I seek to bridge this gap between statistics and information into action by sharing stories and experiences of those doing the work. I seek to understand the motivations and drivers of people working at the intersections of urban agriculture, climate justice, and community resilience and identify shared challenges they face while also paying attention to the interplay of capitalist hegemony. This capstone project seeks to investigate the nexus between climate change and food justice from a social justice lens highlighting urban farming as a community-based system for resilience.



Figure 2. Trays of seeds found inside the hoop house of an urban farm demonstrate how many crops can be grown in a relatively small space.

Epistemology

I sought to answer the following research question: How can experiences of urban farmers in California shift the tide for how we understand community-based models for climate resilience? In order to challenge my positionality as a researcher, I aimed to develop a liberatory community-engaged epistemological framework for how I approached this question through qualitative research. Garrison et al. (2024) define liberatory perspectives as ones that “center the lived experiences, voice, virtues, and ancestral wisdom of survival and resistance among historically marginalized people”. Rather than highlight voices that already have mainstream coverage, I seek to uplift marginalized voices as a way to incorporate polyvocality into my research. Liberation theologies are in response and resistance to dominant social ideologies.

In the context of my case study, the dominant social system of capitalism will be challenged through a liberatory approach. Rather than trying to maintain neutrality, I

will be leaning into my positionality as an urban farmer to build a basis of connection with the participants I interview. Qualitative researchers often try to maintain neutrality while conducting their research but this can cause them to reinforce hegemonic structures which Zavattaro and Nickels (2023) call “the myth of neutrality”. Adding a decolonizing lens transforms qualitative research into a collaborative learning space rooted in anti oppression. Decoloniality challenges Western ethnocentrism and welcomes and “ecology of knowledges” (Thambinathan & Kinsella, 2021). Exercising critical reflexivity is one way of engaging in liberatory, decolonized research. A reflexive approach to interviews means that I understand how my own values and beliefs “impact [my] perceptions, and [evaluate] how the research process is affected” (Lee et al., 2021). Instead of focusing on the outcomes or answers to interview questions, valuable knowledge can be gained from the act of asking and reflecting which can create a reciprocal relationship between interviewer and interviewee. I aim to embody the five Rs of decolonizing research methodology as outlined by Carjuzaa and Fenimore-Smith (2010): “Respect (centers individual and community strengths), Relevance (imbeds research within sociohistorical and cultural context), Reciprocity (adopts collaborative practices), Responsibility (prioritizes learning from community), and Relationality (incorporates wholistic connections)” (Lee et al., 2021). This research is not simply to produce a paper. I see it as a stepping stone to create transformative change and move beyond theory towards praxis as I immerse myself in decolonization through embodying the role of a scholar-activist.

One way in which I added critical reflexivity to the qualitative interview approach is to assess the power dynamics present between community members and academic

researchers when conducting interviews. Food access and security is an intersectional issue and as an interviewer, I had to consider the structural dynamics of social class. I remained conscious of class dynamics since urban farmers are much closer to the means of production when assessing class from a Marxist view (Mao & Feldman, 2018). It was important to name the impact of class while discussing urban agriculture and community resilience as it is often poorer folks that feel the impacts of lack of food access and environmental racism. Mao & Feldman (2018) warn of normalizing middle class values in interviews with poor and working-class participants which can discourage candid story sharing and limit interviews. I had to be aware that I could be speaking to poor and working-class urban farmers as I conduct this research from a liberatory approach. Interview questions were formulated so that they did not instill middle-class values while conducting cross-class research. “Why do you work here?” versus “what led you to work here?” carry much different weight to interview participants and may lead to different responses as noted by Mao & Feldman (2018). This phrasing points to a difference in how poor/working-class individuals “tend to view their life circumstances as determined by forces outside of their control, while middle-class individuals see themselves as having more control over social threats and opportunities” (Mao & Feldman, 2018). As an academic researcher, interviewing a working-class farmer has the potential to create a social power dynamic. In order to not simply extract from each interview participant, I aimed to create a space for robust discussion and bi directional information transfer.

Academic language can carry classed communication norms that bias interviews (Gist-Mackey & Kingsford, 2020) and reinforce hegemony through capitalist norms

of extraction. Researchers are taught to conduct interviews that result in “rich data”, or a “varied number of nouns, adverbs, adjectives, modifiers, verb tenses, and strategy in communication” (Gist-Mackey & Kingsford, 2020). Rich data is often the result of academic privilege that contributes to wordy and in-depth interview responses. Rather than seek “rich” data, I aimed to conduct conscientious fieldwork, as coined by Gist Mackey & Kingsford (2020). Community-based research has, historically, been rooted in the desire to obtain information from a specific group to share it with others from a different demographic background. The researchers seek to gain knowledge from community members but fail to consider what the community members have to gain in return. Liberatory perspectives challenge this hegemonic practice by bringing the element of activism to the scholarly space. This approach requires activism to set the tone and pace of the research and leans on study to support that which is counter to the traditional research approach of study, then research, and maybe someone uses it for activism. By starting from the positionality of a scholar-activist, transformational praxis is centered and relationships developed through the interview process are simply the first step to creating a bi-directional relationship.

Positionality

My positionality is important in this work and was a factor in how I conducted interviews with participants. I am a child of immigrants, a woman of color, and an employee of an urban farming nonprofit. I am also a graduate student at the University of San Diego and a grassroots organizer for the Sunrise Movement. I live in the Linda Vista community of San Diego in a working-class neighborhood comprised predominantly of people of color, first-generation Americans,

refugees, and immigrants. My connection to my community and my work informs my activism and my research but I also have never personally experienced food insecurity. I sought to use my positionality through my employment, schooling, and activism to build strong relationships and networks to affect long-term change through urban agriculture.

In the paper “‘What is the Community Going to Get from It?’ Abolitionist Ethics and the Praxis of Responding to Reciprocal Community Requests”, authors Danley, Jackson, and Thomspson (2023) share their experience with interviewing the owner of a bookstore in New Orleans after Hurricane Katrina. The owner had four questions for them: “(1) What are you here for? (2) What are you asking from the community? (3) What are you going to get out of it? (4) What is the community going to get from it?” (Danley et al., 2023). These questions helped me frame my interview questions while also assessing my own positionality in relationship to the community being researched.



Figure 3. A community garden located next to affordable housing gives residents the ability to grow food outdoors.

This research is rooted in the eventual goal of instituting systemic change for urban agriculture that eliminates barriers to starting urban farms or gardens in low food access areas. I asked the community how urban agriculture has impacted their lives, what challenges they currently face or have overcome, and the hope they see for the future through urban agriculture. Through these interviews, I obtained testimonial information that sheds light on my research question and identifies pathways forward. Through this research the community has gained an ally, a volunteer, and an activist dedicated to furthering urban farming efforts for them and others seeking to do the same.

METHODOLOGY

I sought to interview three participants individually using 60-minute semi structured qualitative interviews. I compiled a list of 10

total questions consisting of 5 main questions with several follow-up questions that served to keep the conversation flowing (Appendix 1). I initially wrote 5 open-ended questions that I aimed to keep very neutral in their wording. After brainstorming and narrowing down to these 5 questions, I utilized an autoethnographic approach by testing the questions on myself. What I learned from my own responses allowed me to refine my questions and reword them to promote robust responses. One of the first pitfalls I made with my original questions was keeping them too broad. This caused me to not know where to begin my response. To improve this, I added some follow-up questions, or “probes” that helped accomplish the goal (deMarrais, 2004, p.51). What I aimed to uncover from interview participants is their connection to urban agriculture, their connection to their community, how they interact with the

government, and what challenges they face that impact their ability to do this work. I was particularly interested in hearing stories and encouraging them to share their perspectives from a community frame, hence the lack of direct questions about climate change.

The participants I selected to interview were urban farmers who actively engage in agricultural practices within urban settings. Criteria for selection included involvement in urban agriculture for at least one growing season and a commitment to sustainability or climate resilience in their farming practices. A diverse sample was sought, ensuring a range of experiences across factors such as age, gender, socioeconomic background, and the geographic locations of the farms (within San Diego County). I attempted to recruit a total of 3 participants via local urban farming networks and word-of-mouth referrals to ensure a variety of perspectives on the intersection of urban farming and climate resilience. However, I was only able to successfully schedule two interviews within the timeframe of this project. I do plan on conducting more interviews to continue this work outside of the time constraints of this project.

I met each interview participant at their farm or garden sites to conduct the interview to decrease the burden on the interviewee to meet. In order to protect the identities and have open, honest conversations, I have kept the names, specific locations, and any identifying information anonymous. In considering the ethics of such an interview, I understand that there is a power dynamic that is created between the interviewer and interviewee. I sought to eliminate or, at the very least, decrease this power differential by taking intentional steps in my outreach and during the interviews. Rather than extract information from the participants, I aimed to create a collaborative interview space that

encourages two-way sharing of information. Modeling storytelling from my own experiences helped participants frame their stories as well.

Upon scheduling an interview time with each participant, I arrived at their location of choice and grounded our conversation in an introduction about who I am, what this project is, and the future goals I see of this work. I shared my personal and professional connection to urban agriculture, my passion for community organizing, what I have found empowering about this project, and the next progression of turning these research findings into policy that helps us both. During the interview, I recorded the conversation on my phone and took brief notes to remain as present as possible. The flow of both interviews was very conversational, and we were able to build off each other's responses to take the interview into directions I had not anticipated. Both interviews ended up exceeding the 60-minute time frame but to be respectful of each interview participants' time, I wrapped up the conversation around the 75-minute mark. The insights gathered from these interviews provided a rich foundation for understanding the complex interplay between urban agriculture, community dynamics, and climate resilience.

RESULTS AND DISCUSSION

The first interview I conducted was with a participant named Linda*. This interview was conducted at the community garden she works at and helped start. I met her in mid-morning and we sat at picnic tables situated near the center of the garden while we spoke. She separated seeds while we conducted the interview and I got to observe her interact with garden volunteers. She mentioned that the garden was situated next to affordable housing complexes and senior cottages, making it a central gathering space. Linda

shared that “this is a space for everybody to come and garden and commune, and there’s so much work to be done” after telling me about an 80-year old man who lives in the senior cottages and comes to volunteer every day as a way to get outdoors and connect with others. At this community garden, community members can rent garden beds where they are responsible for growing their own crops. Since most members live in nearby apartment complexes, they do not have access to yards where they can grow food and spend time outdoors. Linda shared with me that most of the gardeners are beginners, so they provide monthly educational workshops and a seed library that are open to the community at-large. *Names have been changed to maintain the anonymity of interview participants.



Figure 4. A wheelchair accessible garden bed at Linda’s community garden.

Through my conversation with Linda, I learned what it took to create this community

garden on what was previously an unused section of a community park. “Parks and Rec used it as their dumping ground, basically... but I was like full sun at the corner of the park, there’s still lots of green space left, and so that’s when we said, ‘okay, let’s go through the process’”. The process Linda mentioned alluded to what is outlined in the City of San Diego Park and Recreation Department’s Departmental Instruction, an outline for city staff and community members for the policies and processes for starting a community garden on city-owned land (City of San Diego, 2013). This 12-page document describes all of the necessary steps for the application, planning, construction, operation, and evaluation of community gardens and Linda explained “no one’s ever done it because it’s really bureaucratic [and] cumbersome”. Linda’s journey with this process began in 2020 and “it took many years, lots of outreach, lots of fundraising, lots of collaborating with different partners and [they] were able to break ground [at the] end of last March” despite them having “good relationships with the Parks and Rec staff”. The Departmental Instruction specifically mentions that this process will “have a minimal amount of impact on City staff time and resources” (City of San Diego, 2013). This requires community-based organizations to obtain funding for these projects by means of donations and grants. In order for smaller community-based organizations to successfully follow the Departmental Instruction, they need substantial support from partner organizations.

Not only is following the Departmental Instruction time-intensive, but it also requires considerable funding. An additional barrier to navigating the City’s bureaucratic process involves hiring landscape architects and contractors capable of complying with the environmental review and permitting

processes. These specialized designs and permits require significant financial investment upfront. Linda mentioned that “it cost us too much money, way too much money”. The Special Use Permit that needs to be issued to permit a community garden on public park property is “like a 50-page document. It’s crazy how long it is,” according to Linda. However, Linda’s experience is not unique.

The second interview I conducted was Eric* who works at an organization that engages with urban agriculture through workforce development and education programs for socioeconomically disadvantaged populations. I met with him at his office on a weekday afternoon and dove into a discussion of the challenges we both faced when working on urban agriculture projects within bureaucratic systems. He shared that they “built a garden for [redacted] College last year, and just their outdated policies around other bureaucratic stuff made it difficult. The garden was supposed to be a \$30,000 garden, and it ended up being like \$100,000.” Substantial budget increases like this can be heavy burdens for community-based organizations to bear, especially when they rely on grant funds for their operations. Eric mentioned the need for more streamlined processes because “[the bureaucracy] makes it very hard. It makes the financial burden a lot heavier. And these are placed on communities that don’t really have financial resources like that”.

Clearly, policy hurdles can make the process of starting urban agriculture projects substantially more difficult. It adds to the time, effort, and money needed to bring it to fruition. This is where partnerships come into play to help share the burdens. Linda told me how a partnership with a large foundation that works on park equity projects was a big help to getting their community garden

established because of their connections to local politics and wealthy people. Partnerships between urban agriculture organizations/groups and supporters must be equitable and community focused. Linda spoke of her experience working with a landscape contractor that “didn’t know how to work with community.” Building a bottom-up intersectional solution like a community garden involves centering community members’ voices in order to build out a project that they can truly support and feel a part of. Linda said that when they worked with the general and landscape contractors, “when it came time to the put the community part in the schedule, they’re like ‘you got to do all these [things] in four Saturdays’... it was a nightmare. I started working 12-hour days”. Instead of working collaboratively with the community-based organization that Linda represents, the contractors pushed forward their own timeline and left out the aspects that were important to Linda’s team.

Additionally, they pushed Linda and her team to overextend themselves to accommodate their quick turnaround period for community input – something that takes ample time to do for best results. She stressed the importance of “find[ing] landscape companies that actually build community gardens” because they would be able to understand the unique needs that community-based organizations have for their communities. My interview with Eric shed light on the impact that good mentors and guides can have on a fledgling community organization. He shared about a trip he took to Hawaii to visit a large sustainable agriculture organization there and what he learned from their executive director. His biggest takeaway was “collaboration, collaboration, collaboration”. He said, “I have a lot of San Diego pride, I guess, and so we really want to work with local companies, local organizations, and people that are doing

things in the community that are aligned with us. So, we seek out those people”. Having a strong network of people and organizations dedicated to the various aspects of urban agriculture could prove to be an immensely valuable resource for people actively doing and planning to do this work.

In addition to relationships with other community organizations and local businesses, urban farmers must also build relationships with local government officials to move along their projects. Linda shared how their initial interactions with the Department of Parks and Recreation director had led to them being told that they would need to go to the water authority to get their own water hookups, “which is really expensive”. However, as they got to develop their relationship with this person, they helped identify a way in which they could use the park’s existing submeter and be billed by the City for their water usage. This workaround helped them save a lot of money and strife. Eric mentioned that one of their projects required them to install a water meter which was quoted at \$50,000. Funding in this amount can be incredibly difficult for a small nonprofit to obtain and next to impossible for a grassroots group. Linda mentioned how their local city council member’s support of the project and their connection to a carpenters’ union allowed for all the structures at the site to be built for free. In my own experience, our relationships to the city council office have helped us push along some parts of the bureaucratic process, especially when waiting for a certain department to get back to us. Political offices can aid in projects such as this by exerting pressure on the city departments to prioritize the requests since they must “have a minimal amount of impact on City staff time and resources” (City of San Diego, 2013). Based on the interviews I conducted, it appears that there is a great need to simplify top-down

processes, such as the Departmental Instruction, when working on projects that aim to create bottom-up solutions for community-based climate resilience.

The ideal outcome of this project is to develop a policy brief that can be used to advocate for reducing barriers to urban agriculture. This goal requires an intentional process to avoid reinforcing top-down capitalist hegemony. First, it must be created through a bottom-up process. All groups and individuals interested in urban agriculture – from seasoned farmers to community members who would benefit from these projects – must be at the table. They must be involved in helping identify the issues and developing the solutions. I see three potential advocacy areas based on my initial interviews:

1. Simplifying the bureaucratic processes involved in starting urban agriculture projects on public land.
2. Incentive programs for turning vacant/unused land in functional urban farms or gardens for a minimum threshold of time.
3. Allocating state funding to support urban agriculture in underinvested communities through local government staff support and start-up funding.

My interviews with both Linda and Eric indicated the need to ease the bureaucratic burden of implementing urban agriculture projects. Linda’s group has already started doing advocacy work for this very issue. Working on this aspect of the broader issue can pave the way for other grassroots groups to get involved in urban agriculture as well. The ripples of change are immediate and can be felt by the community quickly compared to the second and third advocacy areas. Some key elements of this will involve simplifying language and processes. The requirements

should be clear and within reason. It should be easy for someone who is not experienced in zoning and public construction projects to understand how to navigate through the entire process. Additionally, the required investment ought to be clear. There should be an estimate listed for how much such a project would cost based on a designated parcel size (i.e., 0.25 acres). Groups that seek to start an urban farm or garden should have a good idea of what the budget is, without surprises. One way this could be made clear is by providing ballpark estimates for the required steps in the process and the needs a particular site may have. Examples include how much it would cost to conduct an environmental review, hire a landscape architect and a general contractor, or install a water meter. If there are certain tests and permits required by the local government to approve the site, then the ballpark range for those should be included too. This would help groups fundraise for these projects with an upper estimate in mind rather than be surprised with a large financial burden a while after the initial fund raise. From a grassroots perspective, building out a network of organizations that have

experience with bureaucratic processes – whether it is with a city or a college – can be a helpful resource for community groups trying to start urban agriculture projects. This can be built upon by adding in contractors, landscape architects, and any other businesses that have experience in this work and know how to work alongside community members.

Another issue identified in these interviews was the difficulty in accessing land. While Linda’s organization went down the route of building their community garden on public park land, Eric shared his own struggles with land access. He told me about a vacant lot across the street from an elementary school that has been sitting fenced off for at least 5 years. He said “it’s just the ugliest thing you ever want to see in your life... how are you allowed to have something that looks like that across the street from an elementary school?” We spoke about the potential of this space and its proximity to the school could allow for more outdoor garden education for the students there. I visited the lot after my interview with Eric and got to see how underutilized this space was.



Figure 5. The empty lot Eric told me about. It looked like what had previously been a small shopping center but the building has since been demolished. Wild vegetation has sprouted and grown throughout this empty parking lot.

Both the City of San Diego and the County of San Diego have an Urban Agriculture Incentive program for their residents. For both programs, the incentive is offered through a property tax credit for vacant or unimproved lots of 0.1 to 3 acres within city limits and in the unincorporated areas of the county (City of San Diego, n.d.; San Diego County, n.d.). If landowners agree to use the parcel of land for small-scale agriculture production for a minimum of 5 years, they are eligible for the property tax credit. These programs stem from California State Assembly Bill No. 551: The Urban Agriculture Incentive Zones Act which was approved by the Governor in 2013 (The Urban Agriculture Incentive Zones Act, 2013). Programs such as these can incentivize land owners through capitalist drivers such as tax write-offs. The success of a program must make this option more financially appealing than the possibility of profit that causes vacant land to sit empty and unused for years. Further interviews must be conducted to determine the best avenue for such an incentive program to be built into this policy brief.

The final intervention that the policy brief may include refers back to my initial assumption about what the biggest issue would be for urban farmers – funding. However, my assumption about the ways in which this funding reaches them has changed. Rather than simply writing in a line item for urban agriculture in the state budget, the experiences of the urban farmers I interviewed have led me to believe that there are more targeted ways in which financial investments can be made. Firstly, allocating resources to promote urban agriculture within

city lines could help avoid the problems that result from the lack of investment from city offices. Secondly, offering unrestricted startup funding to help retain contractors and invest in infrastructure improvements can also decrease barriers to entry. Determining what this breakdown must look like will also require additional interviews and consensus building among the parties involved in developing the policy brief.

In summarizing the insights from these interviews, it becomes clear that urban agriculture holds significant promise as a tool for addressing food apartheid and fostering community resilience, but the path is fraught with systemic barriers. The challenges of navigating bureaucratic processes, securing financial resources, and accessing land underscore the need for targeted policy interventions and collaborative support systems. At the same time, the stories of resilience, creativity, and community driven solutions illustrate the transformative power of grassroots action. These findings form a critical foundation for developing a policy framework that prioritizes equity, sustainability, and community empowerment.

CONCLUSION

This research underscores the transformative potential of urban agriculture to address systemic inequities in food access while building climate resilience. By centering the voices of frontline urban farmers, this research highlighted the critical barriers they face, including complex bureaucratic processes, financial burdens, and land access challenges. Addressing these issues requires

simplifying policies, incentivizing the use of vacant land, and securing targeted funding for underinvested communities. Future work will involve expanding the interview pool and refining policy recommendations to support grassroots urban farming efforts. Ultimately, this project aims to contribute to a more equitable and sustainable food system through policy change and community-led action.

Appendix 1

Interview Questions

1. Tell me how you got involved in urban farming.
 - a. Can you share your journey into urban farming and what experiences or influences led you to this path?
 - b. Are there specific events or influences that shaped your understanding of urban farming?
 - c. What experiences in your life or community led you to see urban farming as a tool for resilience and empowerment?
2. What are some ways that you and people in your community find urban farming to be challenging, frustrating, and/or disappointing?
 - a. In what ways does urban farming impact your community, and what specific changes have you observed?"
 - b. Can you share a story or example that highlights the significance of urban farming for community members?
 - c. What challenges does your community face, and how do you see urban farming addressing those challenges?
3. How do you collaborate with community members and organizations, and what role do these partnerships play in your work?
 - a. What challenges have you faced in collaborating with others and how have you overcome or faced them?
 - b. Can you share an example of a collaboration that has been particularly impactful to your community or farm?
4. In what ways do you think government can better support the work you do in the community, and what gaps do you feel currently exist?
 - a. What opportunities do you see for collaboration between your organization and local government to enhance food access and community wellbeing?
5. What are some of the biggest challenges you encounter in your work, and how do they affect your ability to serve the community?
 - a. What are some of the biggest challenges you encounter in your work, and how do they affect your ability to serve the community?
 - b. How do the challenges you face impact the community?

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Exploring Sustainable Food Networks and Traceability

“A Vision for Urban Food Justice”

The Knowledge of the Fruit Tree

Neda Kabiri
December 2024



Prologue

AND SO IT BEGINS . . .

The smell of citrus lined the boulevard of school grounds, students were seen picking a range of fruits from oranges, and nectarines to plums and apples on their way to school. Some enjoy a juicy snack, and others place them in the side pockets of their backpacks for later. Looking at the distance, a smile is shared among a small ambitious group as they look at each other in appreciation of the grounds they have cultivated and brought to life to share an enriching experience for all or should I say, “Knowledge of the Fruit Tree”.





A Tale of Awakening, Resilience, & Hope

A group of students are heard conversing on their way to school, one student mentions to another peer, “Would it not be a delight if we can pick fresh fruit on our way to school?”, as they walk past a few bushes, trees, and flower shrubs. Another student in the group replies, “What fruit tree would you like to line the walkways with?” The conversation continues and the students name all their favorite fruit trees they would like to see lining the boulevards of the city near their school campus. Ringggg (school bell) ... The students are seated in their classes, and in one particular class a teacher by the name Maya holds a morning discussion, to warm up the students and get them started on their day. (Maya)- Today’s discussion: What would your ideal city look like? Two students from the group walking to school together shared this class, and offered to raise a question: “Maya, what fruit tree would you like if you could imagine fruit trees in our city instead of ordinary trees and shrubs?” Maya, amazed by the idea, began to think and answered “Hmm any fruit tree at all, we have so much concrete around us a little fruitful greenery would be a gift!” The idea alone of having food access on campus and also a student-led cultivation program was an idea that she would not let go of.



Abstract

In today's world, food is far more than just sustenance. It's shaped by complex social, political, and economic forces- many of which go unnoticed by the average consumer. How often do we pause to question where our food comes from or the systems that deliver it to our tables?

My research dives into these critical questions by exploring the intersection of food systems, sustainability, and corporate influence. This work challenges dominant food knowledge narratives by integrating ethnographic and archival research with fictional city planning practices to design transparent, traceable, and grassroots-driven food networks.

Through archival exploration, my theoretical base is formed over those of corporate hegemony and fiction-based research inspired by thinkers like Bertrand Russell, Rachel Carson, and Octavia Butler. In my research, I aim to uncover how corporate practices obscure the origins of our food, sidelining locally grown produce and perpetuating injustice. Using ethnographic methods, I conducted an ethnographic study, in which I observed how consumers interact with products in grocery stores paying particular attention to labeling, reflecting our society's fractured relationship with food and the need for corporate transparency and traceability. As a part of my research process into fiction-based research, I have written a narrative inspired by real community conversations that took the form of a critical constructivist conception of interviewing. The heart of my fictional narrative is set in a near-future city transformed by community activism. This city aims to redefine food access with sustainable networks that tackle urban food waste and equity, as well as remedy flaws in urbanized frameworks.

Introduction

Corporate dominance and a lack of meaningful government regulation drive a

growing disconnection between people and their food systems. This disconnect reduces

the value of food and limits consumer choices and it leads to poor health outcomes and unsustainable agricultural and food production practices (Lebelo et al., 2021).

Ongoing discussions of systemic food issues have raised concern, but brought little change (Djan, 2023). Groundbreaking advocacy methods are needed to reclaim the right to clean and transparent products, and to combat misleading labeling that deceives the public (Anderson et al., 2023).

This paper delves into these critical questions, exploring how fictional counter-stories can challenge our assumptions about food production, corporate control, and urban planning. By combining narrative storytelling with academic research, my work seeks to expose the gaps in our food systems: gaps that disproportionately affect marginalized communities and exacerbate food insecurity (Djan, 2023). From the misleading labels on ultra-processed foods to the systemic failures of urban planning (Nkula-Wenz et al., 2023) in creating equitable food access, it is necessary to emphasize the urgency of incorporating accountability and transparency into every aspect of our built environment.

As I explore our food systems, I navigate a landscape full of hidden practices and a lack of transparency. My journey is not just about the food we eat but the stories behind it. I am determined to actively explore how corporate practices have hidden the true origins of our food and how this has contributed to injustices that affect many people unknowingly. Through archival research, I'm peeling back layers of history to reveal how corporate hegemony has sidelined the value of locally grown produce. I want to challenge the assumption that the ingredients on our shelves are safe and wholesome. My work will involve an ethnographic approach through spectating consumer product

interactions in a grocery store and utilizing my observations to further understand and reflect society's collective relationship with food.

Through the inspiration of community conversations, I have produced a fictional narrative that simplifies complex issues into familiar concepts. The story is based on an urban city where community activism and sustainable urban design have redefined the

city's approach to food and the environment. The city adopts sustainability practices that include creating boulevards lined with fruit trees, community gardens, and a grocery compost network. These initiatives address food waste, improve access to whole, nutritious foods, and empower residents to take part in sustainable urban living.

I want to spark a sense of curiosity: when you grab that product off the shelf, do you really know where it came from? Who benefits from the system, and who gets left behind?

In this exploration, I'll be guided by the motivations of thinkers like Bertrand Russell, questioning how we understand the "knowledge" of food and the historical context behind our food systems. In addition, I aim to reimagine a food landscape rooted in transparency and community, inspired by both the speculative visions of Octavia Butler and the advocacy of Rachel Carson.

In theory, my objective is to inspire action and dialogue through my research to enforce a sense of responsibility and stress that food is not just a commodity but a necessity that deserves our highest degree of care and attention.

This academic journey has brought me closer to understanding how to advocate for a future where our food systems zero in on safety, sustainability, and equity while uncovering systemic issues. By blending qualitative



research with advocative storytelling, it is hoped that a movement will be instilled in readers that reclaims our connection to food

and promotes a more just and transparent world.



Lit Review

Think of the last time you picked up a piece of fruit and how much time you spent thinking about that fruit before you ate it. In exploring this, I will be addressing “How can a fictional counter-narrative give us some inspiration for changing the way we digest knowledge about our food? Food chains follow a certain directory map, from government-owned farms to crates owned by corporations shipped to stores nationwide. Now take a minute, and hypothetically place an apple into your hand, as you read this, do you question the source of the apple, or can you confidently trust and bite the apple as is, do you take measures in the way you eat an apple? All of this will tie in soon, our social and political structures all convince our behavior to approach this situation in a specific way (Wood et al., 2021).

My research explores the existing structures of our food chains through a narrative lens, supported by archival research, to establish a precedent for a 'future history' approach that addresses gaps in current research on food networks. Particularly, investigating how urban planning shapes the quality of health for many citizens; as well how large corporations and monopolies are hiding behind a veil of food injustice; and how consumer behaviors are either in a state of denial or misled by a foundational trust in the

networks that build our food systems (Slater et al., 2024).

“Food systems are constantly bombarded by shocks, including climate-related natural disasters, global and local market distortions, political upheavals and conflict, as well as pandemics” (Fanzo et al., 2020). Based on existing research regarding nutrition and food security, there has been a large discussion on how the knowledge of food sources has brought concern to many consumers; as a wave of gut, digestive, and intestinal problems have spiked in younger populations compared to in the past when it comes to GERD, IBS, kidney cancer, Crohn's and celiac disease (Wu et al., 2024). There has been speculation that the mass production techniques used to cultivate food at the rate of population growth have exacerbated public health issues by abandoning traditional agricultural practices and participating in food fraud (Saadat et al., 2022). The cost of this shift resulted in increased levels of toxins found in produce, largely due to pest control methods and marketing values of food attractiveness (Zhou et al., 2024).

Aside from the concern of pesticides and additives, large corporations responsible for pushing products on shelves are also rebranding their labels and food names to

appear more appealing. "Ultra-processed foods account for nearly 57.9% of caloric intake and 89.7% of the added sugars consumed in the United States" (Sawalha et al., 2023). For example, pick any product from your pantry, turn to the product label, and read until you can no longer decipher what the contents might mean; some are just additives consisting of emulsifiers or texturizers, however, others are considered hazardous. How can one make this distinction? Further in the paper, I will discuss my ethnographic observational study analyzing consumer behavior on how and whether the consumer decided to investigate a product's labeling. In doing so I will be utilizing existing research on traceability and transparency: "Transparency is defined as disclosing information about the product's production process, ingredients, and social and environmental impacts, enabling consumers to make informed choices. [...] Traceability is defined as tracking the product's movement along the entire supply chain, identifying food safety risks, responding to illness outbreaks, and ensuring compliance with regulations" (Hubbell et al., 2023). These two key contributors to consumer decision-making are essential in creating and shaping an informative approach to guide a healthier way of living.

"While consumers indicate they want to know extensive information about their food products, only a small portion of them are likely to explore the information if provided to them" (Hubbell et al., 2023). Given this existing gap, my research intends to simplify informative decision-making through storytelling and clear methods of distinction for the everyday mind. This narrative demonstration aims to serve as a guide for all populations who suffer from food inequalities including access to whole clean sourced foods. There is a large disconnect between what is to be known about our food, although many products may appear

harmless, the wrong decisions will collect undesirable consequences in the long run.

Speaking of inequalities, there is a crucial racial and socio-economic urban zoning profile that further distances minority communities from whole foods and encourages consumption of poor diets based on locational perimeter to grocery stores (Hilmers et al., 2012). Urban Planning is a department utilized to plan with intention to provide for residents and to allocate grocery stores, supermarkets, food chains, pharmacies, and schools according to the space of the city. Urban Planners have the insights to suggest the ways in which to better optimize a city. In certain minority communities food deserts continue to be an abandoned area of concern, and even grocery stores in middle-class neighborhoods fail to address the necessity for clean food (Cummins & Macintyre, 2002). Currently, there is sufficient research on how urban environments can better optimize and uplift the resilience of communities, especially those in minority areas (Kapucu et al., 2021, Kapucu et al., 2024).

The gap I will be addressing is the active storytelling implementation to meta concerns surrounding the issues with food justice, urban design, and sustainability. My paper intends to create a fictional picture of what a futuristic city with these public concerns might look like if they were to be addressed with an interconnected network in mind. A network that collaborates with the youth, food corporations, and existing community knowledge to alleviate public food concerns to increase the transparency and traceability of their neighborhood food chains; and to bring in a new urban setting based on an in-house value on sustainable practices that benefit all. Similarly to how Friedmann argues that there is no one practice or concept of urban planning but rather a 'plurality of planning cultures' that coexist and frequently

compete (Friedmann, 2005). This ideology of urban planning culture is true, but my fictional city approach intends to utilize how the preliminary aspect of planning can be influenced and easily adapted to sustainable missions.

Furthermore, to add to the way we digest knowledge about our food, we have to understand the principles of the way we think about our political structures and how socially we as humans contribute to this one way or another. What we do in our homes partakes in the collective structure of the nation's "ideal home" vision. This shifts into how corporations market products to suit our "needs" or what they attempt to convince us of our needs. Corporate hegemony reigns over our food, and they solemnly declare what we can eat (Anderson et al., 2023). Nonetheless, responsibility is bestowed on the consumer as they make personal choices on what products they pick off the shelf and place into their shopping carts to bring home.

This linear market-to-table process is something I will be dissecting, exploring how consumer intentions shape their interactions with the products they purchase. I will also examine how reducing the availability of processed foods and improving product safety guidelines and labeling can profoundly change lives, families, and communities.

To uncover the truth behind our food we must familiarize ourselves with the regulators of the food chain, one being the FDA, whose job is to regulate the health and safety of a large scale of products on the market. The unfortunate truth is that the "Center for Food Safety and Applied Nutrition, the little-known food arm of the FDA, has repeatedly failed to take timely action on a wide range of safety and health issues the agency has been aware of for several years, including dangerous pathogens found in water used to grow produce and heavy metal contamination

in baby foods. The agency has been slow to acknowledge numerous other chemicals of concern, including PFAS, so-called forever chemicals, which can be found in the food supply and are used in food packaging" (Crunnden & Wittenberg, 2022; Evich, 2022). Does the political food economy consider us fools? Is this what "trust" means? Consider these questions as a part of this discussion to integrate yourself into the conversation of what defines our food systems.

Going back to traceability, the lack of awareness and media collectives on government inefficiencies is a call to action to begin to take proactive decisions in cities, to inspire those structurally designed to ensure our safety that residents are willing to put in the work to protect their homes and their communities, a pact of agreement to levy responsibility with truth of action, no blinds, no hidden procedures in existing industrialized food systems or over-reliance on monoculture, climate-insensitive methods, and the neglect of local agricultural knowledge (Ambia, 2020).

My paper aims to promote local agricultural knowledge on a city level to support and regulate cleaner diets and establish safer, healthier living for all. This will be conveyed by proposing a sustainable urban model rooted in the value of creating a sustenance-based lifestyle that prioritizes food security and access to fresh produce.

Now, to move forward with formulating my narrative, I will draw heavily on the styles of Octavia Butler and Rachel Carson, both of whom mastered the art of "poetic science"-an approach that intertwines rigorous scientific insight with the evocative power of storytelling. Butler's speculative fiction offers a framework for envisioning alternate realities, while Carson's narrative nonfiction, such as *Silent Spring*, merges scientific clarity with a sense of urgency and emotional



resonance (Carson, 2000). Their methods will guide my attempt to create an informative story, one that educates and engages readers to look beyond established systems.

In the context of food justice and urban planning, I aim to weave together facts and historical insights with lived experiences of individuals impacted by systemic food inequality. Like Butler, I will use narrative characterization to exhibit a future city- a place where food deserts are eliminated, and communities reclaim their food systems. Imagining a future that helps highlight the existing failures of the present world order while also offering actionable alternatives. Butler's use of speculative scenarios and complex social structures provides a compelling lens to critically engage with our current systems, questioning assumptions, and challenging power imbalances within urban food landscapes. Carson's approach to environmental advocacy will also be central to this narrative. In *Silent Spring*, she highlights the often overlooked impact of pesticides on ecosystems, showing how these chemicals permeate everyday life. I intend to adopt a similar strategy by highlighting how corporate and governmental decisions in food production discreetly deteriorate public health. By taking readers through both personal stories and broader policy implications, I hope to create an interconnected network of ideas that will resonate with readers on both an intellectual and emotional level. This is the power of poetic science- it allows for the creation of a narrative that not only educates but also moves people toward a deeper understanding of the interconnectedness of social, environmental, and political systems. An important aspect of this storytelling approach is that it guarantees that the voices and experiences of those most affected by food injustices are heard and valued, and it allows these individuals to share their stories. Butler

places marginalized voices at the forefront of her stories and often centers them in her narratives. My narrative will offer space for grassroots activism and community-driven solutions while it critiques top-down structures of power. I want to encourage those facing marginalization to lead the conversation about food justice because they are often the populations silenced and cornered by systemic issues. The stories and perspectives I will be creating follow an all-embracing and all-encompassing view of food systems that form the backbone of my narrative.

The beauty of merging these two narrative styles elicits urgency while instilling hope. Carson shows us the pressing damage inflicted on the environment but also urges us to act before it's too late. Similarly, Butler evokes the same feeling by imagining dystopias where resistance and survival guide their resurgence. My narrative will balance these tensions, using storytelling to illuminate the current crisis in food systems while providing pathways for change. Whether it is reimagining urban planning, holding corporations accountable, or empowering communities to reclaim food sovereignty, the story will explore these themes through both factual evidence and creative imagination.

The consonance of Octavia Butler's speculative imagination and Rachel Carson's passionate scientific plea are the foundational inspirations behind my story-building process. Highlighting a poetic science lens, I hope to reproduce an informative narrative that embodies urgency, immersing readers in an equitable food system that takes shape in a post-modernist sustainable city.

In discussion of literary works, another piece that highlights social activism that has served as an inspiration to my storytelling approach is "Flight Behavior", by Barbara Kingsolver.

Her work vividly uses characters' struggles and realizations to portray a message of how biodiversity and human behavior share a codependent relationship, grounded in environmental science and ethics (Kingsolver, 2012). She attempts to bring out the inner responsibility of all humans to tend to nature as anthropogenic sources deteriorate its beauty. Another key mention is Octavia Butler's "Parable of the Sower", I

mention this exact novel because although her writing style as an author has brought me formal inspiration, this text focuses on theory building and the use of personal anecdotes to deliver a broader structure of influence to the reader (Butler, 1993). It is intricate in the build-up and delivers a profound impact to not only existing literature but research pertaining to future history approaches.



Methodology

I aim to investigate the relationship between consumer awareness and the practices that occur behind the scenes in large-scale food production systems. Most specifically how shelved products lack ingredient transparency and traceability contributing to food injustice. This practice alone is something I am also studying from an ethnographic and epistemological perspective to draw attention to the decision-making process and underlying trust consumers place when purchasing goods. To build onto this meta-analysis, I plan to utilize archival research and discussion to further question how corporate hegemony has displaced the richness and value of whole and locally grown produce. With this emphasis in mind, I plan to reflect my research intentions by taking a storytelling approach through a personally shaped story to better communicate these intricacies in a relatable manner.

The epistemological focus of my study is to uncover the nature in which individuals digest and gain knowledge of their food sources, and how they come to discern certain products from others whether it is by reason through experience or authoritative persuasion by institutional ethics. In the bigger picture how common knowledge is at its core an accumulation of generational perceptions compounded; and how knowledge by acquaintance and knowledge of description form a duality in the processing of information to what we know as "communal knowledge" (Russell, 1910). The goal is to reintroduce a trend, instilling pressure on the nature in which food is cultivated, produced, and handled in a way that is closest to the original works of our ancestors, with innovation and industrialization in mind this means clean ingredients, fewer additives, artificials, and preservatives, and the elimination of hidden practices to deceive consumer attention. Food is not a toy, let's not market it in that

way. Food is a necessity and an essential and should be a priority to keep not only “safe” but clear from all types of manufacturing junk.

I aim to uncover the ways in which consumers are distanced from the origins of their food and the ethical implications of their purchasing decisions. This connects directly to my research, as I am investigating how the lack of transparency and traceability in food products affects consumer trust and decision-making, and how these hidden practices reinforce corporate hegemony over local and whole food systems.

This approach follows critical epistemology, as I am not only questioning the dominant knowledge systems but also aiming to deconstruct them through ethnographic research, archival work, and storytelling. By exploring the power dynamics that underpin corporate decision-making and consumer trust, I seek to provide a more holistic understanding of food justice and advocate for greater transparency and sustainability in food networks. My work aims to challenge the current epistemic framework by highlighting how small local initiatives can shift the paradigm with the start of grassroots initiatives grounded in localized unity and engagement in sustainable efforts.

Rewind: Imagine walking into a grocery store, grabbing a product off the shelf- do you really stop and ask yourself where it came from, or do you trust the label, assuming it’s safe and healthy? My goal is to question that trust. How do the gaps in ingredient transparency and traceability impact our choices? How does corporate power over food production create a system where consumers are often left in the dark about what they are eating?

So far, I’ve been diving into reports and documents that expose the underlying structures of corporate food systems,

focusing on the regulatory loopholes and how they contribute to inequality. By examining these sources, I’m beginning to piece together how big corporations have slowly distanced us from the origins of our food, undermining the value of whole and locally grown produce.

In addition to reviewing academic journals, I will also apply ethnographic methods such as interviews and observations or what I will formally refer to as “community conversations”, as a collective discussion of what I see and gather. The observations include a small study sample of grocery store shoppers at a local supermarket and how people pick a product and read the label. The study will cover how the designated shopper in the aisle has interacted with the product (testing to see if they read the label, “yes or no”). The point of this study is to randomly survey consumer choices and food selection to further understand the culture in which our food networks thrive.

I will also be including dialogue of a podcast within the storytelling which will reveal real-life discussions from select community members, farmers, and health professionals. I aim to uncover real, personal stories that illustrate these broader systemic issues. Who benefits from this system, and who is left behind? My interviews will be grounded in the experiences of people who engage directly with local food systems and those who care about transparency and sustainability. These stories will help build a narrative-driven analysis that connects the dots between corporate hegemony, consumer trust, and food injustice.

I will adopt an epistemological approach towards my study analysis, so I can explore how people gain knowledge of their food sources. Do they rely on trusting what institutions tell them, ethnic traditions, or first-hand experience? I will actively explore



how both generational experiences and institutional narratives shape consumers' interpretations of food while drawing from Bertrand Russell's concepts of "knowledge by acquaintance" and "knowledge by description". Essentially understanding how this influences their ethical compass on product choices, and how they perceive these products to be affecting their overall health and consumption habits.

Through archival research, I will also look at the historical roots of corporate control over food production and the power dynamics between corporations and consumers. The ethnographic analysis mentioned above will shed light on how these dynamics erode consumer trust and reinforce food injustice.



My goal is to challenge the current systems of knowledge that support corporate control and advocate for alternatives like local sustainable food networks that are transparent, ethical, and community-centered. This research aims to reintroduce a

focus on clean ingredients and push back against the hidden practices that mislead consumers.

Regarding the composition of my narrative, my writing style will reflect a blend of Octavia Butler's speculative imagination and Rachel Carson's compelling scientific advocacy. By emphasizing Butler's ability to depict alternate futures, I will explore new possibilities for the current food social structure. Meanwhile, Carson's dedication to advocacy will guide my analytical depth in addressing the hidden practices within current food production networks. This interplay will allow me to not only expose systemic issues but also depict a vivid picture of a prosperous, just, and equitable food system.

Through what I call "poetic science," I aim to create a story that informs, resonates, and inspires action by connecting readers with the complexities of our food networks in a relatable, emotionally compelling way. My research will culminate in a fictional city plan of a sustainable future- an innovative and self-sufficient urban landscape where food production is transparent, local, and rooted in community engagement. Serving as a blueprint, this fictional city will set an example for how to reimagine food grown, distributed, and consumed in a manner that prioritizes environmental sustainability and justice. Through a combination of imaginative vision and grounded scientific advocacy, I hope to offer readers a hopeful and tangible model of a reimagined future of food justice.



Results and Discussion

In the process of storytelling, I have formed a concise way to engage readers to think interdisciplinary in the way cities are built and to place importance on simple action, and by that I mean the power of the individual and their voice. The story explains how even if the current systemic structure does not appear to be malleable, it indeed can take form through the rise of multiple individual efforts who truly care about their future and their community. Community is not bound to the names of the city borders but the strength of the people living in it.

In collecting the voices for my story and the inspiration behind the anecdotes, I have engaged in conversations with neighbors, grocery store managers, customers, the average city resident, teachers, mothers, and parents that exist in my network. The collective dialogue was formed by in-person interviews at coffee shops, phone calls- past business hours, and casual dinner conversations with family and friends who make up this population. These community conversations followed a critical constructivist conception of interviewing. I did this because it sees interviews as a conversation where both the interviewer and the interviewee create meaning together. Instead of trying to get a fixed "truth," this approach treats interview data as a way of understanding how people make sense of their experiences in a specific context. It feels more authentic and dynamic, especially when exploring complex topics or people's life

stories. The knowledge that allowed for my creative thinking is founded on the voice of what I call "the collective", and Amara- a character being the navigator of ideas in my story, encompasses my conversational and ethnographic journey with all the different characters in real-time.

My findings acknowledge that community members are as resilient as we may believe them to be and that their efforts do shine through difficult social circumstances. The overshadow here is that people do struggle to identify the true sources of our food, and most do not bother to place the extra time and care to make distinctions for the betterment of their health in terms of product labeling. I conducted an observational study in a local grocery store to further bring insight into the conversations and dialogue we have with our food. My observations revealed that while some shoppers make health-conscious decisions by closely reading labels, many rely on habit, convenience, or familiarity when selecting products. The few who took the time to read and compare labels likely have specific dietary needs or are more invested in making informed, health-conscious choices. However, for most shoppers, the packaging design, brand recognition, and price matter more than the detailed ingredients or nutritional content. It suggests a divide between those who prioritize quick decision-making in a familiar retail environment and those who consciously navigate the growing complexity

of food choices with a focus on their personal health goals.

A few lingering questions came to mind while observing and collecting data from participants in my study and interviews. I began to question the essence of structural organization and how to encourage a specific agenda in existing frameworks. It is all narrowed down to the power of the individual, to take a stance and form a collective. Small businesses have the chance to compete with large monopolies for their authenticity and quality, something that will always last in the market. If people begin to shift attention to authenticity and access to these goods, the existing structure and social hierarchy will shift. The core takeaway from this paper is that, if individuals begin to abandon normative societal “comforts”- shopping at grocery stores, trusting the established system, and placing trust in their fellow neighbors, peers, and friends, a powerful network can be created, a responsibility that rests in the hands of the people. For example, the responsibility to have fresh fruit exchanges, voluntary garden tenders, bakers and cooks are all roles that one individual in the population finds to be a valued hobby, and with that comes communication and time, but with proper outreach, a strong coalition can be created. Many people forget that certain tasks can minimize burden if they are shared and distributed.

In one of my interviews, an individual mentioned the ethical issues with trust and responsibility. By this, they meant what if few people put in the effort and still maximize outputs, while those that care and tend to the project just benefit evenly, will that be fair? There is always a need for a civilized structure, that is not forgotten, when people take the time to tend to a garden for example, the output shows and there will be plenty to go around. Those who do not give

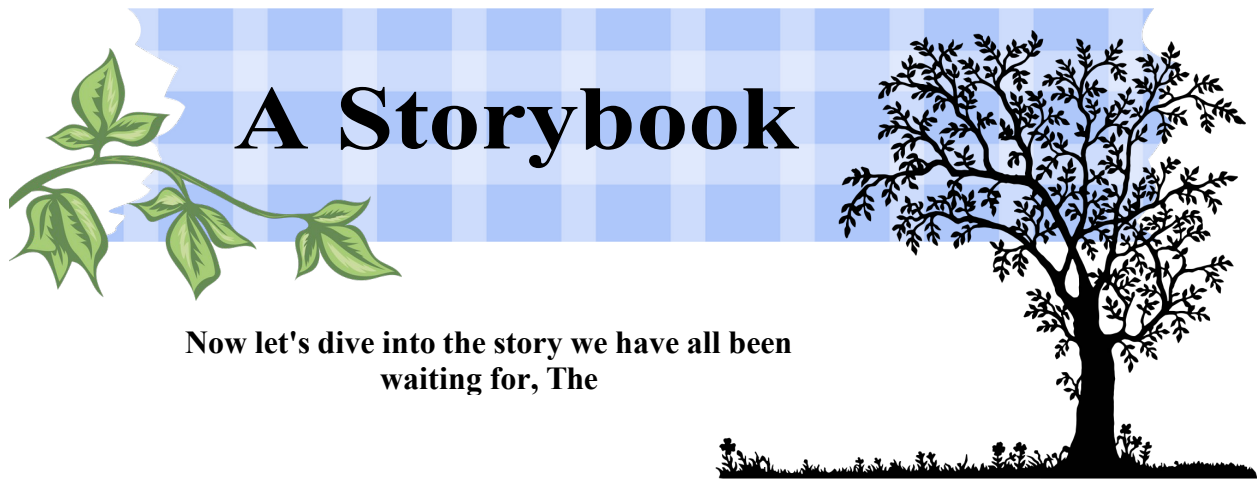
in action will repay in other forms, this is not only a fruit or vegetable garden, but a cultivation of humanity as well, the more it is nurtured the fewer ethical dilemmas, as kindness and virtue overcome acts of corruption and greed.

Drawing on emotional and character development, I wanted to take a minute to address the story behind the characters' role and their true purpose, and how that relates to my overarching theme and theoretical underpinnings.

This paper is theoretically grounded in the dynamic interplay of agency, power, and systemic inequities within food systems, brought to life through a diverse cast of characters whose lived experiences spotlight the critical tension between corporate control and grassroots initiatives. By analyzing Maya's Awakening as not only a consumer but a teacher, her efforts and realization foreshadow a world where student-led conversations and visions can become reality through the proper mentorship and support, a world where students don't just sit behind a desk but feel inspired to make a difference and produce a change in their local environments. Maya sets an image for all teachers to follow in their responsibility of nurturing the knowledge of the future in ways that are not just bound to the classroom. Another main character is Carlos, his role as a farmer is to showcase how those enriched with traditional knowledge can begin to share their stories, in this case- how nature provides for us, to instill a sense of connection with our food and the collaborative works that bring produce to our tables. Another character, Ravi, exemplifies local shop owners and the stressful barriers they face with consumer competition in a world of established habits, he is a model for curiosity to encourage shop owners to create events to provide communities with opportunities to discover new sources and interests.

A few other characters behind the scenes include Dr. Kim and Selena, who are inner network characters that portray individuals directly working for the system to wake up and take a call to action about what could be done better for the health of the people and to share the truth behind unethical corporate practices to push for equity and encourage change from within a corrupted network. To sum up the inspiring cast, Amara is the

overarching voice, the activist who puts together a grassroots movement from simply speaking words of inspiration into a podcast to rally a group of passionate and committed individuals to form resilience in a small urban city. A voice that serves to connect with readers to be their own mentor throughout the story, to enrich, inspire, and instill action for a systemic revolution fought with a few seeds of change.



Now let's dive into the story we have all been waiting for, The

In the quiet town of Greenfield, a place where life moved at a slower pace and people kept to themselves, Maya was known as the teacher who brought learning to life beyond the classroom walls. This small suburb, tucked away from the city's hustle and the relentless traffic, was a place where people cherished both their rural roots and their modern conveniences.

One Sunday morning, as the sun cast a warm glow over her neighborhood, Maya's phone rang. "Hello, is this Maya?" came a voice on the other end. "Yes," she replied, her tone bright with curiosity. The man introduced himself as a representative from the Greenfield School District. "We'd love for you to join a liaison of teachers at an upcoming conference," he said, "to speak about your community-driven student projects. You've

become quite the 'golden teacher' for inspiring students to get involved beyond the classroom."

Maya chuckled. "Well, sounds like this opportunity picked me! How could I say no?" She accepted the offer, and with a smile, jotted down the conference details as she listened to him outline the event. Once the call ended, she remembered she had guests arriving later that day. Her pickleball team was coming over for a cocktail party, and she had a long list of appetizers to prepare. She grabbed her keys and purse, heading off to the closest grocery store.

In the deli aisle, she paused in front of the cured meats section, her eyes scanning the bewildering array of options: honey-cured, smoked, fat-free, extra spicy. The list went on. She opened the fridge door and reached

for a package, then hesitated, flipping it over to read the label. What should have been a simple list of ingredients left her puzzled: artificial colors and flavors (red 40), sodium nitrate, sodium nitrite, high-fructose corn syrup, BHA/BHT, etc. She'd grown up with her grandmother's simple homemade recipes, and now, here was a package of what appeared to be all but real meat, something more along the lines of an imitation. Placing the package back on the shelf, she settled for the least complicated option and continued shopping, yet something stayed with her- a nagging curiosity about what was really in the food she bought.

Later that evening, after her friends had left and she finally had a moment to herself, Maya kicked off her shoes and sank onto the couch. As she mindlessly scrolled through her phone, a bright green ad caught her eye: "The Knowledge of the Fruit Tree - Podcast streaming live!" With a curious tap, she found herself listening to Amara, a passionate voice dissecting food justice, transparency, and the corporate food system's hidden layers.

Amara's Podcast - First Monologue

Scene: After Maya's realization in the grocery store. As Maya sits down that evening, lost in thought, she taps on the play button of Amara's podcast, and a voice both gentle and impassioned fills the room.

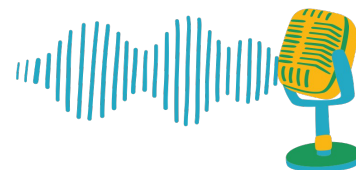
"Welcome back, seekers of truth. Today, we dive into a world carefully designed to keep us complacent, far from the roots of what we consume. Have you ever read the back of a food label and wondered why the simplest foods are anything but simple? I've asked this myself countless times. But here's the thing: our food isn't just about sustenance- it's about control, trust, and ultimately, power. We'll break down these barriers, and peel

back each layer until we understand exactly who's shaping what ends up on our tables. Knowledge of the Fruit Tree is here to arm you with the truth, let's reclaim what we've lost."

Amara's Labeling Insights:

Here is a deep dive into something that has been stuck in my head lately -Nitrites; Nitrates; BHT; Red 40 etc. You should have heard of them by now, but what are they really doing to your body?

Now, there are nitrites and nitrates, which you may have heard about in cured meats such as bacon, sausages, and deli meats. These preservatives allow food to appear new, however, when subjected to higher temperatures-such as if you prepare them-they can produce something called nitrosamines. And believe me, this is a terrible thing. Nonsense, think again: nitrosamines are carcinogenic, which means they can cause cancer. That's pretty scary, right? Although there are methods to delay this reaction, such as incorporating vitamin C or specific antioxidants into your meal (to a limited extent), the danger is nevertheless present (American Institute for Cancer Research). Then out comes BHT- Butylated Hydroxytoluene. This is the chemical that preserves food, but it has also been associated with liver and kidney damage. Research indicates, though, that high doses of BHT taken persistently may have a relation to the formation of some cancers (National Institutes of Health). And finally, Red 40: this one is probably one of the most popular artificial colorings. It does beautify our delicacies, but it has been known to cause hyperactivity among kids and some allergies.



The catch is this: there's never been solid proof that it is entirely safe at the levels we consume. So why take the chance? (Food and Drug Administration).

And I'm not saying to push the panic button, but we really need to start paying more attention to what ends up in our food. Today's issues are tomorrow's concern, and you deserve the truth about what makes us healthy or sick. The next time you are about to grab that fancy processed snack or deli meat, turn over the package first. Your body will thank you."

A shiver of recognition and a spark of urgency runs through Maya as Amara's words hang heavy in the air. She has never looked at food this way - but now it's like a curtain has been lifted.

Maya's heart raced as Amara spoke; this completed the nagging questions she had felt all that day, maybe her entire life. After attentively listening to Amara, Maya was buzzing with thoughts by the time she finished watching the final episode of Season 1.

Maya's Awakening

That very night marked a turning point, a "lightbulb moment" for Maya. She made it her mission to always provide and care for her students' well-being, she had no choice other than to incorporate what she had learned into her learning modules to share what she had taken away from Amara's wisdom. By Monday morning, she was already working on a plan. Maya wanted her students to not just learn about food but to experience it to understand where it came from and why it mattered. Her exact thoughts and ideas were directed to that of a local farmer's market and the possibilities of starting a community garden, maybe even fruit tree boulevards lining the streets and avenues of the neighborhood. A

transformative vision, one where her students could take part in something much bigger than a lesson plan, something that fulfills a communal responsibility and allows them to personally connect with nature for years to come as they admire the fruit tree they once planted.

Meeting Carlos, the Local Farmer

Maya's thoughts took her to Greenfield's farmer's market, where booths filled a large lot of fresh produce with so many new faces, one of which she met by the name of Carlos, a local farmer with a genuine smile and marked hands aged by years of working the earth. After many concurrent visits, they conversed about his struggles against big supermarket prices and the ever-growing difficulties of price competition and market demand not only faced by himself but by other farmers as well. Carlos, fascinated by Maya's peaking interest, shadowed the works of a mentor, teaching her about organic farming, crop cycles, and sustainable practices that held principles in nurturing the land while also respecting it.

As Maya spoke to Carlos at his farmer's market stand, he shared valuable insights about his work. "A farmer's job is not just about growing the food; it's about creating and maintaining soil health," he explained, smiling as he handed her a bunch of freshly picked carrots. Carlos shared one of his "secrets" with her, saying, "Crop rotation is one of the simplest yet most effective ways to keep soil healthy. By alternating where I plant certain vegetables around designated times of the year, my efforts assist in regenerating this lovely soil full of nutrients."

In a separate week, as they roamed past the collection of flowers he'd planted along his fields, he added, "And these flowers? Their beauty is not simply for the human eye, the vast colors and natural scents attract pollinators like bees that help them to

flourish. These flowers are as much a part of the ecosystem as the veggies themselves.” Each one of Carlos’s tips added a new realization to Maya’s understanding, revealing to her how interconnected the world of farming truly was. Maya found herself to be inspired and determined by these insights. Accompanying Carlos’s guidance, she planned to start a school garden, where her students could experience the endless wonders of growing their own food.

Amara's Podcast - Second Monologue

Scene: After meeting Carlos at the farmer’s market and beginning to learn about local farming.

In her kitchen, preparing a meal with fresh produce from Carlos’s stand, Maya clicks on a new episode. Amara’s voice, with every ounce of purpose, fills the quiet of the evening.

“Local farmers are the silent rebels of our food landscape. In every seed planted, every crop harvested, they resist a system that’s rigged against them. Our supermarkets provide comfort in supply and accessibility, yes, but it’s the Carloses of this world who offer truth. When we buy from a farmer, we’re not simply buying food, we’re investing in a story that cares about the soil, the earth, and the people behind each bite. So next time you visit that local market, pause. Listen to their stories. This, friends, is where real knowledge blooms.”

As Maya listens, she recalls Carlos’s calloused hands, his easy laughter, and his passion for each vegetable he tended. Amara’s words attach themselves to a very vulnerable space in Maya’s heart, and she feels her resolve deepen. No longer can she consider herself just an observer; she’s part of this movement. Amara’s Reflections on the Power of Food Systems

“Fun Fact! Did you know? During World War II, people planted victory gardens, growing their own vegetables as a way to self-sustain in a declining economy and food shortage. Communities back then rallied together in unity to ensure everyone had access to fresh produce, and that every family had equal rations to survive crucial periods. Presently, we need a new kind of ‘victory garden’, one that challenges the corporate food system and is not driven by profit over quality. In other words, when a seed is planted, we are not just growing food; we are cultivating resilience.”

Dr. Kim’s Perspective

Her network grew when she met Dr. Kim, a former R&D scientist from the corporate food industry. Disillusioned by the hidden additives and deceptive marketing she’d helped create, Dr. Kim now advocated for ingredient transparency and consumer education. She joined Maya and Carlos in teaching the students how to read food labels and understand the science behind clean ingredients. Together, they organized workshops that inspired students and parents alike to question the food on their plates.

Insights on Food Systems in Amara’s Monologues

In another episode, Amara shared a little-known history lesson: “Imagine a time when local markets were the only place people could find food. Supermarkets didn’t become popular until the 20th century when convenience began to replace community.” Her voice carried a sense of nostalgia for that era when people knew the farmers who grew their food and the bakers who made their bread. She continued, “As time passed, these local food systems faded, replaced by shelves full of mass-produced items. But here’s the thing: we can bring back some of that lost connection. Supporting farmers markets, community gardens, and local grocers like



Ravi keeps that spirit alive.” Ravi, the Ethical Grocer

Greenfield’s only independent grocery store was run by Ravi, a grocer who sourced his products locally and ethically, a rare and valuable gem amidst the competition from larger chains. Ravi warmly invited Maya, Carlos, and Dr. Kim to host workshops in his store, where the community could gather to discuss food systems and sustainability. Maya saw how Ravi’s dedication to supporting local farmers created a different kind of supermarket, one where community and quality were valued over sheer profit.

Selena’s Dilemma

Their work soon caught the attention of Selena, a marketing executive at a major food corporation. At first, she dismissed their efforts as the idealistic pursuits of a small-town crowd. However, after attending one of their workshops and witnessing students talking passionately about their garden projects, Selena found herself at a crossroads. Her job involved marketing products as “natural” despite the reality of hidden ingredients. Could she continue to promote something she no longer believed in? Her internal conflict grew, and soon Selena would face a choice to be part of the problem or part of the solution.

Amara, the Voice of the Movement

A force so magnetic: Amara’s sagacity became the incentive for Maya’s awakening, one that also inspired the community and its people to come together and work towards a revolutionary future. Uniting consumers, local farmers, and schools, Amara led food justice initiatives to inspire a connection with the origins of our food and the very earth it sprouts from. Amara’s podcast “Knowledge of the Fruit Tree,” featuring personal stories from people like Carlos, Dr. Kim, and Ravi, educated students about the importance of

sustainable food practices that cultivated a sharing ground of knowledge- drawing attention to the value of these experiences.

With each continuing episode, Amara’s voice was made louder, and not only in Greenfield but cities and networks beyond became inspired to unite in the fight for a fairer and healthier food system.

Community Gardens & Fruit Tree Boulevards Maya’s students embraced the mission, transforming the school grounds with gardens and fruit tree boulevards. Carlos guided them in planting, while Dr. Kim explained the science of soil health and sustainable farming. The trees and gardens became a symbol of hope, a visible reminder of their commitment to change.

Food Waste and Compost Project

Driven to reduce food waste, Maya and her team approached the local supermarket chain with a bold proposal: to turn unsold produce into compost for community gardens. At first, the executives resisted, but with community pressure mounting, they agreed to support the initiative. Maya’s students took the lead, creating a compost program that taught residents about sustainability and completed the cycle of farm-to-table and back to the earth.

Amara's Podcast - Final Monologue

Scene: Before the town hall meeting, as Maya prepares to speak.

The night before the town hall, Maya listens to Amara’s latest episode, finding strength in her words.

“This is where change begins not in corporate boardrooms, but in the places where we gather, share, and dream. You, listeners, are the roots of this movement. Stand tall, speak the truth, and remember that knowledge isn’t a luxury. It’s a seed, waiting to take root in



the hearts of those brave enough to listen. Go out there and plant it.”

Amara’s words steady her, filling her with purpose.

The Climax - A Community Push for Change
During the time when a new marketing scandal surfaced from Selena’s company, the community became distraught. With Amara at the helm, they rallied at a town hall, calling for transparency, support for local farmers, and ethical food practices. Maya’s speech that night captured her very essence, from a questioning consumer who grew into a passionate advocate. As the room resonated and erupted in applause for the town’s unification of the cause.

Resolution - Building a Sustainable Future
Greenfield’s transformation became a model of sustainable living. Ravi’s store thrived, selling produce directly from farmers like Carlos, while the local supermarket expanded its compost initiative.

The town’s food network brought everyone closer to the land and each

other, creating a vision of a sustainable future that reached far beyond Greenfield.

In her final podcast episode, Amara celebrated the journey and invited listeners to carry on the work in their own communities. As Maya looked over the fruit tree boulevards with her students, she knew they’d planted something that would grow for generations to come.

Final Thoughts

Knowledge of the Fruit Tree stands as a story of awakening, resilience, and hope. Through Maya, Carlos, Dr. Kim, Ravi, Selena, and Amara, it reminds us that change is possible when communities come together, sparking the minds of young readers to imagine a world where food systems are just, sustainable, and deeply rooted in respect for the earth.



Summary

In the exploration of existing literature, I found that food systems are shaped by political structures, corporate control, and social behavior that often go unquestioned. My paper actively centers on the idea that storytelling can offer new ways to understand these systems and that fictional counter-narratives can critique them effectively. The concept of "poetic science" intrigued me because writers like Octavia Butler and Rachel Carson use storytelling to inform and evoke an emotional connection with their readers. This approach leads me to consider how we digest information about our food literally and metaphorically. While analyzing existing research, I discovered that much of the literature narrows down to alarming trends in public health and draws attention to the concerning increase in digestive disorders linked to modern agricultural practices. There is a gap in how communities most affected by food insecurity and injustice discuss these issues, and this gap affects everyday understanding. I questioned how we can present these complicated topics in ways that are accessible and engaging especially including those who are often excluded from the conversation. Through this review, I also delved into the role of urban planning in shaping food access, discovering that while there's significant research on optimizing city layouts for health, there's little emphasis on how storytelling could influence these designs. This gap became central to my research, as I started to imagine how a fictional narrative could help bridge the disconnect between food justice, urban design, and sustainability. My paper establishes that while there are plenty of facts, figures, and policies about food systems, a way to humanize these discussions is the missing piece to the puzzle.



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Thank you!

Exploration of Transformative Approaches to Cultures of Food Systems in Apartment Communities

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ABSTRACT

Currently, our food system exists in a state of disproportionate challenges for those living within it. Aspects such as food waste and food insecurity unequally impact those who are typically the least likely to be heard. Solutions which aim to resolve these issues are aimed toward helping the majority, but what about those who are left behind? Food systems as it relates to a person's culture and background are vital to understand solutions which aim to identify assets as well as inspire change. A justice framework is essential to amplifying the voices of those who are least likely to be heard. Critical pedagogy is one such framework which was designed to place learners and teachers at the same level, allowing for the exchange of ideas and generation of appropriate themes. With the intention of extending this application to residents of apartment complexes in San Diego, California, this paper describes a transformative approach to studying people's food system culture.

San Diego's Food System, Food Culture, and How we Got Here

Today's food system is well-represented through culture, something in which an individual can belong to many. When we investigate a group of people sharing some set of similar qualities or features, we can find many of the assets which support their success. Similarly, we can look at systems with respect to the culture within it, more specifically, a person's food culture ([Mingay et al., 2021](#)). I want to talk about food systems here, specifically those within apartment communities, and the cultures which are embedded within them. Many approaches have looked toward best practices and slapping on interventions which aim to aid the majority of people.

While these are often successful, it leaves the potential for discovering interventions which might otherwise be missed that could have left

a significant impression upon the community/culture it intends to serve. How can we more transformatively approach the culture of food systems in apartment communities?

The food system in the United States is fraught with issues that contribute toward environmental unsustainability, poor health because of disparate access to healthy foods, and a culture which supports it. Food waste occurs across every point within the food cycle but is disproportionately wasted within households ([Dúran-Sandoval et al., 2021](#)). This food is otherwise safe to eat but is tossed into the garbage for a variety of reasons. Food waste in landfills contributes to methane production ([Qin & Horvath, 2022](#)), not to mention the wasted resources needing to produce the food in the first place. And while enough food is produced to feed everyone, many families remain food insecure in San

Diego and across the country ([San Diego Foundation, 2022](#)). Addressing food security through looking at it through a systems lens can achieve positive results beyond food security, and come to include other important aspects of it, such as food waste and other sustainability concerns ([Oostindie et al., 2016](#)).

San Diego, California's local government has instituted programs to reduce food waste in single households ([The City of San Diego, 2024](#)). However, the city is composed of many multi family housing communities, such as apartment complexes, which are not included in such programs. Here we have an open opportunity to improve the food system within these communities to make a meaningful impact within a concentrated space. From the researchers' perspective, it provides an excellent challenge for implementing methods aimed at serving a large group of people who share many common qualities, but simultaneously are connected through physical space and living accommodation without necessarily sharing commonalities beyond that.

Apartment communities provide a unique setting in which to apply interventions to reduce our impact upon the food system and improve the health of those who may be having trouble gaining access to safe, healthy food. Being that these communities have a higher concentration of households and shared amenities, there are ample opportunities to make a substantial impact. Here, we can see opportunities for changes to infrastructure, improvement of perceptions, and improved cultural connections to attain and maintain sustainable, prosocial behavior.

Many ways of intervening, however, look at change-making through a lens of tackling issues and often leave out the assets and positive qualities that compose various communities. Applying interventions that are

based upon a set of best practices is not guaranteed to help each individual community, challenging the idea that one size fits all. Bringing in the people who make up the community, such as through focus groups ([Nagle & Williams, n.d.](#)) is incredibly important for these big change projects. Giving people a voice for what they see as potential for their community can yield incredible results while maintaining, and potentially strengthening, their shared culture. In a broad sense, this project challenges dominant methods and narratives for uncovering solutions within systems and the cultures which are found within them.

To find the solutions we hope will create lasting change, it is important how we come upon them. As a researcher, you are given a special toolset with which to assess needs in a variety of ways that are appropriate for the given recipients. But the recipients also play a crucial role in developing solutions. Who better to gain valuable information and ideas from than those who you intend to serve? This project challenges dominant narratives about discovering methods for approaching system-level topics and intends to uncover and apply methods for transformatively approaching culture food systems within apartment communities.

The following sections of this paper highlight the methodology that inspired it and shaped a school of thought through its framework, along with specific methods. It dives into the background of that methodology to enhance the reader's understanding of how the author came upon these methods. Next, it will describe, through a storytelling approach, how the author executed the project. Then it describes results of the author's work while blending her discussion points throughout. Finally, this paper ends with future research opportunities the author intends to continue well after the time this paper is written.

LITERATURE REVIEW

The United States wastes more food per capita than almost any other country ([LeBlanc, 2019](#)) for a variety of reasons. Approximately 30 percent of perfectly safe for consumption is wasted ([Environmental Protection Agency, 2024](#)). For many, food is waste due to a lack of knowledge about expiration dates, proper food storage techniques, buying in too large a bulk to be able to consume everything, failure to donate viable food to food banks, and changing individual standards about what produce should look like, to name a few. Wasted food is brought to landfills where it decomposes among masses of other types of refuse. Rather than the organic process of composting, which returns nutrients from decomposing food into the soil, food waste improperly decomposes, furthering the effects of climate change.

When food is wasted, it is transported to landfills and accounts for the most common item present ([Jaglo et al., 2021](#)). At those landfills, the food then decomposes and is converted into greenhouse gas and methane ([Ishangulyyev et al., 2019](#)). Each year, food waste produces approximately 170 million metric tons of greenhouse gasses ([Jaglo et al., 2021](#)). Food waste decomposes at a higher rate than other items in a landfill, and the methane it produces contributes to global warming 25 times more than carbon dioxide ([Ishangulyyev et al., 2019](#)). Reduction in food waste by consumers would result in a decrease in food in landfills, and thus, a decrease in greenhouse gas emissions and methane production by those foods ([Cattaneo et al., 2021](#)).

Food insecurity is another substantial issue within the United States food system. Food insecurity is defined as the limited regular access “to enough safe and nutritious food for normal growth and development in an active and healthy life” ([FAO, 2024](#)). While we

produce enough food to feed everyone, one in seven people are food insecure ([Live Well San Diego Food System Initiative, n.d.](#)). Much of the food wasted has the potential for feeding households experiencing food insecurity ([USDA, n.d.](#)). According to Ishangulyyev and colleagues (2019), reducing food waste by 15 percent would feed all of those who are experiencing food insecurity, although these results also include food loss within the food production life cycle. The food that otherwise would have been wasted can be donated to those who need it, which not only prevents the food from contributing to GHG and methane, but also has the potential for decreasing food insecurity. Several factors play into the likelihood a person will face food insecurity, ranging from racial demographics, economic background, gender, with the strongest indicators being single mothers and communities of color. Very often, these communities live in what are known as ‘food deserts,’ areas where grocery stores are outside a one-mile radius in urban areas, and ten miles in rural ones ([Brace, Moore, and Matthews, 2020](#)). Someone facing food insecurity may not have adequate transportation to maintain access to healthy, nutritionally adequate food.

Many solutions aimed at systemic issues are often brought forth through looking at what others have done. While this can be effective for communities with shared qualities, they can miss the individual experience by focusing on what has been most effective for the majority. Best practices are usually those solutions which have been demonstrated as effective in these situations.

For food waste, entities such as the U.S. Department of Agriculture and the Environmental Protection Agency publish a set of best practices, such as preventive practices such as planning out shopping trips, proper storage of goods once it is home, and

using viable parts of produce if a portion of it is damaged ([EPA, 2023](#)). These recommendations place responsibility on the consumer to engage in self-monitoring and regular checking in with the quality of their food to ensure it is consumed before it spoils. Buying fewer groceries to begin with would decrease the chances they would go uneaten but requires careful planning prior to going to a store.

Fruits and vegetables that spoil or go uneaten, such as vegetable scrap that were not used during cooking, can be composted ([EPA, 2023](#)). This diverts the food from going to a landfill and can contribute to creating compost that contribute back into the food life cycle. This replacement constitutes a sustainable use of produce in the vent that households buy too much produce that they cannot finish before spoiling. Food that a household does not intend to or cannot eat before spoiling can be donated to food banks ([EPA, 2023](#)). In San Diego, there are multiple food pantries and donation centers where individuals can drop off food that has not spoiled. These locations then redistribute the food and make it available to those in need.

Most recommendations for reducing HFW rely on individual households to act. There do not appear to be many programs in place which would support these sustainable actions. Food pantries and available composting receptacles support these behaviors, but the rest occurs within the household and require individual action. It is here where a limitation lies. Relying on these best practices can be ineffective and inefficient. It misses the individual's story and unique circumstances, their history, motivations, and many other qualities that are vital for painting a picture of what is happening.

Solutions which aim to adequately serve and identify solutions for the communities they

intend to serve must be brought about through adaptive methods which are derived from influential models and schools of thought which shape their approach. Critical pedagogy ([Freiri, 2005](#)) has built the foundation of participatory action research and challenges the mindset that is prevalent within academic and research approaches by empowering participating individuals by providing opportunities for their voices to be heard. Through this method, participants are guided through a teacher (or in this case, researcher), to take the lead in their own development of understanding for their subject matter. It provides opportunities for research to take paths that the researcher may not have expected or thought of. Rather than researcher approaching the topic with a fully formed idea of how their project will turn out and unintentionally directing the session, such as a focus group ([Nagle & Williams, n.d.](#)), and molding it the way they think it ought to go, they instead approach it as an idea that has not yet fully formed. This leaves room for new directions and new ideas that could otherwise be missed, thereby producing generative themes that can evolve participatory action.

Identifying appropriate solutions within any scenario requires careful observation and adequate knowledge about the subject matter. Employing a range of techniques can help achieve the most useful information to point researchers in the right direction. Through careful research, individualized interventions can be formulated and introduced. Over time, these interventions are closely monitored initially, and any alterations can be made. But research needs to be well informed for it to achieve any meaningful impact. Participatory action research, a cornerstone of critical pedagogy, is an effective way to accomplish just that.

Participatory action research achieves substantial insight into the community with

whom researchers are working by means of employing creative methods which involve active and engaging collaboration with those we are working with ([Dancis et al., 2023](#)). It leads to effective and relevant collective action through engaging, collaborative work. Participatory action research differs from many other forms of research due to its nonlinear process that engages in a cyclical process to tackle the complexity of its subject matter ([Susskind et al., 2018](#)). It has primarily been used in academic settings ([Lykes et al., 2018](#)) but has also reached out toward the justice field ([Center for Justice Innovation, 2023](#)) that works to give communities a voice.

Reflexivity plays a significant role within qualitative research. It is important that researchers understand how their viewpoints shape their research and the way they interpret results. Reflexivity is both a concept as well as a process ([Palaganas et al., 2017](#)). It is a concept in that it is prevalent throughout the inception and undertaking of research by the researcher. This process recognizes that the researcher plays an active role, to differing degrees, of their subject matter. Having a level of consciousness about this phenomenon will bode greatly for any researcher, as it indicates self-awareness about his or her own personal influence upon their work. Reflexivity is also a process. It requires that the researcher reflect upon their own subjectivity that shapes their work, as indicated by many factors, such as their economic and social background, which have come to influence their assumptions and opinions.

Understanding the role of reflexivity in qualitative research has played its part in my understanding of the history researchers bring along to the current research. Autoethnography is a valuable tool that researchers can use prior to enacting their research, to identify qualities within

themselves which are influencing their perspective within their subject matter. It provides opportunity for self-reflection which can uncover the collection of one's experiences, biases, norms, and expectations, that are present throughout their personal and social life ([Adams et al., 2017](#)). This is an exceptional method for not only demonstrating the role of the researcher's experience in the development of projects, but also to provide a chance for the researcher to self-reflect and fill gaps in their research and potentially complement the existing research within their respective subject matter.

METHODOLOGY

Critical pedagogy, as mentioned previously, is a theoretical framework which enables the active voice of those involved in the subject matter, particularly in which those voices historically may not have been taken into consideration. It is a framework in which this project is based around. Critical pedagogy is built upon ethical considerations to ensure the representation of voices through dynamic participation. This project intends to build upon transformative literature and practices which embed ethics to paint a picture of deep understanding of communities, in this case, of the residents in this author's apartment community. Additionally, the intention of utilizing these methodologies detailed below are to add to the existing literature of applications for critical pedagogy as a way of transformatively approaching the subject matter of food systems culture for apartment residents.

Critical pedagogy, therefore, proves to be the primary epistemological approach of this project, and asserts certain methodologies to support its successful implementation. This section will detail those methods as well as tell the story of how the author approached these methods within her project. It leaves open many avenues for future projects and this

as an ongoing collaboration with apartment residents, which are discussed in the final section of this paper.

Community mapping is a community-based participatory research approach which includes the active participation and engagement of people living within the experience of the researchers' area of focus ([Preston City Council, n.d.](#)). It goes beyond the typical physical mapping of a given area and sets out to discover the unique assets and experiences of those involved through a meaningful approach. There is some component of physical mapping involved as well as other visual media to spark a conversation about the given focus. It also sets the stage for finding missing resources and areas of improvement through a lens which supports advocacy for those who are often underrepresented and underserved.

Participants for community mapping should involve those who represent the community well and give a voice that represents all members of the community well. It is important to include people who can give different opinions and insights which form the community. By doing so, this opens the opportunity to support a polyvocal approach to community engagement and research ([Ortega et al., 2023](#)). Polyvocality involves gaining the voices which weave together to represent the ethnographies of those whom we seek to understand, and those stories combine to create a "quilt" of their lived experiences. Through this type of community collaboration, we come out of it with a set of values and voices with which to move forward and create actionable steps toward just communities.

Community mapping also includes an expectation that after a session is made complete, that is not the end of the communication line. There is an expectation of ongoing communication that may give rise

to future and ongoing collaboration and support. This way it avoids inadvertently giving participants a sense of their participation being a one-off experience that could otherwise not lead to any real effect. It is the responsibility of researchers to follow up with these participants and reinforce the relationship moving forward, and potentially build upon a sense of trust and community.

Prior to enacting any meetings with participants, it was important that the author critically analyze her own role within the community, as she is also an active member and resident of the community in which she performed this research. Autoethnography, as detailed in the previous section, allowed the researcher to identify and evaluate her own biases as they are informed through experience, especially given her dual role as both participant and researcher. This allowed her to home in on those qualities, as they are always present, to some extent, in any research. These experiences were used to augment the experience of participants' mixed histories and identities, as well as to adjust the methods used in the research.

Inspiration for analysis in this project was taken from the framework of Freire's *Critical Pedagogy* as well as through works inspired by it, such as [Strand and colleagues \(2003\)](#) and [Kincheloe and colleagues' \(2018\)](#) approaches to understanding this qualitative data, using a non linear, cyclical approach to attempting to gain an understanding of the subject matter as it relates to lived experiences within the context of culture of food systems in apartment communities.

Analyzing results of qualitative research involves critical evaluation of what happened during the "data collection" or exploratory phase. Identifying patterns among, but not limited to, the stories presented, ideas shared, and nuanced information with the intent of building a solid understanding of what

transpired during the research phase provides opportunities to derive impactful and thoughtful conclusions. This project aimed to do just that. Here, it includes the personal experiences of the researcher as she implemented this project, as well as the findings that were derived through teachings with critical pedagogy. The main criteria for analysis was to ensure equal representation of what transpired with participants during the focus groups that would provide an understanding of context for what transpired.

Methods Performed

To better understand her own place within her food culture, personal food system, and her role and experience living in the apartment complex, the author engaged in methods used to conduct autoethnography. Through a blog posted in her school's affiliated blog resource, Omprakash, she critically reflected upon these topics. She gave special focus to her upbringing as it related to her personal food system and how that lent to her status within it. She followed a timeline of events and stopped to reflect on moments and circumstances which were most influential, she thought, in shaping what she feels today is an accurate representation of her current place within these roles. By writing these things in a blog post for her instructors, mentors, and colleagues to see, she was able to build upon the context that would later shape methods used in the project. Additionally, she took the same approach she would later ask her participants to take, by collecting two sets of photos within her community and within her personal life. She used these to supplement her blog post with a visual component that enhanced her description of her own food system and food culture.

The week after the initial blog post with the author's autoethnography, she decided on practicing what a conversation with a community member might look like when it

came time to host a focus group, the primary mode of connection with community members. She contacted one of her neighbors who had lived at the complex for approximately two months at the time of contact. The two came together at the neighbor's apartment after the workday, it was the first time the author had been inside the neighbor's apartment. Usually when she would see her neighbor it was out in the community or passing by on their way to take their dogs out or on the way to or from work. Her giant dog was glued to the author for the entire conversation. The two had good rapport and text regularly for things such as if one had a package outside, or about questions about the community since the neighbor was relatively new.

The two sat down for approximately 30 minutes. The author gained vocal permission to audio record the conversation and took notes to record key points made during this time. The author came with a set of prepared questions to help navigate the conversation if necessary. The main objective was to create a dialogue about the participant's personal food system and culture as well as her ideas about the community's food system. The author entered this space as a community member as well, but with the added aspect of being a researcher. This sort of dual role felt odd at times, as this might not be an everyday conversation the two might have, but she homed in on this unique opportunity for a productive and interesting conversation. The author took the information gathered here and reflected on it in another blog post, giving it the time necessary to digest it and make any adjustments to her own opinions and reactions. The exact results of this conversation are detailed and described in the final section of this paper.

The author distributed digital flyers online, and physical flyers throughout her apartment

community, asking residents to accompany her for a focus group. The apartment complex has two private online social media accounts with a combined 4.7 thousand members (some may be duplicates, as it is possible to follow both groups). Though the group does not prove residency, many residents utilize these groups to share up-to-date news about the community, sell items, and ask general questions. The physical flyers were posted outside community buildings, community amenities, and at each mail station. Residents were asked to contact the author about any questions they might have about the focus group, as well as to set a time that a group could meet. Five residents reached out and inquired about the group, three agreed to meet at the same time. The estimated time it would take to complete the focus group was one-to-two hours, and participants were notified of this beforehand.

The focus group was set to meet in the shared community space on site, a central location in the community. The area was empty of other residents during the time of the focus group. The day prior, one participant contacted the researcher, saying she was unable to attend. The day of the focus group, only one participant arrived as planned. The researcher decided on holding the group despite it just consisting of the author and one participant. The researcher was able to make a last-minute change to these methods she intended on using and brought with her some of the information shared by the practice participant weeks prior to, in a way, supplementing the voices, opinions, and experiences of the group to maintain some sense of a focus group despite the low number of attendees.

The primary method for supporting an approach to a transformative approach as a way to adopt the epistemological framework of critical pedagogy was to engage in community mapping through use of a focus group. This allowed a space for open dialogue and a sense of shared opportunities for all voices to be heard and represented, as well as for the opportunity for generative themes to be formed through an approach made by the author to maintain a learner's mindset as well as to maintain the dual role as participant-researcher. Supplemental materials were included to apply a visual component to work with throughout the focus group.

Each participant was asked to take two sets of photos with three to five for each and send them to the author prior to meeting. The first set of photos was to photograph what they thought represents the community. This was intentionally left as a general question and not one specific to the community's food system, because the author wanted to gain a sense of what aspects they found most represent the community without boxing in the participants' behavior to fit the history and ideas that the author holds. Plus, ties to the community's food system could be made during the focus group if they come naturally and may be guided more through the second set of photos. The second set of photos the author asked participants to take were meant to find opportunities to capture objects or settings that represent their relationship to food. This aimed to gain an understanding of each participants' culture and history of food. The author also took these photos prior to the meeting, and printed everyone's who attended, as well as a physical layout map of the community. While community mapping is meant to go beyond just the two dimensional map to and manifests across physical space the social issues or topics at hand, the map of the community was meant to supplement the conversations and for participants to

reference any certain areas of the community.

Given that just two people were present, the author and participant, the author made a last-minute change to the setup of the meeting and brought in the information shared during the practice interview with her neighbor some weeks prior. This was intended to improve the sense of an actual focus group where ideally more people would have been in attendance. Pictures printed were scattered across the table and an open dialogue began, allowing for an open space for connections between pictures, and for both people to share their worlds. The author reflected on things like what she did in the autoethnographic blog post, and new ideas and themes came to be generated. Details about what transpired is shared in the final section of this paper.

After the focus group was held, the author thanked the participant for his time and the two agreed that they had one another's contact information in case of any future opportunities to connect about the topics discussed or any similar themes. Later, the author reflected upon the themes discussed and soon after, shared her experience thus far with a few of her classmates, professors, and advisors, where she summarized the journey that has transpired. This brought a vital opportunity to showcase the intention of the project as well as to reflect on the challenges that are often met in doing this type of research. Those reflections went into this next final section of the paper.

Discussing what Happened, Reflecting, and Looking Toward the Future

This final section details the results of the author's project throughout its course, and dives into discussion about how these results

support the main theme of this paper, as well as accomplished what the author set out to do, which was to add to the literature of critical pedagogy and apply its theoretical framework toward transformatively studying the lived experiences of apartment residents in relation to their food cultural systems. This section extensively dives into the results of this capstone project, highlighting key reflections throughout the process of conducting it. This section also serves as a final reflection of the completed work. It ends with a succinct final summary of what the author concludes as this project comes to an end.

The author's autoethnography exercise resulted in a blog post reflection which pointed to some common themes that detailed her personal experience with the food culture system and highlighted key components of certain experiences which shaped them. Her reasoning for engaging in this exercise was to highlight her own personal biases that would inevitably make an influence upon this project. Rather than trying to be objective as possible, as much research does, the author instead wanted to celebrate and identify those qualities within her which would have a significant impact upon her work. Her primary focus was upon food waste and food security, evidenced by the amount of language surrounding those two topics. This was also some weeks before the project took a greater turn toward focusing on a pedagogical approach as its main theme. She spent a bulk of the blog post expressing how her upbringing and academic experiences most shaped her thoughts and opinions about her own personal food system. This can be extended into her personal food culture but is not expressed directly.

Critical Pedagogy and Cultural Schizophrenia

This week I've been looking more into one of my research approaches/influences, critical pedagogy. An interesting term I stumbled upon while reading early pages of about the practice of Critical Pedagogy (Ramos, 2005), *cultural schizophrenia*, struck me and I began looking more into it, finding that it could very well be an influencing phenomenon for many of the participants who I will work with. Cultural schizophrenia refers to "being present and yet not visible, being visible and yet not present" (Ramos, 2005). Wacker (1999) describes cultural schizophrenia as a necessary quality a person can have "in which one virtually lives in two worlds at the same time without feeling any inconsistency." I thought about this in the context of my project and how simultaneous parts of me are operating at the same time, but neither can be fully expressed, a sort of asymmetry.

Description: A piece of the author's reflection upon "cultural Schizophrenia"

A primary influence upon the author's status within her own food system was her academic background. In her prior graduate program she focused upon the food system as it relates to negative aspects, giving context for her continued interest in those two features. Since that blog post, the author's thoughts have and continue to evolve. This project helped her reflect upon the way she has historically focused on negative aspects of the food system – an emphasis on what is wrong with it – rather than what can be celebrated about it. She tended to focus on negative aspects of the food system as opposed to finding the assets that any given community, culture, system, however you want to refer to it, has in place. One quote from that blog post reads as such:

"With respect to being a resident, I see a lot of potential for using the infrastructure of this apartment complex to foster community involvement as it pertains to our food system. Mainly my attention is upon the food waste, as we do not have any amenities that would help us divert food from ending up in a landfill. Also, I know we have a good range of

household socioeconomic status here. I think we can use that as an advantage and sort of two birds one stone that and divert excess food away from the trash and, instead, into some type of food pantry. Other benefits could come from fostering a culture at this community, one in particular being that residents feel like they can initiate other types of programs, such as starting up group workout classes at our gym or hosting a clothing swap that reduces textile waste in landfills."

Since her autoethnography, the author has contacted a great deal of literature surrounding critical pedagogy and community-based research. These have been most influential in shaping her methods, but also importantly, her outlook on tackling social issues research. Most importantly to her personally, she appreciates the way this project has shifted her approach to these topics from one which is mainly concerned with issues and casts a negative light on things, and instead toward valuing what values we can celebrate. Of course, while continuing to tackle systemic issues, it gives

the author a breath of fresh air. It likely will be something that helps with her future research approaches as a pivotal way of avoiding burnout for the heavier, more emotion-inducing topics, such as famine and climate change.

Next was time for preparing the author to conduct her methods. She wanted some practice with working with her participants and reached out to a neighbor. This neighbor was relatively new to the complex. Their interview resulted in a 30-minute dialogue where the author's neighbor shared some interesting views and information about her history with her food system as well as with some of the community residents. The author had some questions prepared, but allowed for the conversation to flow naturally.

"I can see someone like the neighbor across the way benefitting from a food pantry that the apartment [complex] could host inside the office. I think there are a lot of other people who struggling to afford food and a lot of others who waste it who could drop it off." (Quote given by the author's neighbor).

The resident considered herself as someone who is food secure. This was not always the case for her. As a child, her family had to borrow money to afford food. She related to people experiencing such trouble and anticipated that her friend is not the only resident with this issue. Next, the topic of infrastructure came up in conversation. The two discussed opportunities for physical attributes that could be added to improve the livelihoods of those struggling to afford food. Ideas such as community gardens and a food pantry on site were among some of those ideas.

The author and her neighbor spent some time during the interview discussing food waste. Being a newly single woman and a self-identified frugal person, she must prepare her

food in advance but be careful to utilize as many of the ingredients as possible to mitigate food waste, and thus, the money she spends on her groceries. She intends on using up as many of the ingredients as possible, but oftentimes food waste can happen, and food scraps end up in the trash can. The apartment community does not have any food refuse bins, and the neighbor stated that she does not have space in her apartment to maintain a scrap container or compost bin.

Being such a mixed community, this offers a unique opportunity to essentially kill two birds with one stone. On the one hand, food waste is an issue that is rampant among most communities in the United States. On the other hand, people are struggling to afford enough consistent food to feed their families, challenging their food security. Though the neighbor herself does typically not waste perfectly safe food, it is not uncommon that much food that could otherwise be consumed is tossed. One idea that came from this meeting was that there could be a food pantry centrally located within the community where residents could drop off food they do not need for those who do. This would be a relatively simple addition to the community and, although it is not likely this would fix the issue of food insecurity or food waste, it could play a role in improving these aspects of the community's food system.

The two ended their conversation finding that their ideas aligned well. The author wanted to replicate this with more participants, and through discussions with her advisor, decided that a focus group would provide that opportunity to have multiple different ideas floating within the same room, given the likelihood that participants would come from a diverse range of backgrounds and allow for more viewpoints to be shared at the same time, aligning well with achieving the goal of polyvocality for this project.

Though the discussion with her neighbor included a very open dialogue, upon reflection and through contact with literature on critical pedagogy and community-based research, the author thought that a more open approach to working with her next participants would allow for greater freedom of expression for ideas and experiences. Pivoting her project toward one which has its roots within a social justice lens was a necessary next step.

Throughout the creation and implementation processes of this project, the author has been challenged with the shift toward a qualitative approach. Her academic background, as described within the results of her autoethnographic journey, has largely affected her mindset when it comes to not only food systems, but also to research approaches. Typically, the author would work strictly with a set of best practices, in this case, and be careful to avoid any personal influence in her work. In the past, as she has reflected, this personally felt robotic and inflexible. She wanted to challenge herself by taking a more holistic, open approach with a learner's mindset. Of course, critical pedagogy teaches that the students are teachers just as the teachers are students. This was pivotal for her work moving forward, as she wanted to really work on her ability to lean into this dual role to find new connections with her participants.

To find participants, as described earlier, the author distributed digital and physical flyers in her community. The process of finding participants proved to be more of a learning experience than expected. She posted twice to her community social media group, an active group with more than ten posts per day and typically a high volume of participation as evidenced by the number of replies posted relatively soon after. She was able to sign up three participants but, as mentioned in the methodology earlier, only one person attended. This gave her food for thought

about the challenge of finding not only participants for a one-on-one style interview, but also for accommodating others schedules for such a thing and finding a time that could work for all involved. The author herself has never volunteered her time for such a thing, so maybe it is less surprising than she expected that others might not either. Most notably, it gives rise to questions about the sense of community itself. Would hosting these types of meetings at regular intervals in the community be something that could instill and build a greater sense of one? Maybe it could bring forth more opportunities for related and even unrelated projects moving forward, as it could give a basis for the exchange of ideas and experiences if conducted and reinforced with a shared sense of openness and collaboration.



Description: The flyer posted to the apartment community's social media page

The participant and author came together with their two sets of photos taken and printed prior to their focus group, as well as a printout of the layout of the community captured via an online GPS tool. These visuals were point pieces that drove the natural flowing conversation. The intentionally vague prompts for the pictures left open the direction that the participant could take. Given the author's tendency toward focusing on food

waste and food security, she wanted to be sure that the prompts would not intentionally or unintentionally steer the participant's response toward any certain path. After all, the central intention of this approach was to find generative themes that came about from the focus group.

The author added components of the interview with her neighbor with the intent of enhancing the voices heard and experiences shared in the "group." This effectively brought about a connection with the participant who shared his frustration with affording food and thinking he was an outlier in the community. He opened up about his current living situation being that he was staying with his sister temporarily, and that he struggled to afford food while he was saving to move into his own home. The information from the neighbor about one of her other neighbors also struggling to afford food brought a point of connection. It is the hope that this connection brought some sense of belonging through a shared struggle, that he is not alone in that feeling with respect to the community. After some thought and after presenting this information aloud to the attendees at the program's virtual conference, the author found this connection most compelling and important. It is a lived experience shared by many, but possibly one where people feel isolated. If that focus group could have any positive impact, hopefully it was one that brought a sense of belonging and hope to someone struggling, a voice that may otherwise have been kept under wraps.

A few other themes generated from this focus group, and included overall noticeable physical fitness of residents, which contributed to a thought that this apartment complex must be home to a large group of people who may have the resources, such as time, to maintain a healthy lifestyle. The participant stated "people here are fit, they

probably make a lot of food from scratch" when asked about a picture he took of the dirt trail that wraps around the perimeter of the complex. The two leaned deeper into this and came out with some thoughts on the healthy aspects of home prepared foods on one end of the spectrum versus highly processed ones on the other. This could also be a cultural dynamic that reinforces cooking from scratch, or even a shared value of clean eating. It was agreed that the time it takes to accomplish such a lifestyle is one that should not be taken for granted and is an attribute that should be highly valued.

Another theme that came about during their focus group was food waste. The author, having brought her own sets of photos, included one of the refuse areas within the community. Admittedly, it is a subject that might not have been brought up had the author not included it in her own set. But, as discussed earlier, she decided to lean into her own experiences for this project while striking a balance where those experiences would not take over and lead the participants' responses in any which way. She intentionally waited until later in the focus group to bring this up and when there was a lull in the conversation so that it would not unintentionally kick off this as a primary theme, and supported her attempt to allow for other generative themes participants could bring to the table. A limitation presented itself here since there were fewer voices present than the author intended/had hoped for.

Like the conversation with her neighbor, the participant and author conversed about the potential for infrastructure that could support effective food waste disposal. The participant noted the apparent ease of doing so, given the established infrastructure for other forms of trash. During the online presentation symposium for the program, one student's project focused upon the contamination of

specified refuse bins, highlighting it as a system issue within her city of interest. The author wondered if a similar issue might happen in this case. Given the prevalence of mismatched refuse in the garbage and recycling bins already, she assumed it would be so. The author shared that almost every time she goes to toss out trash and/or

recycling, she sees items not being sorted properly. As well, oftentimes the bins are overflowing, primarily in the recycling bin when boxes are not broken down. There is signage on the doors of the area that indicate what goes where, but it remains an area for future improvement.



Description: A sample of photos discussed during the focus group and accompanying quotes from participants.

A day after her presentation, the author read an email from her apartment complex indicating a roll-out of food waste receptacles in the apartment complex! Such funny timing. The bins will be distributed throughout the community, though the author has yet to see where they intend to place them. A local company is expected to regularly collect and haul away the waste on a regular basis. It would be interesting to see the future of this new initiative and whether this makes a substantial community impact, and how it affects opinions and responses by community

residents.

This project comes at the end of a master's program aimed at enhancing the critical thinking skills of students through a variety of courses which include, but are not limited to, learning through exposure to a variety of real world examples of issues revolving around sustainability as it relates to health, which are prevalent within our world, and oftentimes are far separated from the learner as well as the larger audience. The author has documented this process in the thirteen weeks prior to finalizing this paper through weekly blog

posts accessed by her peers, advisors, and instructors. It would be interesting and informative to better detail the lived experiences of the author throughout this period, as she took three weeks away from the course for unrelated and personal reasons. Coming back into it, she felt a sense of belonging and support from her advisor, peers, and professors. Completing such a program was both life changing and monumentally influential upon her personal, academic, and career interests and the thoughts that accompany them. She challenged herself with stepping outside the confines of her personal and academic background, and this project highlights some of those learning opportunities along the way.

The project presented here adds to the literature for applications of methods informed by critical pedagogy. It challenges the approaches made to systems research by leaning in on qualitative approaches for opening dialogue within that realm. While the author comes from a background of quantitative-focused research, she has come to learn and appreciate the applications and benefits of expanding beyond them and incorporating qualitative ones. Her toolkit has surely been expanded upon and will be made available to future projects.

The results that the author found were unlike what she had anticipated, especially given her sharp focus upon certain aspects of the food system in her prior academic career. The first focus group almost serves as a baseline for future collaborations. Many ideas surfaced after the first meeting, more so than were questions answered. Alternatively, the author hopes to find future opportunities to engage with her community, as this felt like a first step toward something that could really be a catalyst for future collaboration with her participant and within her community. The generative themes produced in this work

demonstrate avenues for future work to be done.

This project, in the author's opinion, effectively answered her initial thesis question regarding finding transformative ways of studying food systems culture for apartment residents. It is evident throughout her methodology and results/discussion. The methods she adopted and practices she performed created opportunities for transformative connections that could, in the future, lend toward significant and meaningful change. Voices were well-represented, and participants were able to express their attitudes, opinions, share their backgrounds, and really get a chance to open throughout this project. Though some modifications were necessary, and sometimes in the moment, the author is confident that she accomplished what her project set out to achieve.

This work matters for the ongoing efforts to create lasting, equitable change that will support sustainable behavior while supporting the voices of those who have historically been underrepresented. It is necessary to find approaches that *work* and figure out ways to apply them to appropriate contexts. This project is one such application. This will help broaden the reach of critical pedagogy's framework across whichever applications are suitable for it. It lends itself to approaches that are only concerned with the results that benefit the majority and challenges the dominant approaches to systemic change.

Wrapping it Up: Summary and Future Directions

Adopting methods derived from frameworks that transformatively approach the culture of food systems for residents in apartment communities can be accomplished in many ways. This project looked toward critical pedagogy to discover such methods and utilized focus groups to facilitate and

encourage the generation of dynamic discussions where the researcher and participants work together. Through understanding her own biases through autoethnography, she was able to lean into these preconceptions throughout her interactions with participants. The outcomes were shared ideas and feelings in an open, supportive environment, as well as generative themes which brought about ideas that could be applied in the future to create significant sustainable and health-related changes within that community. Future works aim to continue this open style of dialogue and maintain and grow a sense of community where projects such as this one, as well as related ones, can result in effective, impactful, and meaningful change.

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Illustration by Korina Arvizu

Urban Agriculture as a Catalyst for Socioecological Memory Awakening: A Case Study of West Hollywood's Missing Middle Class

Arvizu, Korina (Her/She)
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ABSTRACT

An examination of urban agriculture and its interconnectedness. Exploring obstacles and opportunities for the implementation and promotion of urban agriculture as a catalyst for socioecological awakening in the city of West Hollywood. Examining the impacts of socioecological awakening to address the missing middle class. West Hollywood is a case study for the rest of the United States of America, spotlighting a social injustice that has fallen low in priority for nation, and having the greatest potential to improve social and environmental issues, the missing middle class. Criticism of capitalism as a contributor to the severance of socioecological memory, severance to social environmental justice and the dwindling missing middle class, thriving in one of the most progressive cities in the most progressive states in the nation. My story as a dual citizen, agriculturalist, planner, and granddaughter serves to add a voice to the call for a socioecological awakening through urban agriculture in order to change the national narrative towards socioecological issues with collective knowledge.

INTRODUCTION

To secure a future for Americans a focus on connections and not divisions is needed. The City of West Hollywood, WeHo, as it is affectionately called, has a long history of championing social and environmental justice issues. WeHo, as it is affectionately called, is also well known for its upscale design district, swanky hotels, restaurants, and bars, but the city is young, established in 1984 by an unlikely mix of groups seeking social justice solutions to a lack of services and renters' rights. There is a juxtaposition within the residents of WeHo with regards to wealth and access to nutritious and affordable food. While the 1.9-mile squared city is home to several food markets (Ralphs, Bristol Farms, Pavilions, Whole Foods, and (2) Trader Joes), as well as hosting a farmers market every Monday at Plummer Park, food accessibility remains an issue to its local residents. According to [2022 U.S. Census](#) WeHo's missing middle class was approximately 45% 7% below the national average ([Geiger, 2024](#)) and I believe a socioecological awakening is a crucial step in creating this injustice and promoting stewardship over the environment.

I explore how promotion and implementation of urban agriculture can serve to awaken the dormant socio ecological memory of the City of WeHo's citizens. Socioecology's most basic definition is the study of how humanity interacts with and responds to the environment. Socioecological memory goes beyond this and can be best explained as a back-to-basics knowledge base that was once passed on generationally through cultural traditions and community interaction. The Industrial Age and the indoctrination of capitalism into American culture have distanced Americans from the environment

by compartmentalizing food production systems and removing direct connections to food sources, essentially robbing a community of socioecological memory.

Urban Agriculture is not a new concept, known as engineering marvels in the gardens of Babylon, the floating chinampas of Mexico City, and Incan irrigation systems of the Andes Mountains. History has highlighted urban agriculture as socially equitable, a symbol of prosperity, and a reflection of societal priorities, as it can be for WeHo today. WeHo adopted policies, codes, and laws that allow for urban agriculture and continue to encourage innovation. The city has created and supported community gardening since 1985, just a year after incorporation. Community Gardens served as placeholders for otherwise vacant lots slated for future development that were tied in the entitlement process for years. These community gardens have had great success and continued interest.

An enhanced integration of urban agriculture into public and private spaces would highlight the interconnectedness of social and environmental systems thinking to awaken a socio ecological memory. Urban agriculture has the potential to fill the gap between the wealth and needs of WeHo citizens through city funded and supported systems of urban agriculture. Connecting to food systems, ecology, waste, and social justice will be important for socio ecological awakening. These interconnected systems spotlight environmental and social benefits highlighting through practice the importance of urban agriculture. These benefits include lessening carbon footprints, feeding community, reducing waste in landfills, and reducing water use while creating community, place and awakening socio

ecological memory. The process of socioecological awakening is not only the goal but part of the process. Collaboration between citizens, dreamers, government, and nonprofits in positions to fund, implement, and support urban agriculture integration will be essential. Urban Agriculture is in a unique position to be implemented across cultural and economic boundaries and has the potential to catalyze a collective socioecological conscience and memory. The following literature outlines the foundation of socioecology its importance to a just and habitable environment in this nation's future, examining the missing middle class in the city of WeHo and how urban agriculture can serve as a catalyst for the awakening of a collective social knowledge, or what I refer to as a socioecological awakening!, both the journey and goal.

LITERATURE REVIEW

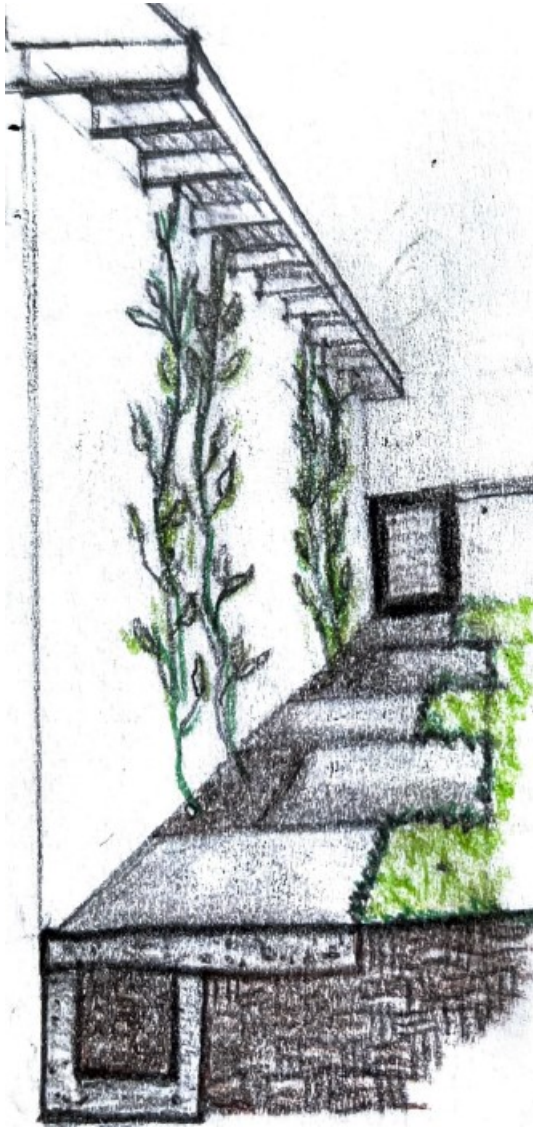
Defining Socioecology

Socioecology is a fairly recent term, with the earliest references made by zoologist Ernest Haeckel in the 1860s to describe social and environmental influences on primate behavior (Egerton, 2013). Socioecology is more than just a word; it is a theological framework, an ethnographic perspective, a lens, and a systems approach. In the systems approach, socioecology breaks down interactions with social and environmental surroundings in incrementally larger circles as individuals, central to larger connections to family, community, and society. By tapping into this system's approach through urban agricultural knowledge, sharing at each level of the socioecological system. I reviewed articles from the fields of psychology, sociology, and education to frame and understand the concept of socioecological awakening. Psychology defines socioecology as the investigation of “*human cognitive, emotional, and behavioral*

adaption to physical, interpersonal, economic, and political environments.” (Oishi, 2013). The IPBES, or Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, a branch of the United Nations, defines Social-Ecological Systems as “complex adaptive systems in which people and nature are inextricably linked both social and ecological components exert a *strong influence over outcomes. The social dimension includes actors, institutions, cultures, economies, and livelihoods. The ecological dimension includes wild species and the ecosystem they inhabit.” (Socio-ecological System, n.d.).* A back-to-basics call will frame a socioecological memory awakening with a shared societal memory of interconnected social-ecological systems necessary for survival, but most importantly is the acknowledgment and understanding that all is connected and that stewardship over people and planet is more than self-preservation, it is socio ecological justice. I reference literature in the fields of psychology, sociology and education to support my call for awakening as a solution to social and environmental justice.

Urban Agriculture

Urban agriculture literature is widely available and offers perspectives on the practice's interconnectedness with natural resources. Much of the literature review offers valuable statistics on the potential impacts of social and environmental justice. Water is an example of an interconnected system crucial not only to urban agriculture but everyday life. Technological advancements have brought solutions in agriculture for the 70% of water intake agriculture currently uses, much of it lost during irrigation.



Drip irrigation has proven to be highly effective in reducing water usage by 30-70% and an increased 20% -90% in crop yields ([Chartzoulakis & Bertaki, 2015](#)). Water management includes practices to increase water infiltration and capacity, decrease water evaporation and erosion, and control weeds. Some of these practices include Mulching, increasing organic matter and maintenance, soil surface tillage, contour tillage, and reuse of reclaimed water, amongst some examples. Soil, another important interconnected system and **crucial** component to urban agriculture. The Food and Agriculture Organization of the United

Nations Statistics demonstrate a feasible solution using a multi-pronged approach of implementation where banning synthetic fertilizers and pesticides, a focus on soil fertility, crop rotation, nutrient cycling and ecosystem dynamics, along with food waste reductions of 25-50%, reduction of feed in arable land and reduction of animal products can be sustainable and additionally make significant impacts on the environment ([Muller et al., 2017](#)). Urban Agriculture highlights the interconnectedness of social justice in food systems and policy failures. One example of a social justice failure is the lack of policy to address the issue of fertilizer and pesticide used in food systems, harming food systems workers, causing infertility and loss of pregnancy ([Vigar et al., 2019](#)). Urban agriculture's historical context demonstrates the practice has been applied across centuries, geographies, and cultures, only changing drastically and detrimentally during the industrial revolution. Historical context strengthens my argument of relearning a collective societal knowledge, once passed down generationally or through apprenticeships before current educational systems. The concept of urban agriculture has signified prosperity, technological advancements but most notably the social-political prosperity of food security.

Urban Agriculture research connects waste, soil, water management, weather, and social and economic inequities and provides statistical data on the impact of these systems on social and environmental justice. Policy must be strengthened with an ethos to shift away from quantity to quality. Policy has failed to address nutrition, diversity, and social justice issues ([Welch & Graham, 1999](#)). Policy has failed to address micronutrient deficiencies, which are referred to as 'Silent hunger.' This deficiency results in 2.15 billion people deficient in iron, accounting for 40% of

global populations (up from 30% a decade ago), mostly women and children in developing countries ([Welch & Graham, 1999](#)). Micronutrient Malnutrition affects 2 Billion people globally and can affect in utero development of children and two years postpartum. These developments affect those in poverty, making it a social justice issue as poverty and malnutrition tend to self-perpetuate in vicious cycles ([Welch & Graham, 1999](#)). Each perspective offers important points on humanity's relationship with nature, but no argument is complete, just as no one solution will solve humanity's current conundrum. A picture that clearly outlines issues to address is clear and a path is revealed, but to speak of a future story will require a back to basics socioecological memory awakening.

The Missing Middle-Class

Politicians and economists often associate financial and social prosperity with a strong middle class and data supports this argument. The missing middle-class national issue is explored within the context of WeHo. In a research report done by the Center for American Progress Action Fund the middle class is considered the driving force of economic growth, and a healthy, engaged, stable society. Research shows that when the middle class is strong all social classes prosper economically, and educationally as the number of educated Americans increases. A stronger middle class means a more educated society. Why is this important to social-environmental justice? The 2024 election campaign highlighted this, as educated voters vote for social and environmental issues and for candidates that are aligned with these values. It is not in the interest of capitalist agendas who refuse to believe in, or acknowledge climate change as a reality to promote education, or an educated middle class, as this would eliminate a

majority of the capitalist target voter base and with it profits at the expense of the same middle and lower classes. The same Capitalist agenda that benefits from severing human food systems connections, serves to sever social and environmental connections by investing in American ignorance. Equally important to the argument is the elimination of high school/trade programs that contributed to missing middle class jobs, and the missing workforce, defunding and pulling investments in colleges and universities and cutting financial assistance. Research shows that access to education by the middle income is not equitable and that education is a determining factor in creating the middle class. Education also determines advocacy and involvement in social and societal decisions ([Madland et al., 2011](#)). "The top 1 percent's share of income reached 23.5 percent in 2007, the last year before the Great Recession, up from 9.12 percent in 1974. Over this same time period, the share of income going to the middle class, defined as the middle 60 percent of the population, fell to 46.9 percent from 52.2 percent" ([Madland et al., 2011](#)). This statistical data further helps to frame the missing middle-class injustice that is occurring across the country despite the progressive ideals and policies enacted by the rainbow city located in the progressive blue state of California.

The Role of Urban Agriculture

Historical context acknowledges colonialism, capitalism, white privilege, and the practice of redlining that shaped WeHo. Data specific to WeHo is scarce as most studies are initiated by the city itself. Information is taken from the [city's website](#). The small 1.9 square mile city has an approximately 34,000-person population and is ranked amongst the most walkable American Cities. A push for urban agriculture is a push for social and ecological

knowledge. Additionally, growing food at home could have the potential to have positive impact on food security, creating community, shifting perspectives. Expanded knowledge and awareness is the foundation of a socioecological memory. Increasing complexities of decentralized food systems and political resistance to globalization have garnered further arguments that current food preferences towards buzz words like “organic” or “fair trade” point to the “proliferation of marketing schemes.” Public perception will be an important aspect of disseminating collective knowledge in a push for urban agriculture, and the establishment of better policies related to food marketing. An urban agricultural model promotes waste management, the elimination of synthetic fertilizers, water efficiencies, soil health, behavioral changes, and decentralized food systems. Defining sustainable agriculture first, as ideals and policy must represent WeHo. Defining sustainable agriculture as practices, connections and ethos that are economically viable, environmentally safe, and socially acceptable as a community and encapsulates agreed-upon challenges of a growing population, climate change, and biodiversity ([Robertson, 2015](#)), is crucial to a socioecological memory awakening.

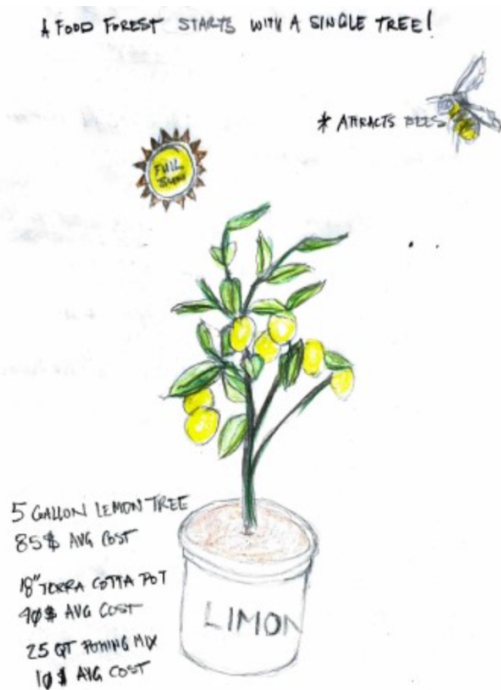
I believe my ancestors had a different perspective of the world through agriculture. A perspective which reveals the interconnectedness of food systems awakening the socioecological memory of WeHo residents. Childhood experiences incited my love of agriculture and armed me with agricultural knowledge, once passed on generationally, within community and society. My experience with food offers a juxtaposition of food relationships, as they relate data and statistics presented. Connections between social and environmental issues are addressed by urban agriculture, individually, as members of a

family unit, or members of a community. Formal education and literacy are new concepts in American culture, only reaching high percentages during the Industrial Revolution when schools and education were formally established. Before formally established education systems, news was shared through traveling theater performances or in music ballads that spread stories across the country or in lessons passed on generationally. This emphasizes that knowledge is not exclusive to formal education systems prominent today. A shared ecological memory and knowledge base is equitable and accessible to all. Socioecology aligns with [Rachel Carson's](#) approach to environmental and social advocacy, as a writer, scientist, environmental advocate and a woman. She worked for the U.S Bureau of Fisheries where she witnessed the unintended consequences of big farming through the use of pesticides (DDT). Her social location greatly influenced her determination to present her scientific knowledge to the public through her writing which incited advocacy. I too was inspired by my location, vocation and education. While urban agriculture is presented here as a catalyst it is not a final and all-encompassing solution. I believe a multipronged approach to define barriers and opportunities can be difficult and often requires shifting away from institutionalized thinking processes. Social and environmental justice issues are hard to define because they are interconnected and unique geography and population. It will take a boundary-spanning team of citizens, engineers, scientists, planners, community advocates, and leaders to develop ideas for a shift in perspectives towards an egalitarianism and justice for all.

Building Blocks

Weho built and funded a series of community gardens since 1985. These community gardens have historically been located on

vacant lots slated for developments that take several years to develop and would otherwise lay vacant. Recently a newly created community garden on a portion of Plummer Park opened its doors in November of 2024, managed by the Recreation and Parks Division with assistance from Facilities and Field Services Division. Weho offers 43 raised planter beds along Fuller Avenue available to residents on a first come first serve basis with priority given to seniors and low-income residents. This revelation prompted several questions as to expansion and use of existing facilities and programs as educational and marketing opportunities for future exploration.



METHODOLOGY

One research question my study includes: what does the middle-class gap look like in WeHo? I found this data more difficult to obtain and the recent unprecedented pandemic exacerbated the data. What are the potential benefits of Urban Agriculture on

social and environmental justice? I have gathered considerable data on waste, water, food production, emissions, and potential social benefits. What is socioecology, and what is a Socioecological Memory? Socioecology refers to an approach, a model, and a philosophy studying the influence of humanity on the environment and vice versa, as well as the reciprocal, cyclical, and interconnected influence. Why is a Socioecological memory important? A socioecology memory has historically been tied to environment and community helping humanity make informed, knowledgeable, and socio and ecologically just decisions. This knowledge base is lacking in current educational and social systems. How to implement socioecology through urban agriculture, is the last research question. Urban Agriculture is connected to environmental and social systems. Urban Agriculture includes; potted plants, window boxes, roof gardens, raised beds, aquaponic, hydroponic systems, neighborhood food farms, and the interconnected systems it feeds and is fed by. The surprising discovery in my research is the implementation of socioecology, across a varied field; sociology, zoology, psychology and education, the lens of socioecology boundary spans.

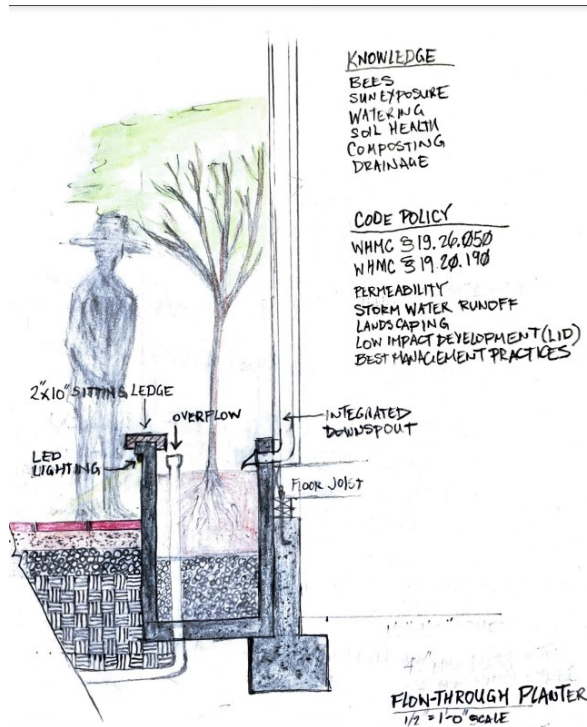
The epistemology relevant to socioecological memory awakening is presented through epistemological observation when working for and interacting with the city's citizens. As a planner I work with hard data codes and policy while balancing a community facing component that builds on social knowledge. Over the years, my perspectives have shifted with interactions and new policies. In writing this paper, I challenged myself to share knowledge born from life experiences along with standard empirical data to strengthen the narrative and connections argued here. The dwindling middle class has been an

unintended consequence of the city's success as a welcoming and innovative city. WeHo is a tiny city that fights loudly and successfully for social and environmental justice. WeHo is diverse, and carefully manicured lawns, streets, parkways, streetlights, and facades. Renter rights, affordable housing, queer rights, fair wages, and environmental justice, are a few championed WeHo causes. The community spirit is present, though many connections have been severed by capitalist systems whose efficiencies have insulated the collective socioecological memory. The applicability of urban agriculture as a catalyst for socioecological awakening through community-based learning, practice, and shared knowledge is being examined.

The theoretical framing used to understand the context and data collected defines socioecological memory and importance of its use in urban agriculture as a catalyst for an awakening in WeHo. Socioecology is founded on social and environmental justice with ideologies based in equity, which include historical underpinnings such as feminism and anticapitalist ideologies. WeHo is connected to its neighboring Hollywood history, redlining, white privilege, and development, making Los Angeles City, County, and California both a melting pot and a collection of homogeneous neighborhoods. This includes understanding the development that led to the unintended consequences of a dwindling middle class and addressing inequity, through implementation of urban agriculture.

Methods include data collection through the United States Census office, collection of data through the City's Municipal Code, Zoning Code, and personal experience and knowledge from almost 8 years of working as a planner for WeHo. I reviewed staff reports, plans and publicly available information. I requested interviews with staff

involved in the process to understand how Community Gardens came to be, funding, management, accessibility and logistics. I was interested in the impact on the community and any supportive services offered, such as composting programs, and agricultural education and training. I was especially interested in any data as to usership, and community impact. I use my architectural, construction experience and education to create feasibility projects for implementing urban agriculture at various scales suitable to serve the city's population, presented throughout in sketches. I explore the implementation process for the dissipation of an urban agriculture project through city records and interviewing city staff involved or responsible for the implementation. Seeking to learn implementation and lessons learned, measures of successful implementation, investment, obstacles, and building support and funding. I gathered data from journals, reports, magazines, and newspaper articles through the University Library records on food, waste, soil, water, socioecology, and urban agriculture. This project advocates for further studies, projects, and funding of urban agriculture and its various components, such as composting, water catchment, and integration into private and public projects.



Like most first-world communities, WeHo faces environmental and social issues. Community interest is an important component in addressing these issues justly and with equity. I use a socioecological lens to guide the process through which data is gathered, generated, and concluded. Examining needs, benefits, and process of awakening a communal socio ecological memory through urban agriculture. Questioning the feasibility of implementing urban agriculture by examining policy, resource availability and how to expand. Preliminary examination led to technical explorations involving municipal code requirements for allotted open space and prescriptive ideas for urban agriculture integration in the smallest of gestures, from a potted tree to architecturally integrated systems. November brought a press release from the city of WeHo and shed light on a community garden program in place since 1984. I was both excited and devastated by the news as I had not learned of this program in my years of employment or research. In turning to staff reports, publicly available

information and interviews with staff could not answer why there was interest from the community but the program had not grown in 40 years, nor why there was such poor promotion, leaving more questions than answers.

Historical Context

California's wealth is largely dependent on water with its largest metropolis', Los Angeles and San Francisco population relying on ports for economic growth. Los Angeles is infamous for the Los Angeles Department of Water and Power, Civil Engineer William Mulholland's modern engineering marvels of water management systems, coupled with the introduction of plentitude in a speech that uttered "There it is, Take it!". The engineering system that fueled modern-day Los Angeles was built of aqueducts, and dams bringing water from the Owens Valley, supplying power to a growing population fueled by a myth of plentitude. California is known as the breadbasket of the world, one of the highest suppliers of (water dependent) food in the world, competing for precious resources.

WeHo is known for its progressive leadership and environmental justice. Looking at historical context provides an understanding of social inequities, environmental justice perspectives and vulnerabilities. WeHo was home to the Tongva People before Spanish settlement arrived in 1521 (Theme Grill, 2022). The Spanish conquest contributed to racist and socially unjust systems by colonizing, assimilating, and tearing family and community apart and destroying cultures, raping, enslaving, and killing indigenous people. One of several actions leading to the marginalization, embedding of a systemic racism towards indigenous people. According to the 2010 Census native Americans make up 0.03 % of WeHo's population, a land recognized as unceded

territory of the Gabrieleño Tongva and Gabrieleño Kizh peoples.

The area was settled by Californios in the 1770's and became a part of the Rancho La Brea land grant in 1821. Rancho La Brea was purchased by Henry Hancock in 1860 who used the tar pits to mine for asphaltum ([Theme Grill, 2022](#)). Henry sold a portion of Rancho La Brea to Moses Hazeltine Sherman in 1886, who acquired the land for the construction of two railways: the Pacific and the Pasadena. Sherman established headquarters for the Los Angeles Pacific Railway Co with power generators and residential housing for railway workers ([Visit West Hollywood, 2019](#)). In the 1890's Sherman built a streetcar yard at the intersection of the Santa Monica and San Vicente Blvd's where metro currently houses a bus yard, the siting of this facility is tied to previously built transportation infrastructure, laying down a foundation of self-propagating institutionalized environmental injustice in lower class more affordable neighborhoods. In 1919 Charlie Chaplin built a studio in what is now the Jim Henson Studio, and Jesse Hampton built a studio that later became the Pickford-Fairbanks studios in what is now known as The Lot. These industries employed and housed the white middle class, entrenching white privilege into the fabric of the Los Angeles area and what was to become WeHo. In 1925 a portion of the former streetcar yard's industrial use was replaced with the Pacific Design Center and the Avenue of the Arts and Design District in the 1970's. The Design and Decor industry found a home in WeHo in the 1950's and solidified its current presence along Melrose Ave ([History of West Hollywood, 2019](#)). This cradle of creativity helped shape WeHo.

Sunset Boulevard became a thoroughfare linking farms and homes, in the 1920's becoming a decadent prohibition era,

gambling destination before Las Vegas. In the 1960's the Sunset Strip thrived during the prohibition era and found a new life as a global music destination, maintaining its status with historically significant venues. In the 1980's an influx of Russian Jewish immigration fleeing the USSR settled in WeHo. The city incorporated in 1984 through efforts of a coalition of dispossessed, underserved and oppressed community groups of gay men, Russian-Jews and elderly calling WeHo home ([Visit West Hollywood, 2019](#)). The great majority of the city's population is white, reflective of historical context. Railroad, entertainment industry, design and décor industry and hotel restaurant industries are part of the industrialization and manufacturing growth of the city, followed by suburbanization by the entertainment industry, reinforcing segregated predominantly white neighborhoods and white privilege. The city's proximity to central Los Angeles continues to pool a low-wage, minority labor force, reinforcing white privilege and racial segregation. State suburbanization subsidies played a role in the creation of white segregated cities such as WeHo, making it the mix of residential and commercial uses built out over 1.9 square miles. The city's minorities, which include LGBTQ, Russian-Jewish and elderly community, continue to experience white privilege, a community oblivious to the consequences of inactions related to resources ([Pulido, 2000](#)).

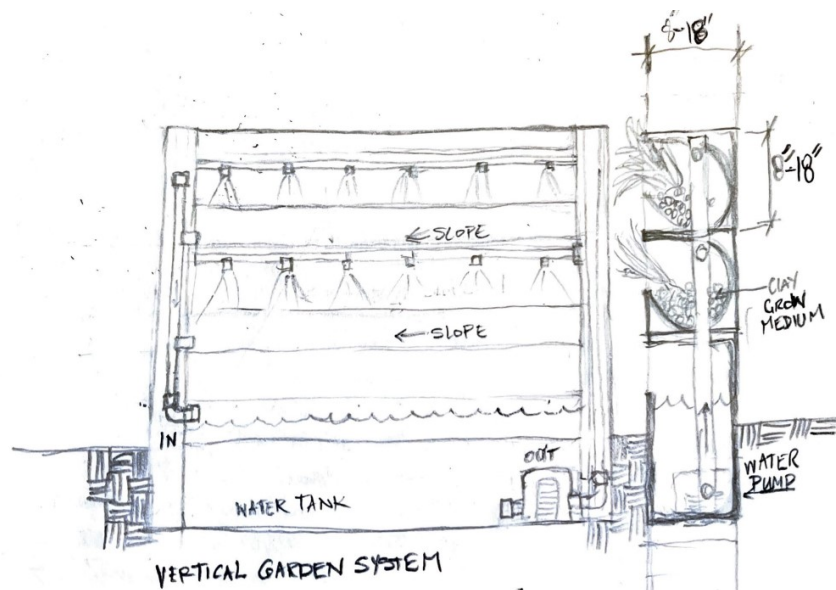
THE CALL TO SOCIOECOLOGICAL AWAKENING

There is a primal need for human beings to connect to the natural environment. It is the need for fresh air and mental calm that comes from being outdoors, and near flora, fauna and water. I seek to tap into and incite this need for advocacy over people and the planet. Humanities' fondest memories are often tied

to the outdoors, close your eyes and think of your happiest memories, and what was memorable about it? A central memory evokes a feeling, what about the rest of your senses? What is the time of day, the temperature, the smell, taste, air, noise? It is this connection to the soil beneath feet that grounds and sustains. Growing up between the United States of America and Mexico, my relationship with food was a juxtaposition. While living in Los Angeles, my mother worked a minimum wage job, was low income, and shopped for the cheapest foods to ensure her family was fed. Many of the food items I grew up eating, I do not purchase now having learned of their low nutritional value, highly processed and often harmful dyes and preservatives. While living in Mexico I was low-income, ate meat once a week but had an abundance of fruits and vegetables. Today I find myself highly concerned with the quality of food, buying organic at the supermarket and from farmers markets, buying local, socially and environmentally conscious products of goods and growing fruits, herbs, vegetables and sprouts at home. I cook most meals at home,

eating out once a week. I imagine a different world, where all grow food at home. I see vertical walls, fruit and nut trees, raised beds, living roofs, rain collection, composting, recycling, bioswales in landscapes full of bees, hummingbirds, butterflies and ladybugs in a biodiverse ecological system. I imagine a world where hunger is eliminated, and food is treated as a human right and not a privilege.

Urban Agriculture helps frame interconnected systems to inform and bring problems to light. Social and environmental justice literature includes the lenses of founders of significant environmental schools of thought. [Hardin's](#) simplified yet resounding perspective about the finite number of resources and unhalted population growth as a pivotal perspective to understanding the bigger picture. Resse's perspective on restructuring belief systems, pointing to the introduction of capitalism only a generation ago offers hope to this idea for a future story. [Angus'](#) point on Hardin's blaming the poor for poverty is a perspective that needs to resound loudly to unravel current capitalist socially unjust practices.



Capitalism as a Catalyst to Inequality

My mother worked in a factory her whole life, and I had graduated from high school expecting to do the same. Once upon a time this industrial way of thinking helped save time and energy when it came to things like building homes and processing large amounts of food for storing. This manner of working created community. Life is not black and white, it is a vast diversity of color, and I think that through a just lens manufacturing can be equitable. The problem is not industrialism. The problem is the capitalist lens through which industrialism is applied. A capitalist perspective that historically and currently hyper-concentrate powers detrimental to the world, ultimately gets to the core of the problem. Capitalism knows no neighbors, has no partners, and respects no moral sentiments ([Baruphakēs, 2020](#)). Justice cannot exist under these circumstances. While I won't suggest capitalism be erased from WeHo, recognizing its oppressive role helps identify the fundamental flaws present. Capitalism has gone unchecked and is self-fed by the illusion of prosperity and plentitude. Socioecology builds on existing ideas and knowledge, tweaking problem areas with innovative solutions. Schnaiberg and Gould describe the process of expanding technological capacity, providing increased efficiency and quality of life improvements without the dominance of economic growth, and instead a shift in how society lives, to live within means ([Schnaiberg et al., 2009](#)). Out-of-sight, out-of-mind mentality has contributed greatly thanks to capitalism's dissecting components into Fordist production efficiency, creating a treadmill of production that blurs understandings of finite resource and simply resource management. Americans are guilty of being wasteful and gluttonous with engrained capitalist false narratives of self-imposed dominance fueling the paradox of plentiful. Equitable social and

environmental changes must address climate change and ecological decline to rebalance the damage caused by placing the economy at the forefront of decisions at the expense of the planet and people.

Given the varied belief systems, cultures, economy, mental and spiritual understandings of WeHo's population, how to unite the many into one? By focusing on a unifying language, a universal truth, is a shared socioecology. One of the most impactful strategies for addressing the environment, economy, and equity is the reawakening of a socioecological memory. Connecting past and present will guide future decisions through shared knowledge. Learning from local indigenous fighting to maintain generational knowledge, championing stewardship over the planet for centuries. A disconnect with the natural environment serves as an effective tool for capitalism to thrive unchecked. This disconnect describes out-of-sight, out-of-mind mindset attempts to exonerate human consciousness for decisions like deforestation, extinction of species through building of dams, and prominent global manufacturing, such as disposal of plastics used to bottle water. If that forest was my home, the species thrived in my community, and that plastic bottle was microplastics in my body, would it sway my perspective? The illusion that it does not affect every individual on earth is what needs to be contested because the reality is that "if" does not belong in that sentence. After all, that statement is true.

Power of Culture and Story

My fondest memories are tied to agriculture and community. My grandfather had an orchard in a small town in Nayarit, Mexico. My family had "dias de campo" which translates to field days. A large portion of my family would spend a day together in the

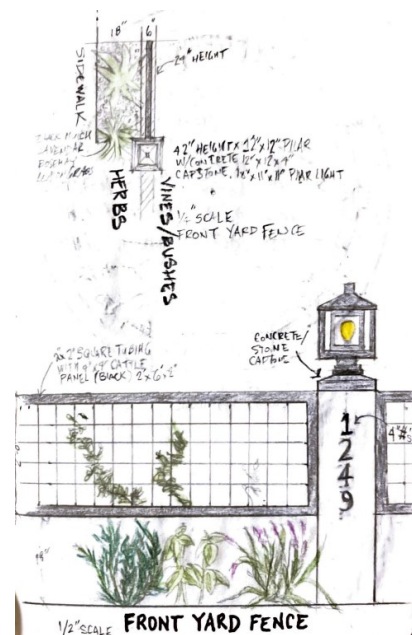
orchard, planting seedlings into the ground, cleaning the grounds, trimming, mulching and transplanting or establishing plants. Pierre-Louis’ perspective that people and the planet need not be in opposition but rather in a beneficial relationship is the message needed. This message provides power to change, encourage, and celebrate stewardship rather than the overwhelming hopelessness that can often leave guilty feelings and the shame of being a member of the destructive human species. Kendra highlights the strength of human cooperation as the key to surviving under the “harshest environmental conditions” ([Pierre-Louis, 2020](#)). Angus’ perspective on shared resources over capitalism and privatization of resources, referenced as the “real commons”, argues that capitalism and privatization create unjust dynamics within society and that eliminating the practice of capitalism and privatizing resources (championed by Margret Thatcher) is the key to a shift in consciousness and connectedness towards resources ([Angus, 2022](#)). Flora’s perspective on nature as a sense of place to be respected, a call for science, knowledge, and action to be in sync, speaks to the power of storytelling’s importance in shaping the future. Detrimental to storytelling is the illusion that humanity is an intelligent, technologically and scientifically advanced species, having the power to alter natural environments with little dependence on nature itself ([Resilience.org, 2020](#)).

These thinkers broaden an understanding of sustainability by providing a shift of perspective. The glass is half full! Desperation would allow the status quo to continue thriving; the disruption is to introduce hope! Empowering humanity to be the change, educating populations, placing decision-making powers in the hands of the people, and designating every citizen as a

steward for a hopeful and just future is the message to implement.

White Privilege

The prevailing assumption in mainstream legal systems about racism in environmental inequality is that inequality is out of malice, that the victim bears the burden of proof to prove to the courts that harm was caused above allowable limits ([Bullard,2005](#)), and that legal systems work within outlined economic frameworks that allow and are exonerated from being racist for economic gain ([Pulido, 2000](#)). The ramifications of these prevailing assumptions are seen in the disproportionate way minorities are affected. Both Bullard and Pulido define racism and provide systems analysis as well as case law and reports that demonstrate the deep-seated racism that has existed and persists today. Despite the overwhelming record of injustice and harm to humanity for the sake of capitalist growth, capitalism continues to thrive and propagate environmental racism by placing the economy over equity and the environment.



Pulido presents an alternative view of racism based on geography and spatiality, as a socio-spatial process. Pulido argues that current legal and societal systems have a narrow perception of racism and that three issues are to blame for the institutionalization and propagation of racism within systems. The three issues are in the framework of sitting, intentionality, and scale. White privilege is important to understanding unequal environmental outcomes because it can exist without malicious intent but with racist outcomes held not for malice but for power, comfort, and control. Historical context analyzes contemporary forms of environmental inequality, provides insight into racist outcomes and self-propagated outcomes within the systems further enforcing inequalities without action, with inaction that benefits the status quo! For Weho that means ignoring the missing middle class issue.

Feminism

Verchick breaks down feminist theory within the environmental Justice movement into three methods: Unmasking Patriarchy, Contextual Reasoning, and Consciousness-Raising ([Verchick, 1996](#)). Applying this method to the paradox of plenty, which seeks to shift views toward finite resources and not of perceived abundance within WeHo. In applying the feminist method of unmasking patriarchy by asking questions about seemingly neutral laws, policies, or decisions concerning resources. Angelenos first heard William Mulholland say, "There it is. Take it" on November 5th of 1913. These five words set a foundation for views towards resources as a possession, a resource for the taking. Identifying that the statement has a male bias, failing to recognize the disenfranchisement caused by stealing water from the Owens Valley and, to add insult to injury, messages of abundance. History notes

that the aqueducts that brought Los Angeles its water birthed the current city of WeHo. The inquiry into how these decisions were made reveals a capitalist agenda that sought to make rich men richer at the cost of the displaced Californians in the Owen Valley through land grabs, ensuring rights over water, leaving Angelenos to bear the price of this capital improvement project ([Ulin, 2013](#)).

In applying the feminist method of contextual reasoning to perceived resources in the region. Following the case of Mulholland's message of the abundance of water, would offer real-life experiences from citizens of the Owen Valley and Angeleno citizens' decision-making rights on the spending of what resulted in a 25-million-dollar debt ([Ulin, 2013](#)). Angelenos may have viewed this water importation as an environmental issue, thwarting nature through hubris by transforming the desert landscapes of Los Angeles into a green oasis rich in deceptive ideas of abundance and motivated by green-lined pockets. It is through urban agriculture that this story can be retold.

Boundary Spanners

To effectively implement proper multi-pronged solution, the role of boundary spanners will be essential. The complex nature of resource management systems, various levels of power, and the diverse purposes that underlie their use, interdisciplinary knowledge and framing of solutions will require a variety of stakeholders addressing challenges in a dynamic way. Engineers are needed for application and construction, design and installation, while city planners are needed for policy recommendations and implementation of system components (ex, Community outreach, greywater systems, rain catchment, bioswales). Stakeholders can all be educators, making their specialized

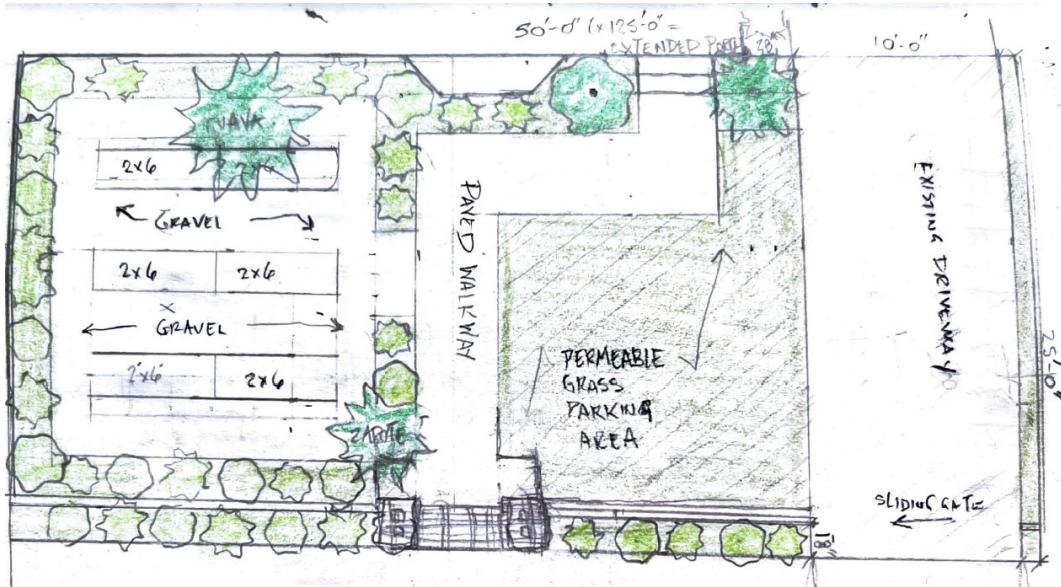
knowledge accessible and actionable for the public and other involved groups. Education is critical across all sectors. Government agencies, utility companies, and business owners can provide an understanding of the environmental and social factors involved for a varied approach to the implementation of system changes.

Power Process and Profit

WeHo's privatization problem is that the principal motive is profit. Feldman defines process as agenda-setting that leads to policies, laws, rules, treaties, and practices. In the case of resource privatization, the process involves a third party designated, contracted, and entrusting the management with a caveat to include Profit. Profit creates a lopsided pillar that weakens purpose and process and compromises power. Process is influenced by the scarcity or abundance of resource, quality supply, and demand. To Feldman's point, the process is reactionary rather than advertent. The reactionary actions here are the municipality taking back the reigns of resource management, removing the profit factor from its thrown under privatization, and making it an equal partner, through public ownership, and the resource management company and any future partners realizing that any future business would need to incentivize lower cost for services and disincentivizing profit as the primary pillar of services. The thought process can be applied to Weho's resource systems.

Feldman would point out that private resource management entities and politicians who are entrusted with power over a municipality's resources for profit. Feldman additionally points out that citizens, through

their voting rights and politicians, and through party agendas, strategically position themselves to advocate resources policies in favor of re-municipalization. The power of resource management can be thwarted by profit if the purpose is lost, leaving the poor without an essential resource for survival. The same can be said of expertise and knowledge as resources of power and their contribution to inequalities when relied upon. Feldman would point out that these practices contribute greatly to inequalities for those who are poor; regardless of the intentions, this is a negative consequence ([Documentary Film Makers & Film Productions. Watch Documentaries Online, n.d.](#)). Feldman defines purpose as a series of tangible objectives, including affordability, portability, quality, and adequacy of water for recreation and life support. In the case of WeHo, water systems are managed by LADWP and Beverly Hills Water. Purpose expands to include policy and tangible objective goals to build policy ([Feldman, 2017](#)). Indigenous people experience environmental inequalities across the globe at a higher disproportionate rate than any other group, experiencing the highest rates of displacement, imprisonment, illiteracy, unemployment, poverty, suicide, and mortality despite only making up 6.2% of the world's population ([Amnesty International, 2024](#)). Indigenous people have endured forced assimilation, denial of self-determination through a lack of recognition, and denial of procedural and distributive justice. Native American People have long been stewards of the planet, historically denied a seat at the table. Indigenous knowledge is now relied upon as native American people have integrated themselves into land management systems now recognizing the importance of their inclusion.



SUMMARY

Social and environmental issues can be solved in the present. Americans possess the tools, missing the know-how, native knowledge lost over generations, severed by colonialism, capitalism and the industrial revolution. A socioecological memory is the sharing of knowledge, possible through urban agriculture with science, research and fact-based solutions, addressing social, economic and environmental injustices that paved the path of the current paradox of plenty. Often tasked with issues that are difficult to define and often require a shift in thinking process. Social and environmental justice issues; the concepts are hard to define, and it is going to take a boundary-spanning team of engineers, planners, community advocates, scientist and politicians to develop ideas to make the shift in perspective in the most egalitarian and just manner. Society has grown accustomed to instant gratification that time itself becomes inconvenient because everything is out of sight, it is also out of mind, hiding water systems under sidewalks under sinks and in walls, or behind fences, perpetuates these attitudes.

Perspectives of what qualifies as trash are further distorted by current waste management systems that insulate humanity from ownership. A decentralized food system has made food into a commodity of luxury. Urban Agriculture is a catalyst for socio-ecological memory. While WeHo is out of the closet, Weho has yet to reveal the truth about the missing middle class.

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Living in the Water Gap: Water Scarcity, Injustice, and Denial on Navajo Nation

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ABSTRACT

Water scarcity is a harsh reality for the Navajo people and one that they did not invite. Historical racism and colonialism have constructed a system of inequity in water access that has embraced limitations and rendered water scarcity unsolvable. Far too many people on Navajo Nation do not have access to safe running water. A constellation of historical and economic drivers based in colonialism have resulted in extreme water injustice, scarcity, and denial. The Colorado Compact and archaic water management practices and policies have protected the interests of government and businesses at the expense of the water rights of the Navajo people. Exploitation of their water through extractive industries and uranium mining has grossly depleted their available water while poisoning much of what they have available. Long processes and longer waits are the norm for settling water rights and proposing infrastructure for water delivery to the reservation. The proposed technological solution in the form of conventional plumbing and infrastructure has created greater distance between the people's homes and water delivery and has relegated them to a process of hauling water to their homes that is labor intensive, time consuming, and expensive.

INTRODUCTION

The Navajo Nation is the water inequality capital of the United States. The reservation has steep unemployment and poverty rates that can serve as a convenient explanation for their lack of water access, but it is a false narrative and one that perpetuates the water access gap that exists on the reservation. Depending on the source, as little as 30% and as much as 50% of the homes on Navajo Nation do not have running water. Neither water allocation nor infrastructure were prioritized for Indigenous tribes when the Colorado River was apportioned in the early 1920s, which put them at a distinct disadvantage in being able to have water infrastructure today. To add to the challenges of water access, much of the land and water on the reservation is polluted by abandoned

uranium mines (AUMs) that were contracted by the US government after World War II in order to build the United States' nuclear arsenal. Kidney and stomach cancer are common in the Navajo people now because of uranium contamination. There is one typical answer to get access to homes without plumbing, and that is conventional centralized water through large underground pipes. The situation of homes and the terrain on the reservation preclude this from being a possibility yet it is the only one that is consistently offered and it has worsened the problem.

On the surface, this might look like a series of unfortunate events or even just really bad luck, but there are reasons for all of this. The true drivers of this water gap are the colonial attitudes and actions that sought to eradicate

the Navajo in 1863, and which have persisted into today. They have infiltrated all aspects of water access through racial capitalism, water law and policy, and even the engineering that should be a predictable solution to the problem. History, law and policy, economy, and infrastructure rooted in the colonial mindset have created a harsh reality of water scarcity that the Navajo people have been experiencing for over a century and as a consequence the Navajo people who have no plumbing in their homes have inherited an arduous process in order for to access clean water.

The goals of this project are to call attention to the inequity that is foundational to the water gap on the Navajo reservation, how it has happened, and why it has been allowed to continue. I wanted to know both how such a shocking and prevalent lack of water access came about and why it has been allowed to go on for over a century. My first thoughts were that it had to be accidental: After all, how can thousands of people on the Navajo Nation be without running water in the United States in the year 2024? Looking at history and policy of water allocations in the west as well as built infrastructure, the lack of water access for the Navajo as well as all other Indigenous tribes was no accident. This distancing of the Navajo from water continued when the federal government subsidized plumbing and irrigation to entice white settlers to move to the west in the [early 1900s](#). Infrastructure was readily installed in homes (even remote homes) and farms throughout the west, but they purposely left the reservation dry.

The federal government wouldn't put money into water infrastructure for the Navajo reservation, but was keen to exploit its resources, particularly uranium. The reservation was rich in sought-after resources such as coal, and perhaps most significantly

uranium, which was coveted by the United States federal government to create its nuclear weapons cache. This mining contaminated many ground and surface water sources on the reservation, and when it was no longer profitable the mines were abandoned. The Navajo people are still dealing with the effects of uranium pollution.

This project also seeks to challenge engineering hegemony by calling into question the paltry efforts aimed at solving this egregious situation with a one-size-fits-all solution that has widened the water gap for the Navajo, and embraces the status quo. The answer that is commonly offered to get water delivery to homes on the reservation is large, expensive, centralized infrastructure. This is, quite frankly, not possible due to the rugged terrain and the remoteness of homes. And yet this is the typical solution for getting water to the many who don't have easy access to it.

The lack of water on Navajo Nation is shocking, but it isn't a reality that most people in Arizona and the United States are aware of. I myself have lived in Arizona almost my entire life, and I had no idea about this situation. I hope to give a voice to the Navajo people and to raise awareness about this immense injustice. Neglecting their need and right to water has gone on far too long, and their story needs to be known.

I have gathered the lived water experiences of people on the reservation both through research as well as an interview of my own. I was also able to get an interview of my own from a Navajo professor, Dr. Tommy Rock, who grew up on the reservation, in order to deepen my own understanding that the challenge of water scarcity presents, and also to get lingering questions of my own that were not addressed in other articles or journals. I have also been able to compile statistics that show a stark contrast between the Navajo people's use of water and that of

the average person who lives off the reservation.

LITERATURE REVIEW

Historical, political, and economic drivers rooted in colonialism have orchestrated water scarcity and water contamination on the Navajo Nation, while innovation stagnation and engineering convention have created a technology gap that perpetuates the crisis. My literature review uses a journal that shows how conventional water management is biased against people of color and marginalized communities and stands in the way of them accessing water. Another resource shows how settler colonialism has affected the water gap for the Navajo and helped pollute their water. Ronson Riley Chee's dissertation details the bureaucracy that entangles new water infrastructure plans in a bureaucracy that rarely moves the ideas for infrastructure from an idea.

Inequity in Water Management

Over-allocation of water has been the excuse for a lack of investment in infrastructure in Atlanta's poor neighborhoods. This allows those who are in charge of water management to keep from taking responsibility for it being a management problem by instead making it a "regional problem." The journal profiles water allocation in the Apalachicola-Chattahoochee-Flint (ACF) River Basin, wherein the city of Atlanta has devised a series of strategies, both spatial and temporal, to delay resolution to water delivery to poor black neighborhoods. It bears marked similarities to the rejection of responsibility to deliver water to the reservation by the state of Arizona and its actors as well as the Supreme Court of the United States. These entities also sound the alarm that water cannot be delivered to the reservation because the Colorado River is over-allocated (it is), but it is a facade that the decision-

makers hide behind. The over-allocation of water has not and does not keep cities and states from building new and bigger cities, suburbs, and businesses. The real reason for these water conflicts is the "system of capitalist urbanization and its fetish for water-intensive growth through endless territorial expansion and geographical restructuring."___Complying with and supporting the Navajo Nation's water sovereignty in Arizona stands in direct contradiction to the economic interests of the decision makers. Ironically, the economic and social drivers that create the governance of the water supply are creating water scarcity, not only for marginalized communities, but for all water users.

Settler Colonialism and how it Affects Water Allocation on Navajo Nation

Laura Bray's dissertation on settler colonialism and rural environmental justice addresses how the ongoing occupation of native lands and appropriation of resources is an institution of settler colonialism. This colonialism continues to influence the Navajos' access to their own resources on their own lands. Exploiting the resources on the reservation, especially uranium by the federal government, benefitted the United States government in a multitude of ways. The United States sought to harvest uranium domestically both to build its nuclear arsenal as well as to use it for nuclear power. Routine safety measures were not observed in the mining or refining of the uranium, and the Navajo - who the mines employed - were not made aware of the dangers of working with uranium. After the disaster at Chernobyl, the price of uranium plummeted and uranium mining was all but halted in the United States because it was no longer profitable. The mines were simply abandoned. Not one of them was properly closed, and the radioactive land and water have not been cleaned. There

are at least [523 abandoned uranium mines and at least 4 abandoned uranium mills](#) on Navajo Nation. It has left a legacy of water contaminated with uranium pollution that has widened the water access gap on the reservation.

Ms. Bray also categorized all significant water plans and projects that have or have not benefited the Navajo Nation, what the projects have entailed, and what promises were made. It is an extensive compilation of data that clearly lays out the disparities in the priorities for new water infrastructure that benefit off-reservation spaces (they take a few years) and that benefit the Navajo Nation (they take decades and are still unfinished). [Dams have been built, the reservoirs of which have flooded Navajo land and prioritized irrigation and water delivery to off-reservation homes, farms, and businesses.](#)

Required bureaucracy for water infrastructure on the Nation

There is a required bureaucracy for water infrastructure on the Nation that works against making inroads for water access. This bureaucracy is another remnant of settler colonialism that has kept engineering water on the Nation on a continuous loop of non-solutions. [Ronson Riley Chee's dissertation](#) on the prioritization of potable water on the Navajo Nation details the proscribed pathway these engineering projects have to take in order to be accomplished. There are both Navajo and US government agencies that are involved in the planning, financing, and development of water infrastructure on the Navajo Nation. These include the Navajo Nation Department of Water Resources, the Bureau of Reclamation (which is a federal agency that manages water resources), and the Indian Health Service, among others. He points out the deficiencies and problems inherent to this process and how oftentimes the plans do not

materialize. It is this lackadaisical treatment of the challenge of water access by using a one-size-fits-all, large, expensive infrastructure solution as the only solution, yet it simply cannot work in the remote homes on the reservation. Why is the only solution the one that can't work?

Manifest Destiny and the New Deal also played a big role in the establishment of the inequity of water access for marginalized and minority groups in the early 1900s when the west was being plumbed. The federal government subsidized drinking water for white settlers, as well as irrigation for farmers as a way to make the arid west suitable for farming. This westward expansion and "free water" were implemented with the goal of enticing white settlers to move west, but the system was not set up for the benefit of the Navajo Nation, and compromised their water access because they didn't benefit from subsidized infrastructure. Ironically, water infrastructure subsidies started to be phased out in the late 20th century, and funds for federal water infrastructure all but stopped. This fact has widened the water gap on Navajo Nation, as federal funds for infrastructure plans are much slimmer now.

Environmental justice is another context that applies to my study. The appropriation of water resources on the Nation is another form of settler colonialism rooted in environmental inequality that allowed off-reservation companies access to water on the reservation for their own gains and to the detriment of the Navajo. The problem of water scarcity on the Navajo Nation is in large part due to these companies' overuse of the Nation's resources and in part due to empty promises made by the federal government to get water to the reservation to enable them to build a thriving lifestyle. In the case of uranium mining, it has compromised the potability of water sources because they have been contaminated

with radioactive waste. These water sources are unregulated and have [concentrations of uranium, arsenic, and/or bacteria at levels that are above safe drinking water standards](#). There are streams and there are wells, but because of the uranium mining that was started on the reservation in the early 1940s in order to harvest uranium for atomic weapons, many of these water sources are contaminated with uranium. It is colorless, odorless, and tasteless, but the health effects from ingesting it are deadly. They are deemed acceptable for livestock, but are unsuitable for human consumption. Especially for those who live in remote homes, these unregulated water sources may be their only access to water.

Historical methods inform part of my study as they show the structural inequalities the Navajo Nation has been saddled with starting with the Colorado Compact and Manifest Destiny. The doctrine of Prior Appropriation recognized the Navajo's water rights as senior users to the Colorado River and other proximal watersheds. Fortunately this is blanket recognition of water sovereignty enshrined in law that the Navajo and other Native American Tribes were first to use the water, but unfortunately it does not quantify their water or require the government to construct infrastructure for water delivery. For this reason, they have been embroiled in lengthy court battles and attempts at water settlements in order to be able to use their water. A fact that benefits the state and its economic interests, because that water is being used for its own benefit.

All of these resources challenge the idea that water scarcity on the Navajo Nation is a result of their own mismanagement or apathy. The lack of infrastructure notwithstanding, These are not circumstances that the Navajo have brought upon themselves nor is it the result of the consequence of their own

mismanagement of water or their own failed attempts at a solution. This is an example of water scarcity and denial that has been constructed by the ongoing structural inequalities that have been forced on the Navajo people. Water scarcity and inequality in marginalized and remote communities is an example of the failures that colonial and structural inequalities have manufactured for the Navajo, and they are as actively practiced today as they were when they were instituted.

A glaring gap in the literature is the absence of Navajo voices in any water management solutions. They were kept out of the earliest decisions for water allocation and management, and they are still being excluded. It is the Navajo who live this reality of water scarcity and, as such, they are the experts on it. The literature that profiles the solution comes from government entities, most of whom are not situated on the reservation. There are typically outsiders who have a technological answer to make water available. This solution doesn't widely catch on because it costs a tremendous amount of money, requires expensive maintenance, and the problem doesn't fit the solution.

Another gap that I have come to realize is that for those homes on the Nation without running water there is a two-layered Navajo water infrastructure: It is unconventional, it is small, inexpensive, and the only way that water can get to these people. The first part of this infrastructure is social, particularly family. Families help each other to haul and share water. There is also the "hard" infrastructure that consists of trucks (they are necessary to haul water) and large water containers. Compared to the conventional hard infrastructure that costs millions and has not materialized in over a century, the Navajo water infrastructure works and is extremely cost-effective.

Looking critically at conventional water infrastructure and how this method of engineering cannot offer the solutions needed for the water problems that exist on the Navajo Nation is an important consideration. The one-size-fits-all approach is an extension of the problem and a placebo. It would be beneficial to explore the potential of smaller-scale projects such as rainwater and snow harvesting as well as finding methods for subsidizing and supporting the procurement, maintenance, and replacement of Navajo water infrastructure.

METHODOLOGY

There are people who have dependable water and people who don't - there isn't much of a middle ground. In the United States, if you live in the right place or maybe, more aptly, if you don't live in the wrong place then easy and abundant access to water is a right. Water is supposed to be a human right, but there is a lot of inequality with its distribution, how much it costs, and who can access it. This inequality has shaped water access for the Navajo people. Having available water in their home involves a lot of time, effort, energy, and money, and it is this requirement for water hauling that is the culmination of the historic and political and conventional infrastructure.

My methodology focuses on the experiences of Navajo people who don't have running water in their homes. I have read a plethora of articles with interviews as well as academic journals. They have provided a wealth of information on the Navajo people and how they live, but I also wanted to conduct interviews and get first-hand accounts from people who grew up on the reservation in homes without running water and/or from people who still live in homes without running water. I was particularly shocked by the practice of hauling water, because it is so completely different from my

own lived experience with water. Even considering that I grew up in the desert, getting water has always been easy for me - modern water infrastructure and management have made that my reality regardless of where I have lived. I have never been without water for more than an hour or two, and I can easily count those times that I have been without water on one hand. Looking at how hard the residents of the reservation have to work to get water underscores how easy life is for those of us who have dependable access to plentiful water. I was able to get a lot more information about how it is done and what is required in order to do it through my interview. This water access gap for the Navajo does not end at not having plumbing in their homes. After all, no human being can live without water so those without plumbing have to haul water. This is a time, energy, and money-intensive requirement to access safe, potable water and to have a supply of water at their home.

Postcolonialism and neocolonialism are both lenses through which I am looking at contextualizing the water crisis on the Navajo Nation, specifically how this water inequity was created, and why it has endured for so long. Although the Navajo have had [senior water rights](#) to the Colorado River and other watersheds in and around Arizona, Utah, and New Mexico since before the institution of the Colorado Compact, the extent to which those have reached is on paper only. It is a lengthy and often futile process to get their water rights settlements and infrastructure to access water that is rightfully theirs.

Dr. Tommy Rock grew up in a home that does not have running water. Through him, I was able to get answers to questions about the particulars of hauling water that I didn't find in my research. He provided a dimension to my own understanding about what it is like to live without water and to have to haul water

that research alone could not have done. I had originally planned to structure my interview as more of a community-based participatory research because I wanted the focus to be on both the topic and the interviewee, and I pictured a more conversational tone. I quickly found that really was not possible because my questions were specific to hauling water and why water scarcity on the reservation has persisted. The details of my interview are in the results section.

The fact that so many people do not have running water in their homes on Navajo Nation was what initially grabbed my attention early in my MESH program journey. I was shocked not only that it was a reality, and one for between 30% to 50% of the people who live on the reservation, but that doing nothing to ease this hardship is acceptable. There is a permissiveness and an acceptance in this situation on the part of people who should care and who should be taking responsibility for getting water to the Navajo reservation. All in all, it is the inhumanity that was and still is unbelievable to me.

The water reality on the reservation is such a crying injustice, and yet I had not heard of this before I started researching water in Arizona and I have spent most of my life as an Arizona resident. This is not a topic of conversation nor is it common knowledge. I have spoken to many people in my family and community about water scarcity on the Navajo Nation, and the lack of plumbing for so many homes, and there is always shock and disbelief at the statistics, even outrage and yet, silence surrounds the plight of these people.

The average American consumes 80-100 gallons of water per day. At an average of \$0.13 per gallon at water access sites, a Navajo family of four spends around \$291

per week on water, conservatively. While a typical suburban family of four only spends \$0.002 per gallon of water or \$4.48 per week.

RESULTS AND DISCUSSION

There is a very tangled water web that is the foundation of water access and water denial for tribal nations in Arizona. Following are some of the ways in which history, capitalism, and infrastructure have all worked together to create the water gap on Navajo Nation, and to widen it as time has gone on.

History and Water Policy

It is essential to understand a little about Arizona's water policy as it is especially convoluted and along with historical drivers it has created the inaccessibility for the Navajo people on their tribal lands. They are antiquated and unjust, but still actively in use today in water management particularly to keep denying the Navajo people their rightful access to water sources. The reasons for this are largely embedded in Arizona water law and Colonialism, two particularly cruel overlords to contend with when trying to bridge the water gap. The duplicity of law when it is applied to Native Americans is an all-too-familiar example of opportunity and enrichment for the state and federal governments who stand to benefit from denying tribes' rightful access to water, even though members of tribal nations are American citizens and their treaties with the United States government grant them the use of these water sources in order to create a thriving lifestyle.

First in Time, First in Right is a foundational principle of western water law established before the Colorado Compact and it still applies today water seniority in water rights today. It may seem antiquated to base water law on first-come, first-served, but it is one of

the very few laws that has benefitted Indigenous tribes in the recognition of their water rights. It recognizes the sovereignty of Indigenous Tribes over the water and gives them priority rights over the water on reservations. The majority of the Navajo Nation straddles the upper and lower basins of the Colorado River.

Even with the recognition of the Navajo Nations' water rights, which means that they own about one-quarter of the water in the basins, it is only "paper water," as it is not quantified and that is the requirement in order for them to be given access to "wet water."

The [Indian Intercourse Act](#), passed and updated throughout the 18th and 19th centuries, held that while Indigenous nations were guaranteed land and water rights when reservations were created, they lacked the right to sell that water. Instead, they had to save it for what the federal government considered a necessary use (Unsurprisingly, the federal government also got to determine what qualified as necessary.) [These policies simultaneously ensured and hindered the tribes' sovereign authorities — giving them, in theory, legal rights to water without the means to access the water or even advocate for utilizing those rights, typically for farming, personal and cultural use.](#)

[The Winters Doctrine](#) provided Indigenous tribes with perhaps the only fortune they would have concerning their water rights, and it is significant. The Winters Doctrine enshrines into law the immobility of Indigenous tribes' water sovereignty. If it were not for this piece of legislation the tribes (in Arizona) would most likely have no rights to water at all. It protects tribal claims to water, and gives them legal claims to about 20% of the water in Arizona. This became law in 1908, and as such cannot be contested or changed by other states or stakeholders who use the Colorado River. The Winters

Doctrine does have some shortcomings, though: It did not guarantee tribal nations inclusion in legislation concerning the apportionment of water from the Colorado River with the institution of the Colorado River Compact that was drafted and later signed in 1922. It also does not protect tribes' water sovereignty from being challenged constantly by state governments, local governments, politicians, and businesses. These entities have tried in earnest to ignore the Winters Doctrine in order to keep the tribal nations from their water in order to increase their own water access and use.

Although the Winters Doctrine ensures that tribal water claims can't be erased, which is most certainly what would have happened if it had not been drafted, it created the obligation of tribes to have their water allotments quantified in order to be able to use their rightful water; this has been the source of immense difficulty for tribes in getting access to their rightful water allotments. Native tribes have senior water rights, but they have to go to court or negotiate with the state, the federal government, and other users in order to quantify the exact amount of water to which they are entitled. The Navajo Nation has water settlements with Utah and New Mexico, both states into which the Navajo reservation reaches, but Arizona has been a particularly unsympathetic and uncooperative adversary in these negotiations, most likely because any allotments that are granted to tribal nations take away from the state's own allotment of water.

["The state perceives any strengthening of tribal sovereignty within the state boundaries as a threat to their own jurisdiction and governing authority,"](#) [Torivio Fodder, manager of the University of Arizona's](#)

Indigenous Governance Program and a citizen of Taos Pueblo.

The Colorado Compact, also known as “The Law of the River” was instituted in 1922. It is a significant piece of historical legislation that allocated the water from the Colorado River between the seven basin states and, later on, Mexico, whose purpose was to equitably distribute the water among the users of the Colorado River system. The seven basin states involved in the allocation and use of the Colorado River flat-out excluded any of the Indigenous tribes from participating in the negotiations, and excluded them from any water allotments. Concerning tribal nations, it unabashedly states, “Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes.”

This was significant in excluding tribes from physical access to their rightful water including the building of infrastructure for water delivery to the reservations. When the federal government was building water infrastructure for the west, the Navajo reservation was not provided with plumbing. This is in spite of free water and plentiful subsidies for white settlers who wanted to move west. Native American water rights were not prioritized and were largely ignored, even though rural locations with few residents in the growing west were outfitted with plumbing and irrigation for farming was prioritized. Add Manifest Destiny and the federal government’s subsidizing of water irrigation, and the Navajo were put far behind in the water game. In the 1900s, the federal government subsidized drinking water and irrigation for farmers to encourage them to settle in the west. Much of this happened at the expense of Tribal Nations by placing them on reservations that were remote and far from water access. In the case of the Navajo, they were allowed to return to their ancestral

homeland (the only tribe that was afforded that luxury - all other Indigenous tribes were relocated to reservations), although it was much smaller in size than their original land, and the reservation boundaries were drawn so that the Navajo they were put on the most remote portions of the land while white ranchers were given the land that had easy access to water sources.

The lack of water infrastructure keeps them from being able to develop their own economy on the reservation, excluding them from building their own businesses, and attracting outside business is next to impossible without water availability. This is important because this situation has chipped away at the choices that are available to the residents of the nation to the extent that even access to food is tenuous. The Navajo Nation is a food desert with only 14 grocery stores serving over 175,000 people and yet their struggles have been largely invisible, much as the radioactive contamination in their water, and their voices have not been widely heard.

Subsidizing water and infrastructure for the Navajo was of no interest to the federal and state governments, but they were keenly interested in exploiting the abundant resources on the Navajo reservation for their own enrichment. This resulted in water scarcity and contamination and significantly widened the water gap for the Navajo people without benefiting them long-term. Coal mining and processing on the reservation by outside companies overused water thereby lowering the water table and causing springs to dry up. This was to process coal to run two power plants on the Navajo Nation that provided electricity to very few Navajo homes (30% or more of the homes on the Navajo Nation also don’t have electricity).

Uranium mining was, however, the most toxic and costly capitalist exploitation of

natural resources for the Navajo, and has had the most lingering effect on their available water. For decades uranium was mined on the reservation enticing the Navajo to fill mining jobs that paid them little. The Navajo miners and their families were also not made aware of the dangers of working with uranium, and they weren't given proper protective gear. The mining companies that were hired enriched themselves and polluted the land and many water sources with radioactive waste significantly narrowing the availability of water sources on the reservation. These mines have still not been cleaned up. This pollution especially affects those people who live in homes without piped infrastructure as polluted surface and groundwater sources may be the only ones to which they have easy access, and conventional centralized water infrastructure cannot be installed in these places. This legacy has left the Navajo with some of the highest cancer rates in the United States (when previously they had some of the lowest in the world), and has contaminated much of their surface and groundwater with radioactive isotopes.

This has been an outright denial of water and an extension of colonialism that echoes the actions that the US government took against the Navajo when they tried to exterminate them entirely. One of the things the US government did to separate them from their land was to poison their water sources; a savage thing to do, but just a precursor to the poisoning of water that the US government did with the uranium it mined on the Navajo Nation almost 100 years later. The Navajo were subsistence farmers prior to the infiltration of colonialism that created the reservation. They had a thriving economy that relied on farming, individual home gardens, and sheep. The lack of water and infrastructure kept them from being able to farm thereby essentially forcing them to

choose a capitalist economy in the form of extractivist industries such as coal and uranium mining that enriched both the mining companies and the US government and devastated the Navajo Nation's resources, polluting their water and land with meager compensation.

The above drivers have culminated in a system of water access that is labor intensive, very expensive, and has to be repeated frequently. The Navajo have to drive long distances to communal water wells and haul large containers of water back to their homes. Not having plumbing is one thing, but actually accessing water to have in the home adds yet another layer to the challenge of water access. These containers may have enough water for days or weeks depending on the number of family members in the home and the way they live.

Making water accessible on the Navajo Nation is not straightforward by any means; it is a complex and multifaceted challenge due in part to the terrain and remoteness of homes. There hasn't been any robust action or urgency to change this situation by those who are responsible for it - namely the federal government and the state of Arizona. It is unbelievable that this kind of inhumanity is happening in such a technological country as the United States. This manipulation of law and policy has put infrastructure farther and farther from being a reality, but what is more important is this shocking scarcity of water is an enormous daily burden for the Navajo people and a consequence that requires daily undue challenges to get water to their homes.

Navajo people are 67 times more likely than other Americans to live without running water or a toilet.

The Reality of Hauling Water

Hauling water is what people living on the Navajo Nation have to do to get water for drinking, bathing, washing dishes, clothes, watering plants, and animals, when they live in homes that are not connected to plumbing infrastructure and, therefore, have no running water. It is an arduous process and nothing like driving a mile down the road to a convenience store and picking up a gallon or two of water, which is the only comparison someone living off-reservation might be able to compare it to. It is time consuming, physically demanding, and the only way a family can procure enough clean, safe water for daily use.

There are communal wells that consist of one singular spigot, and they are shared. There can be hundreds of people using the same faucet for their water needs. This water is not free. In fact, it is some of the most expensive water in the United States at [\\$43,000 per acre foot; compare that to the \\$600 per acre foot that the average American water user pays](#). Fill spots are in certain locations and they are not convenient, potentially causing hours in driving long distances to reach a fill spot. The filling spots consist of a single spigot, which can be shared by hundreds of people. This often causes long lines and long uncomfortable waits, especially in the heat of the summer. There, pipes that run to the tap at the filling station are fragile and often fracture under pressure so the water runs slowly. [The cost for this water is substantially more](#) than the average American pays and is a cause of economic strain for the Navajo who make two-fifths of the income of the average American.

There is also a limit to how much one person can get at a time - I learned this in my conversation with Dr. Rock. If a person goes over the limit, there is a consequence of being banned from that particular filling spot for weeks or even months. Imagine being

banned from being able to use the water in your home because you left the hose on and forgot about it. The Navajo are limited to the amount of water they will put to good use when those who have easy access to water have no limits on how much they can waste. Another thing I learned from Dr. Rock, is that the infrastructure that is connected to the communal faucet is often in disrepair and sometimes it has to be shut down because there isn't enough pressure to fill containers. In this situation, people are turned away because there's no backup or alternative to the single spigot.

I wanted to get more details about what is involved in hauling water. One of the reasons for this is that even though details about hauling water are in many of the articles and journals that I have read, there are particulars about the process that I still wonder about. I think it is also an important way to illustrate the disparity in water access that exists on Navajo Nation when compared to the water access that a vast majority of Americans enjoy. Following are details of my interview with Dr. Rock. I have included some of my interview questions, which are in italics.

I wondered if a truck is required in order to be able to haul water, and Dr. Rock confirmed that a truck is essential to hauling water - there is no way to do it otherwise. He also said that the suspension on the trucks deteriorates quickly because the roads on the Nation are rough ([about 77% of roads on Navajo Nation are not paved or paved only with gravel](#)). The roads are particularly challenging after it rains or snows.

This is not a task that a person can do alone, either, as there is physical strength required to load and unload an empty 250-gallon IBC tote onto the bed of a truck. The containers also require periodic cleaning, which means their available water has to be stretched. It also adds yet another financial output

regardless of the chosen cleaning method. I also have to give a shoutout to one of my colleagues who wanted to know about cleaning the containers. So I asked how they are cleaned and if there is a certain way of doing it.

“I’ve seen people take them to a car wash and rinse it out that way. Others have a scrubber and they scrub it out and clean it that way. Dish soap or sometimes they mix it with that and Clorox and clean it out.” What came out of this was another issue that I had not considered and that is that because of the expense of the containers, people would use containers and/or clean their water containers with harmful chemicals. For this reason, Dr. Rock created a guide to help people who haul water.

“I wrote a water hauling guide, poster, brochure, and word document. A tribe in Minnesota or Wisconsin used it for their water hauling as well. I wrote it because people were hauling water, but they were using containers that have other chemicals in it like forever chemicals in them, and people was them with Clorox or what have you and there are still going to be traces of those chemicals inside those containers and it wasn’t safe so I wrote that to educate the public. On there are water barrels that are safer to use rather than barrels that were used in industries and had chemicals and weren’t safe.”

I was looking at the IBC totes, and those are not cheap. That's kind of a substantial financial output for a person to buy one of those. I think I already know the answer, but I am going to ask the question anyway: Is there any sort of subsidy for those? “No, there is no subsidy. Sometimes the children will end up buying a container for the family. A lot of elders are on a fixed income and they’ll ask someone to haul water

for them. I do have some friends that I pay like 40 bucks to get me 300 or 400 gallons of water and it will last for about two weeks or so. A friend of mine got highlighted for doing that.”

With one of those 250-to-350-gallon totes do you get it on the truck by yourself?

“You do require two people because they are huge and bulky.”

Do you need any special type of equipment?

“Oh no, we just lift it up. If it’s empty it’s not that heavy, but I prefer to have two people so I don’t get hurt.”

Tribal elders are often unable to haul water because of the physical strength and mobility required to do it. This got me thinking about the elderly population as they are a vulnerable group within a vulnerable community that is already marginalized with regard to water access. I asked Dr. Rock if the families take care of the elders. He said that, yes, family members will take care of the elders. In terms of accessing water via hauling it, in some cases the elder will have the water container in the truck already so they don’t have to take it out. It is always in the back of the truck so if they need to go haul water then they just haul the water and bring it back. From there, they just turn the faucet on underneath and drain it out or siphon it or they’ll get a water pump to get the water out of it.

How long does it take to get from your home to the fill spot?

“It varies. It can range from 30 minutes to a couple of hours, and during the summer it can easily just be a whole day getting water.”

Water is not guaranteed even when one is hauling it. For homes that are very remote and close to contaminated wells, they may

opt to use water from those sources rather than undertake the journey to a regulated well. These unregulated water sources are not routinely tested and can have high levels of contaminants from naturally-occurring arsenic in the groundwater, E. coli and other pathogens from water contaminated by livestock. They can also be contaminated by uranium contamination from the abandoned mining industry. These water sources are forbidden for drinking by the Navajo Nation EPA, but not all of them are marked as dangerous and unfit for human consumption. There is also the simple fact that when accessing water is near impossible and people are thirsty, they are going to get water from wherever it is available even if that water is unsafe.

The average resident on the Navajo Nation uses an average of just 5 to 10 gallons of water per day. The average resident of the state of California uses 76 to 100 gallons per day.

It is common for Navajo residents to buy bottled water, so they pay for water twice when considering that driving to communal water wells to fill tanks and haul water back to their homes is a requirement when one doesn't have piped water. (Navajo Water Project)

Engineering the Problem

Engineering apathy and inequity have worked in tandem to actively keep the Navajo from being able to access water by promoting a one-size-fits-all solution.

Much of the reason for the prolongation of water scarcity and lack of access on Navajo Nation is that the engineering solutions echo the colonial attitudes of government and policy that uphold the status quo. This has allowed them to hide behind red tape and bureaucracy and “the way it’s always been

done,” which makes no water for the Navajo as the most predictable result. Much as history and policy have cultivated a status quo that refuses to take responsibility to get water to the Navajo people. Innovation stagnation is an accepted form of problem solving. The focus on money and convention are contributors to the innovation gap since this typical and bureaucratic way of managing water is the way it has always been done. It also allows those who are in power to excuse themselves from the responsibility to provide the most basic human right of water.

One of the biggest things in the way of water access on the Navajo Nation is engineering and applying a one-size-fits-all solution to a problem that involves layers of complexity including size, terrain, and funding. Applying the convention of centralized water infrastructure and the conventions of urban water systems to a rural and remote space has perpetuated the problem and widened the water gap.

Water inequity, radioactive contamination of water, and water scarcity are commonplace on the reservation. Some homes do have water infrastructure, but the homes that are located in remote parts of the reservation provide a much greater challenge to delivery of water via conventional underground water infrastructure. A combination of Navajo utility authorities as well as state and federal agencies are the pathway to engineering water delivery to these unpiPED homes. It is a typical and ineffectual solution that is offered even though it doesn't get beyond the planning stages because of the expense. The planning and design for this is rooted in typical off-reservation water districts that allow for straightforward additions to existing infrastructure; it does not take into consideration the conditions or needs for water delivery on the Nation.

The Navajo Nation is roughly [16 million acres or about 25,000 miles, and is the largest Native American reservation in the United States](#) It also has the third lowest population density of any place in the United States with Alaska and Wyoming. Population density is a geographic measurement used to categorize a place as urban or rural by calculating the number of persons in a certain space. The Navajo Nation has a population density of 6.02 persons per square mile. [The average population density in the United States is 93.8 persons per square mile.](#) This lack of population density in a rural area makes supplying conventional water infrastructure next to impossible. These homes are miles from each other, and often a rocky, unpaved road will lead to a single solitary home. The terrain itself is rough and rugged making it very difficult to dig the trenches needed for pipes. The remoteness of the homes and distance from one another makes it cost prohibitive to install conventional water infrastructure. This is not to say that the terrain and remoteness of homes on the reservation are the fault of the engineering, they certainly are not, but centralized water is not the only way to deliver water to a community and to accept this singular solution and abandon the exploration of any other methods of water delivery or access is apathy on the part of scientists and engineers.

There are challenges at every phase of water development on the Navajo Nation, and every phase involves some aspect of government. [The speed at which water lines can be built to serve homes directly depends on the staffing levels and funding levels of federal and tribal programs involved in the planning, design, surveys, environmental permitting, cultural resource reviews, design reviews, and construction management.](#) Estimates to get the immediate water needs of the Navajo tribe met is above [700 million dollars](#) - this is using centralized water as the

only solution. Substantial time and energy has been invested into projects that stall before they reach the building phase, but the likelihood of plumbing remote homes, of which there are many, is extremely slim at best. This is not due to the engineering, but the above-mentioned terrain alone makes it infeasible. And yet the default and the standard has been to solve this problem in this one way, and in one way alone. This existence of technology does not mean that an effort is being made to improve something.

All of these components have created an enormous water gap that has lasted for over a century. This is not the fault of the Navajo people or leadership, but is a result of the federal government's treatment of them by first removing them from their ancestral lands, the later exploitation of the natural resources on sovereign Navajo land, and an adherence to conventional water management and built infrastructure that has stagnated seeking out robust solutions to the problem. This has widened the water access gap even further for the Navajo, placing water resilience farther and farther from their grasp.

SUMMARY

A large portion of the Navajo Nation has been without running water for over a century. Historical drivers have created inequity in the distribution of water through colonial settler attitudes that started in the early 20th century and are still affecting the Navajo Nation today. The opinions, ideas, and needs of the residents of the Navajo Nation regarding water availability and delivery are rarely sought out, which could add a much-needed resource to unconventional, but successful solutions. Connecting homes to water infrastructure is not an easy task because of the remoteness of homes on the Nation, the terrain and unpaved roads, and the pollution

of surface and groundwater with uranium. The answer to this problem has been large-scale water infrastructure, but the price tag and timeline usually stall the project before it starts. This has basically rendered the water challenge unsolvable by those means. People still need water, and those without plumbing haul water, which involves driving long distances, waiting in lines, and carries a high price tag. This is the only infrastructure these people have, and it is bolstered by a strong social and family infrastructure. Challenging conventions and looking toward holistic answers in the guise of small, off-grid water harvesting systems that can at least augment available water and potentially offset the number of trips to a fill spot and money spent on gas and water can potentially make an immediate positive impact. Subsidies and grants for water containers would help support the water infrastructure that water haulers currently have.

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Wind Turbine Along Coast of Massachusetts Maritime Academy Property. Source: V. Taylor, 2024

Analyzing Contentions Attitudes Surrounding Offshore Wind Farm Construction in Massachusetts Coastal Communities

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ABSTRACT

For this paper, I investigated factors contributing to the contentious public discussion surrounding Offshore Wind Farm (OWF) construction near Massachusetts coastal communities. My research revealed that coastal Massachusetts residents offered differing views, opinions, and varying beliefs of how sustainability, health, and the economy will be impacted by OWF construction, often discussing these topics in broad terms. Because there is limited and variable research and literature in the field of OWF construction, coastal communities experience much uncertainty about the impacts of these projects, which inevitably fuels contentious discussions and attitudes toward OWFs. Skeptics toward OWF construction focused on fears of: community industrialization, displaced livelihood, and degraded ecological and personal health. Conversely, proponents recognized the potential benefits of renewable energy, mitigating climate change, and socioeconomic benefits. By describing the contours of public opinion, my research broadens current literature on OWF construction and fills a gap in scientific literature. However, additional research is needed to better understand how the relationship between OWF companies, regulators, and local communities can be improved to eliminate the contentious feelings surrounding this important energy transformation.

INTRODUCTION

The United Nations defines renewable energy as energy that is derived from natural sources and that energy must also be replenished at a higher rate than the consumption rate([UN](#)). The U.S. is in its infancy stages of integrating renewable marine wind energy infrastructure into its environmental, economic, and societal realms. President Biden released [Executive Order 14008](#) (E.O.) on January 27, 2021. This called for a response to ongoing global environmental and social concerns related to climate change. The following year, the White House set a goal; Deploy 30 gigawatts (GW) of offshore wind by the year 2030 ([White House Goal](#)).

Why does any of this matter? In March 2023 the International Panel on Climate Change released a report to policy makers that stated “Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming...” ([IPCC Report](#)). Society must actively plan for the future of renewable energy infrastructure at all steps. This paper will focus on Offshore Wind Farm (OWF) construction near Cape Cod, Massachusetts (MA) and the themes of sustainability, health, and the economy as they relate to the contentious public discourse that surrounds wind turbine construction.

The U.S. is only just beginning to integrate large scale wind energy infrastructure discussions into the fabric of its public and economic structure. In an address to the nation during the February 2023 Floating Offshore Wind Shot the Department of Energy Secretary Jennifer M. Granholm purports that “change can move faster than anyone can imagine” ([DOE video](#)). The global climate is degrading, and development of emerging technologies such as renewable offshore wind infrastructure is necessary which is why the research into OWF

construction community and public opinion is vital.

However, we must remain cognizant of the precautionary principle as we implement novel infrastructure to avoid generating new problems while we solve current ones. To be sure the momentum carrying renewable wind technology is fulfilled sustainably requires a holistic approach and forward thinking.

Ultimately, this research is an attempt to understand the MA coastal community discourse surrounding OWF construction and spur discussion among regulatory bodies and stakeholders involved in U.S. offshore wind energy development. Long term goals to further generate comprehensive and environmentally sustainable marine wind energy regulations and industry practice standards should be developed in concert with community ideas, feelings, and input. Through this research, I argue an energy transition and uncertainty surrounding OWF construction generates contentious attitudes and further research in the subject may help to alleviate these negative feelings.

HISTORICAL REVIEW OF OFFSHORE WIND IN THE U.S.

In this literature review I work to identify the trends and gaps associated with the construction and future planning phases of OWFs in the United States. The trends I highlight are related to sustainability of wind turbine construction processes, ecological health of marine ecosystems, and economic concerns related to a transition into wind energy production. These three areas are the dominant trends I found within literature and with further elaboration of details and discussion I will pinpoint exactly how my research will work to interconnect these seemingly separate topics. My goal is to identify the larger topics of contention surrounding offshore wind projects in the

federal waters off the MA Coast of the United States. The goal is to produce a cohesive report that builds a connected framework to help cull the public contestation currently surrounding OWF construction.

Sustainability Trends and Gaps

The literature and research behind sustainable construction methods when it comes to the U.S. transition and implementation of large scale renewable offshore wind energy production largely centers around waste management and materials. A clear gap I noticed in these discussions surrounding the material sustainability of offshore wind turbines is the importance of the regulatory scheme surrounding these installations. While some literature did mention that the regulatory environment is difficult to navigate, much of the literature discussions were focused on ways to engineer more compostable and useful materials in future construction endeavors like [AlAli et al., 2023](#) and [Martini & Xydis, 2023](#), have provided.

There is a lot of research being done on the mechanical break-down and re-use of turbine blade waste. I watched an excellent interview with Dr. Seeram Ramakrishna, he discusses the importance of “mining materials from the waste” ([Spotlight Interview](#)). Alternative techniques for reusing broken material from old blades are nothing to scoff at and should continue to be researched. Other literature that speaks to the now instead of the future was written by [Chu & Lam, 2020](#), and [Carré et al., 2022](#), which focused on studies to retrofit current wind turbine blades. While this would help to offer more sustainable practices within the wind farm industry and decrease waste it does not address the need for enforcement of such upgrades, which is a gap. In my opinion federal regulations would have to be implemented to require existing wind turbines to enforce widespread use and

outfitting of current turbines with new environmentally sustainable upgrades. I was able to find trends within literature that focused on the importance of regulatory involvement in sustainability practices. However, research is largely conducted by European countries, [Pouikli, 2020](#), described detailed regulatory routes and desires that support sustainable renewable wind energy but that is because European countries have a more established offshore wind infrastructure. There is a gap in current literature that analyzes the current and upcoming regulations available on this subject for the United States.

Additionally, a significant portion of literature only discusses environmental concerns if the use of non-sustainable materials or unchecked disposal continues. This undoubtedly leaves a large gap directly related to an aspect of the sustainable waste management pieces of their discussion which is, what are the detailed end-of-life plan (EOL) plans for offshore wind turbines and associated cabling and power stations. The literature I was able to find discussing EOL plans made no mention of reliable or successful pathways to implement these ideas, they just presented models and assumptions about what could be possible ([Hagnell & Åkermo, 2019](#)).

Ecological Health of Marine Ecosystem Trends and Gaps

Based on data collected by the National Offshore Wind Strategy, the federal offshore waters of the U.S. could provide approximately 2,000 Gigawatts of offshore wind resource capacity ([Smythe et al., 2020](#)). However, research as well as construction within the offshore renewable industry is still in the beginning phases and literature has made clear that both long-term studies and large-scale research efforts on the effect renewable wind turbines have on the marine

ecosystem must be prioritized ([Langhamer, 2012](#)). The Not In My Backyard (NIMBY) movement is centered around preventing coastal and offshore wind turbines from being installed along land where residential homes have idyllic views of the sea. These groups try to use declining health of the marine ecosystem claims, such as whale and bird killings related to turbines, to prove their arguments however the literature shows that more research is needed to definitively prove these claims ([Horwath et al., 2020](#)).

Some studies regarding the potential positive and negative effects of offshore wind turbine installation and habitats that may be formed underwater have been completed. However, literature shows that many of these studies are extremely specialized and specific to individualized underwater species ([Lloret et al., 2022](#)). For example, there is literature and research primarily based in modelling data to project out and determine the effects wind farm placement in the Northeast might have on the surf clam population ([Borsetti et al., 2023](#)). While I believe the surf clam is important and could be vital to addressing the health of marine ecosystems, I do think literature views in this field tend to become overly specialized and narrow. I see that as a gap, and I believe taking a slightly broader approach could be beneficial. Similar scientific research takes the same narrow view and approach, always focusing on a single species ([Horwath et al., 2020](#)). Uncertainty in the health of the marine ecosystem is a massive concern for the scientific field. Another gap I see in the health literature is with respect to the navigable waters these wind turbines will be installed within. I believe the literature is missing discussion surrounding the intersection of man and marine ecosystem some examples include; navigational lighting on structures, hazards to navigation, as well as the intersection of turbine construction and

deconstruction.

Economic Trends and Gaps

For more than two decades much of the economist literature related to offshore wind expenses has focused on uncertainty within the field and how that uncertainty generates greater costs ([Beiter et al., 2017](#)). This uncertainty discussion has predominantly revolved around the expenses surrounding implementation of initial project phases such as permitting and primary construction. The uncertainty also focuses in large part around variable wind patterns, project size, and project location which all directly affect power production and help to drive initial construction estimates for cost ([Castro-Santos et al., 2016](#)) and ([Adedipe & Shafiee, 2021](#)).

However, further discussions related to the later stages of project construction and deconstruction, or decommissioning are not mentioned or at best infrequently referenced as a problem for the future ([Beiter et al., 2017](#)). When decommissioning was mentioned, such as the modeling calculations I reviewed for economic feasibility of offshore wind in the journal *Energy*, to me it appeared out of context. The model used a variable for the estimated costs of both installation and decommissioning wind farms to be treated as the exact same number ([Castro-Santos et al., 2016](#)). I believe this is wholly inappropriate and displays the inadequate literature and research available surrounding the economic costs of certain aspects of OWF construction like partial and full decommissioning processes. As early as 2011 literature has revealed that pricing and cost of offshore wind is still largely undeterminable due to the uniqueness and relatively underdeveloped infrastructure in the United States ([Levitt et al., 2011](#)) & ([Beiter et al., 2017](#)).

Literature reports that the current lack of offshore wind infrastructure in the United States introduces economic challenges. This discussion has been ongoing for over a decade, authors in the Energy Policy journal purported “long-term operations and maintenance costs are relatively uncertain” (Levitt et al., 2011) with the economic processes of offshore wind many years ago. Unfortunately, literature shows this uncertainty is not diminished. A report conducted by the National Renewable Energy Laboratory (NREL) on behalf of the Department of Energy in 2023 emphasized that uncertainties with macroeconomic events such as higher costs of fossil fuels supply chain challenges, increased inflation and interest rates all threaten to hinder offshore wind projects and increase their cost (NREL et al., 2023). The outlook of the report also continues to follow the trend seen in economist literature which boasts a rapid need for offshore wind energy. Due to ever-increasing electricity and electrification demands of consumers (approximately a threefold expansion) the United States must meet the needs via renewable wind energy generation (NREL et al., 2023).

The largest, and in my opinion the most important, issue I have seen omitted from these economies and energy cost/pricing focused articles, reports and research models is related to energy justice and energy security. The current literature amongst the financial and economic fields makes it apparent their groups are reluctant to discuss the humanity driven aspect of their profession. Much of the literature discusses the construction and maintenance cost of renewable wind energy does not relate its discussion and findings to how those economic costs will affect the public. Energy security is extremely important however the economic literature is not making that known. As discussed before, the UN

sustainable development goal 7 calls for access to affordable, reliable, sustainable, and modern energy for all (United Nations, 2024). The key phrases here when viewing this in the context of the economy are *affordable* and *sustainable*, however the gap in literature specific to energy justice and energy security must be filled if this goal is to be met.

Project Contribution to Literature

My capstone project aims to contribute to discussions in the U.S. OWF field since it is still in the infancy development stages. It will identify areas of concern in the public discourse of a specific coastal community to generate further discussions of U.S. renewable energy development on the U.S. Continental Shelf (OCS). My literature review has made clear that current research doesn't explicitly address the unique concerns related to sustainability, ecological health and economic avenues I have identified as under researched or missing, likely fueling contentious discussions surrounding OWF construction. This research will bring into perspective the opinions and feelings of the coastal communities in Massachusetts regarding OWF construction. It will also highlight how OWF construction is related to environmental justice, which current literature has failed to address. By shoring up these portions of the offshore wind energy discussion which have up until this point been largely discussed separately, I hope to provide better clarity into why OWF construction is so contentious in MA while also highlighting future areas of research that should be explored.

METHODOLOGY

As I progressed through this MESH Master's program, I was immersed in a variety of viewpoints both from instructors and fellow

classmates. This began to soften me to alternative perspectives and allowed me to truly begin to listen to the discourse I was having with my peers and further delve into the assigned readings. Now armed with an open mind, I was able to identify patterns developing in the research I was conducting related to offshore wind which I highlighted previously in the literature review of this paper. The sustainability, health, and economic concerns amongst the offshore wind field started to become prominent and I began to ask myself “are these larger themes related to the contentious environment surrounding these renewable energy projects?” and “who is benefiting and who is not?”. These questions helped me to start shaping my larger research questions as well as the methodology needed to complete my research.

Research Questions: *“Why is the construction of offshore wind farms in Massachusetts federal waters contentious among coastal community populations?” and “How are sustainability, health, and the economy discussed in public discourse and opinion?”*

To answer the above research question(s) I employed a three-pronged approach which included, using my background as a regulator in the Coast Guard and my regulatory expertise to review current regulations surrounding offshore wind. I also used qualitative methods to interview and survey key stakeholders involved with or impacted by offshore wind construction and employed quantitative methods to collect archival public opinion data regarding these construction sites to generate an inclusive and comprehensive discussion of where the concerns surrounding offshore renewable wind energy are rooted.

Relevant Epistemology

The epistemology I found extremely relevant to my work is that of cultural relativism. Cultural relativism is an overall rejection of universalism. Since my research surrounds not only American coastal communities but also indigenous populations, the cultural relativism critiques the individualist emphasis of human rights of Western imperialism ([Colchester, 2021](#)). American Indian tribes have long fought to have their voices heard and cultures respected. Cultural relativism teaches that every society shall be given the platform to be understood on its own terms ([Colchester, 2021](#)). It is also important to note that my application of Community-Based Participatory Research (CBPR) in this report is relevant because CBPR places an emphasis on avoiding epistemological errors. Those are our inherent and learned ways of thinking which produce consequences that impact justice and ecological sustainability ([Minkler & Wallerstein, 2008](#)). Currently, there is limited research using CBPR related to OWF construction, however some data has been collected. A 2015 report completed by the Island Institute utilized CBPR with a focus on community education. By educating the local community on OWF benefits and mutual learning opportunities their research revealed education could help to improve the decision-making process related to OWFs which may potentially improve social acceptance of the outcome of renewable wind energy projects in the UK ([Klain et al., 2015](#)). Given the positive outcome of other scholarly research utilizing CBRP methods, I believe CBPR is an important foundation to my research. Embarking on this research journey I know I had a slight bias toward OWF construction and development. To avoid any further bias in my research as I conducted interviews and reviewed survey data, I leaned into CBPR, keeping the community at the forefront of my

mind, I pulled data from all sides of the OWF discussion and not just the supporters. I believe this mindset and stance I took helped me produce data that remained untainted by my own personal feelings.

Theoretical Framings Within My Research

The U Theory, developed by Otto Scharmer helped drive and guide my research process as I worked to generate the results and outcome discussions for this MESH capstone. The U theory process focuses on “individuals, groups, and organizations to sense and actualize their highest future potential” (Scharmer, 2018). Some of the core ideas behind this theory is that to drive stakeholder change from dysfunctional or contentious to cooperative you must change the make of the relationship from reactive to co-creative. As I worked to determine the contentious realities surrounding offshore wind this theory helped to ground my qualitative and quantitative research in overall shared beliefs and trends rather than a positivist framework or mindset. This theory also helped to direct my process as I work through answering my research questions and analyzing the data with an open mind (Scharmer, 2018). Systems Thinking is another theoretical framing I employed. Systems thinking explores how relationships, patterns, and differing separate components within a system all interact with each other (Vitasovic et al., 2022). Rather than analyze the offshore wind technology and associated stakeholders as separate organizations, with systems thinking I ensured I viewed these separate contexts as one large entity (Vitasovic et al., 2022). I believe all these theoretical framings applied to my quantitative and qualitative data have helped my outcome yield a more thorough and well-rounded research discussion.

Methods of Obtaining Qualitative and

Quantitative Data

My research methods were conducted under a theme of CBPR, “Participatory research is defined as the systematic inquiry, with collaboration of those affected by the issue being studied, for the purposes of education and of taking action on effecting change” (Minkler & Wallerstein, 2008). The reason CBPR is a valid method is because scholars have shown the elements which are fundamental to this participatory evaluation style are; involvement and dialogue of marginalized and disenfranchised groups is sought out and their critical reflections are fostered (Minkler & Wallerstein, 2008). In my case study the intended uses are the beneficiaries and stakeholders of the research findings. The marginalized Wampanoag tribe of Mashpee and the local coastal community residents. Unfortunately, as I progressed in research and data collection, I was unable to contact any member of the Wampanoag tribe for comment or participation in this research. I also was not able to generate input or contact from the Vineyard Wind company representatives that, according to public information, assigned specific company members as local tribe consultants. I received no follow up after repeated phone calls and emails.

Archival Data

The methods I have employed up to this point are peer reviewed research literature and public records archival data as my main sources of information. The [Federal Register](#) (FR) is published by the Office of the Federal Register, National Archives and Records Administration. The FR is the official publication source for rules, proposed rules, and notices of Federal agencies and organizations, including presidential executive orders. The federal agencies overseeing the leasing and construction requirements of offshore wind installations

must use the FR as a mechanism to communicate their potential actions to the public. The public has the option to use this as a forum to voice their concerns, making this a data source rich in polyvocality and broad community feedback in a time stamped chronological order.

Stakeholder Interviews

I conducted semi-structured interviews with 2 members of the federal agency involved in oversight of offshore wind. The Bureau of Ocean Energy Management (BOEM) facilitates the responsible development of renewable energy resources on the OCS in the United States. I did not complete an IRB for these meetings however I did provide a verbal notification of my research intent garnering informed consent and guaranteed anonymity. Also, working within my own office at the U.S. Coast Guard Headquarters I reviewed appropriate regulatory schemes related to offshore wind construction to better draft and prepare my interview questions. All interviews were recorded then transcribed into digital Microsoft word format. Once I had digital word documents, I was able to use thematic coding and Microsoft Excel to review the questions I asked to identify themes, and discussion points vital to the results of this research. My research had a significant amount of opposing ideas, feelings, and opinions on OWFs so the process of labeling and organizing all my qualitative data via thematic coding was necessary to accurately extract themes crucial to answering my research questions ([Medelyan, 2019](#)).

Stakeholder Surveys

To foster authentic dialogue and results I orchestrated a concerns survey to produce more results in addition to the archival and public research I conducted. This helped to identify the community concerns related to

offshore wind and allow me to compare the results to the key sustainable, health and economic themes I already discovered in literature. The survey was released in the Sea Grant online newsletter for Massachusetts. This type of data was vital because concerns surveys typically ask community members to define what they see as most important ([Hampton, 2024](#)). Since my interviews were focused on regulatory agencies, I would not have been able to generate this personal data without the survey.

Figure 1. Authors Survey



Research has shown that CBPR is an ideal research style when discussing and involving indigenous communities and people because it helps to maintain ethical research ([Koster et al., 2012](#)). Koster states that “reflexivity is a deconstructive exercise for locating the intersections of author, other, text, and world...

([Koster et al., 2012](#))”. Utilizing CBPR practices I hope to place a check on myself when conducting interviews with all parties. I recognize that I’m an outsider in discussions related to the community needs of the coastal citizens as well as the indigenous Wampanoag tribe. So, regarding my research, I’m utilizing CBPR to help ensure my learned behavior and Western views on research don’t and shouldn’t influence the outcome.

Conference and Field Notes

I attended the U.S. Naval Institute conference titled Securing the Nation - Energy Security Fortifying the Defense Industrial Base and Strengthening Infrastructure Resilience in

October of 2024. Energy and renewable energy generation lie at the heart of my MESH capstone. I participated in this event to gain additional perspectives from another community for my project. I was able to hear from experts such as government officials, military personnel, and academic scholars while they took a deep dive into the crucial nexus of national security, the American

economy, and the future of energy. I took substantial field notes and engaged in impromptu discussions with attendees to synthesize and navigate this community's perspective and triangulate where it intersects with my case study and the coastal communities of Massachusetts that are on the precipice of a renewable energy transition.

Case Study: Massachusetts Coastal Communities

Introducing background to Federal Register (FR) Archival Research

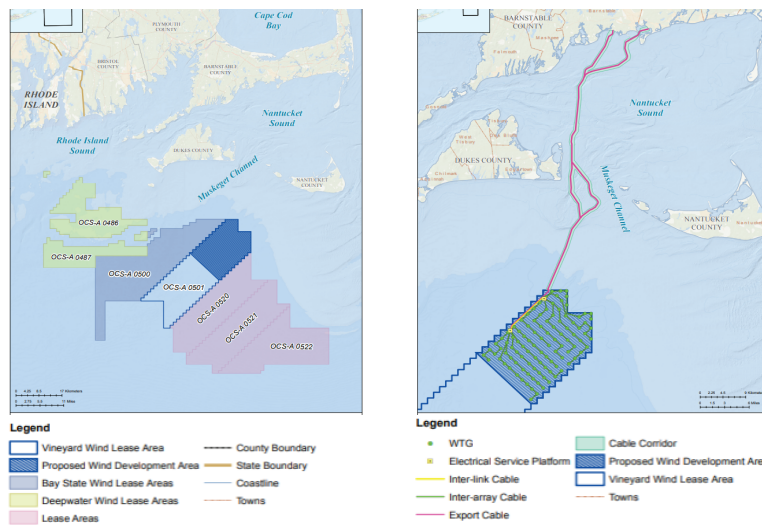


Figure 2. Vineyard Wind 1 Site 1 (BOEM, 2024)

The archival research from the FR consisting of public comments and audio transcripts I compiled and analyzed is grouped into two different site locations across two distinct points in time. I decided to choose these two areas because the locations of the proposed wind farm sites are geographically located near each other. The lease areas are both located in federal waters of the OCS seaward of U.S. Territorial Seas of the East Coast near the New England locality of Massachusetts. Additionally, Vineyard Wind, is the company

that won both of the BOEM OWF lease locations via auction. I picked these two OWF locations to collect a substantial amount of data to reach saturation. Based on the compilation of data collected and analyzed from the FR, my survey, and triangulation of additional research I completed as new themes were revealed, I collected enough data to address my research questions regarding contentious public sentiment and discussion surrounding OWF construction and explore other opportunities

for future research and improvement.

anticipated to develop 160 WTGs and offshore export cable corridors to produce 2,600 MW ([Federal Register, 2024](#)). The comments analyzed were provided in March of 2024.

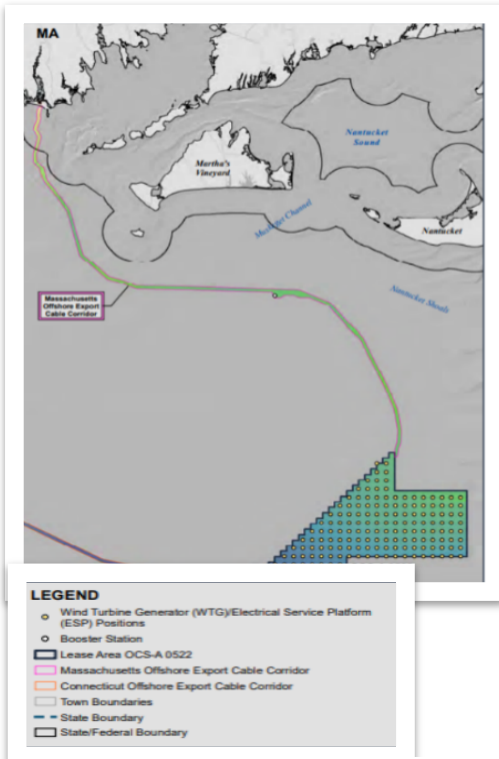


Figure 3. Vineyard Wind Northeast Site 2 ([BOEM, 2024](#))

The first OWF site included in this case study is *Vineyard Wind 1*, and it was the first large-scale construction and operation OWF project approval in the United States. It is located approximately 12 nautical miles offshore Martha's Vineyard, MA and 12 nautical miles offshore Nantucket, MA in the northern section of lease block- (OCS-A 0501). The project will produce 800 megawatts (MW) after the development of 100 wind turbine generators (WTGs). ([Vinyard Wind, 2020](#)). The comments analyzed were provided in March 2018 ([Federal Register, 2018](#)).

The second OWF site is called *Vineyard Wind Northeast*. It is located roughly 29 miles from Nantucket, MA and approximately 39 miles from Martha's Vineyard, MA, encompassing the entire lease block- (OCS-A 0522). The project is

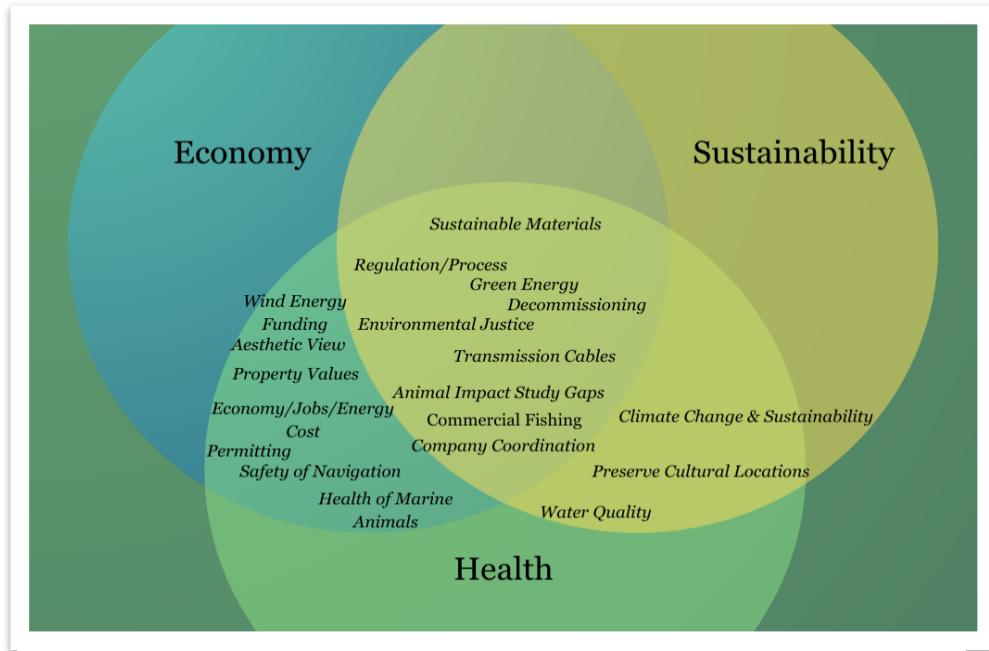


Figure 4. Venn Diagram

To organize the thematic coding of my FR research and help me answer one of my research questions, *How are sustainability, health, and the economy discussed in coastal public discourse and opinion*, I broke down FR public comments into 19 different categories and once that was complete, I further categorized the comments as either positive, negative, or neutral. Finally, I reviewed all comments from both locations then sorted the categories in a Venn Diagram to display how interconnected these areas are within the themes of Sustainability, Ecological Health, and Economy. It is important to point out that no category falls into any single discussion topic. All these discussion categories are interconnected in some way or another, which is something current literature does not address and is important to later themes highlighted in the discussion portion of this research.

FR Results

Vineyard Wind 1: The negative public discourse and sentiment toward OWFs accounted for approximately 30% of the comments while 42% of the submissions specified statements that supported OWF projects. Finally, neutral comments and those requesting more information made up approximately 28% of the submittals I reviewed.

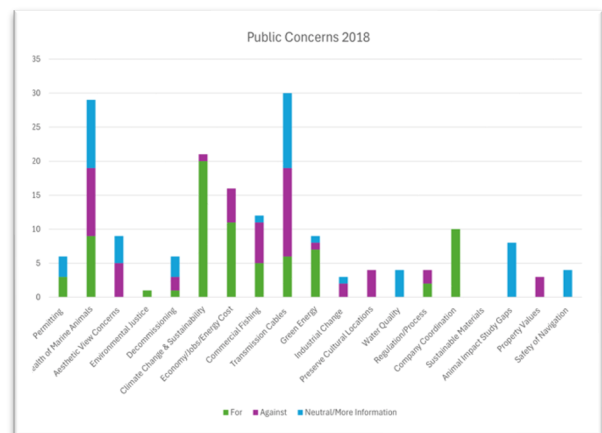


Chart 1 Vineyard Wind 1

Vineyard Wind Northeast: The negative sentiments expressed accounted for approximately 50% of the comments while approximately 34% of the submissions specified statements to support OWF projects. The neutral and more information submittals accounted for about 16% of the comments.

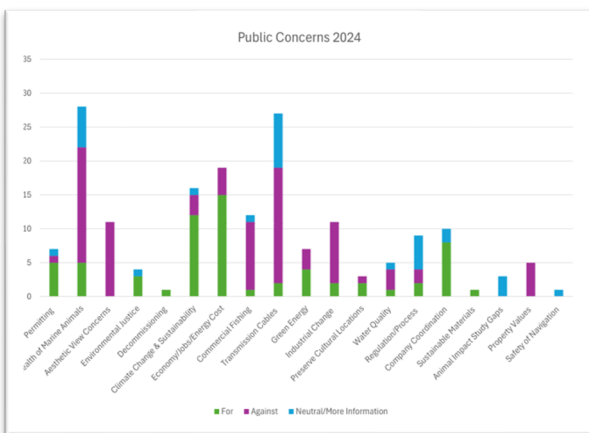


Chart 2 Vineyard Wind Northeast

Combining FR Data with Survey and Quantitative Data to Produce Results

Henceforth, the mention of FR comments and trends in this research paper is derived from the results of my thematic coding of archival FR data described previously.

The following discussion will answer research question 1. How are themes of Sustainability, Health, and the Economy discussed in the MA coastal community public discourse and opinion?

Sustainability

Previous literature discussed sustainability in terms of physical materials used to construct wind turbines and focused little on the regulatory aspects of what might make an OWF project sustainable. This was held true within my research as I only encountered one FR comment related to the material construction of offshore wind turbines;

“Ecological design elements should be incorporated into offshore wind infrastructure, specifically for scour and cable protection where the benthic habitat could be maximized. Using nature-based design elements”

FR Comment 1

Research revealed commentators who opposed OWF construction and its implementation as a mechanism to transition away from traditional energy sources such as oil and gas make no mention of the word Sustainability in their arguments opposing OWF construction. However, many proponents of OWF construction use the word generally when discussing renewable energy transitions, energy sources, and options for the future.

“Our climate is in peril. It is imperative that we move away from polluting fossil fuels to more sustainable energy sources”

FR Comment 2.

“Deliberate movement toward a sustainable energy future focused on clean sources that provide the power we need as a society, that minimize impacts on the natural environment and global climate are critical for our nation”

Survey Comment 1.

Also, during my attendance at the energy security conference The Honorable Meredith Berger, Assistant Secretary of the Navy for Energy, Installations & Environment and Chief Climate and Chief Sustainability Officer spoke. Ms. Berger discussed the current vulnerability of the U.S. energy grid to attacks and stated;

“the advance of technology is important and a managed transition...means we should not be operating toward a total waste”.

Conference comment, Honorable Meredith Berger, 2024.

This statement really resonated with me as it appeared to be another varying definition of sustainability. Overall, my research showed that proponents of OWF construction used the word *Sustainability* in various contexts but almost exclusively in a positive manner. Individuals against or neutral toward OWF construction do not use this word when discussing OWFs.

Health

Available literature surrounding OWF construction discusses the health of the marine environment in limited terms often referring to a specific species instead of a marine ecosystem. This mindset was seen throughout FR comments as some respondents held a neutral disposition but asked for increased animal impact study gaps for a specific marine species;

"cable route will transit over or immediately under the "pine tree grounds, spawning area for Black Sea Bass Mid May-Mid June each year..."

FR Comment 3.

However, as stated previously there is a gap in literature which allows opportunities for misinformation and uncertainty when deliberating the health of the marine ecosystem and waters surrounding OWFs utilized by humans (Armon, 2024). My research revealed a new discussion theme of

Industrialization related to human health that is not captured in previous research surrounding OWFs. It appears to be an increased area of concern for the public closely related to ecological health. Concern and worry about landfall sites, which are the locations where cables carrying power from an offshore wind farm reach the shore, and how it might affect human health, and the surrounding marine environment were mentioned over 40 distinct times in the FR (Orsted, 2024). Commentors made it very clear they were unhappy with landfall sites near their communities even if it meant a positive shift for renewable wind, some comments included the following;

"landing transmission cables should be routed to an industrial or commercial port and not this pristine community".

FR Comment 4.

"This is a place for whales sea birds fish and whitecaps not an industrial scale power plant"

FR Comment 5.

Also, within my concerns survey, almost all respondents stated they were *"somewhat concerned"* over the cabling and shore sites of OFWs. Chart 3 is a graphical depiction of their responses where blue is *"not very"* red is *"somewhat"*, and orange is *"very concerned"*.

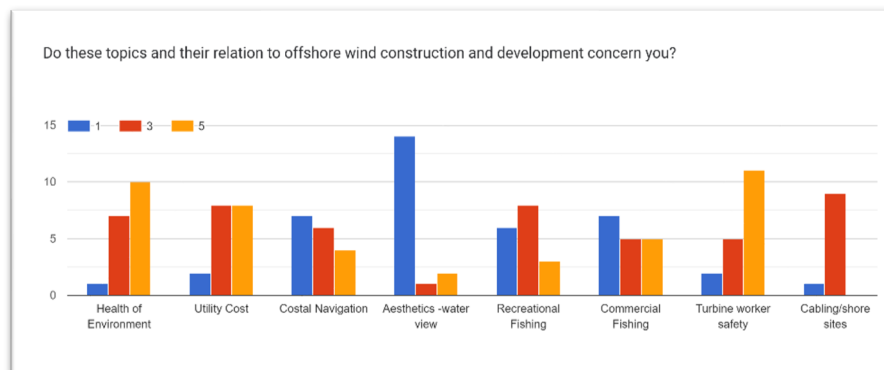


Chart 3 Concerns Survey Responses.

The theme of industrialization spurred deep feelings of uncertainty in all comments expressing negativity toward OWF construction and burying of landfall site cables. One survey respondent even mentioned industrialization specifically:

“it’s environmental hazard to marine and bird life and it becoming an industrial city in the area of the Atlantic”

Survey Comment 2.

The OWF cables connecting to electrical substations onshore which eventually connect to the electrical grid are a new technology for U.S. communities. Many respondents were hesitant to fully support the offshore wind project because of the perceived unknown effects of electromagnetic fields (EMFs) generated by the cables on human health. EMFs are areas of energy moving together, both electric and magnetic types of energy ([BOEM-055, 2024](#)). OWFs have the potential to create

EMF emissions however they are low frequency which is different from the potentially dangerous high frequency EMFs that are generated by x-ray machines, microwaves, etc. ([NCI, 2019](#)). This data shows a disconnect between the public acceptance of factual data sources provided to them by federal agencies via formal reports and their willingness to trust them. My survey produced results that back this as over 78% of respondents said they did not trust or felt neutral when asked “how much trust do you have in government agencies to represent your public interest and safety?” Finally, my survey also revealed some information into what specifically the MA public believes about the ecological health of the marine environment, and it ranges from large percentages believing the entire ecosystem matters, while some feel more granularity and specificity is needed when asked about ecological health as it relates to OWF’s, as seen below in Chart 4.

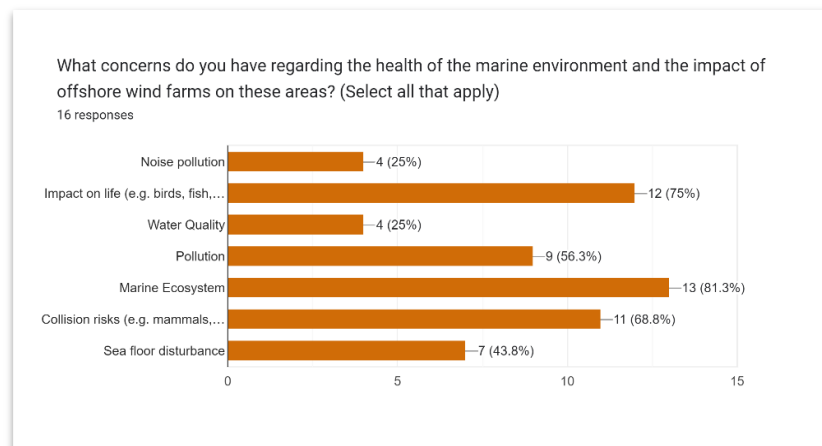


Chart 4. Concerns Survey Question 15.

Overall, my research displayed that health is a large concern for MA coastal communities and their feelings are shrouded in uncertainty and worry. This stems from concerns about

how much their personal health, ecological marine health, and a perceived industrialization of their communities could affect their personal health.

Economy

When asked directly in my survey, over 77% of respondents believed that offshore wind energy would positively benefit their community, and no respondents answered negatively.

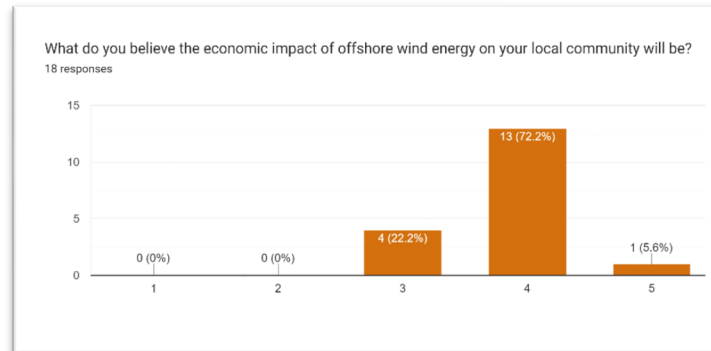


Chart 5. Concerns Survey Question.

Furthermore, a large portion of the security conference I attended was to openly discuss and identify significant economic and policy challenges posed to military installations, facilities, and critical infrastructure essential for national security, given the rising sea levels and increasing frequency of natural disasters. As a military member who cares deeply for the ecosystem that is planet earth around me, I knew I needed to check my observation biases when one panel member, the Professor of Economics and Associate Dean of the School of Humanities and Social Sciences at the U.S. Naval Academy said, “*competition and markets is how we decide which energy to use*” ([USNI Energy Conference, 2024](#)). This is something I immediately did not want to accept. I took stock of the individuals in the room around me, and I saw 10-15 other attendees shaking their heads from side to side in what appeared to be disagreement. But after some self-reflection, I think myself and the other audience members were shaking our heads out of frustration. Previous literature on the economy and OWF construction highlights this exact sentiment. There appears to be a lot of concern from senior economists and

businesses around the actual physical cost and economics of the energy transition, but the public discourse and concern, revealed in my research, is more focused on nuanced socioeconomic factors. These include categories related to energy security and transition like; clean energy job creation, compensation for assumed commercial fishing industry losses, job training for workers in the new OWF field, potential socioeconomic impacts due to changes in coastal recreation due to increased turbines, and lower property values due to perceived degraded ocean views. A few contrasting public comments related to socioeconomic concerns are noted are below;

the town “was not designed to be like the city and nor should it! No one wants this eyesore in this

FR Comment 6.

“Cape Cod is in dire need of full time, year round jobs...We finally have a real opportunity to create

FR Comment 7.

“Scenic enjoyment of the undeveloped marine environment is a valued aspect...as well as a recognized recreational use itself.”

FR Comment 8.

A survey respondent also noted the economic market as a concerning area;

“New area of energy market, uncertainties to success and impact to waterway users.”

Survey Comment 3.

After reviewing FR comments, it was readily apparent that more positive socioeconomic comments centered around the expected profit and long-term job success that would befall the local area if OWFs prevailed. Some commenters said,

“A predictable and consistent permitting process.” is needed to ensure economic success.

FR Comment 9.

“Expedite the permitting to avoid unpredictability and max local benefits such as employment and small businesses.”

FR Comment 10.

There was a decrease in the percentage of comments that requested “more information” between the year 2018 and 2024 which may correlate with the statements BOEM has

made regarding their approach to working with OWF projects. After interviews with two BOEM employees, one individual confirmed they have completed additional engagement with the public beyond what had been done in previous leasing projects. This showed BOEM operated beyond the required scope of the regulations when engaging with the public. BOEM stated they have taken additional steps since December 2010 when they began to solicit for a Request for Interest in the FR to determine commercial interest in wind energy development in areas along offshore MA. These actions could have manifested in an overall positive increase in regulatory agency relationships with the public. However, when comparing this to comments received in my survey that isn’t necessarily the case. My survey directly asked, “How much trust do you have in government agencies to represent your public interests?” On a scale from 1 - Not Much to 5 - Very much, approximately 22% of respondents answered positively, stating they believe government agencies support their interests. However, approximately 27% were neutral and over 49% were distrustful of government agencies. I think this is an important data point and emphasizes the continued division of feelings on this topic.

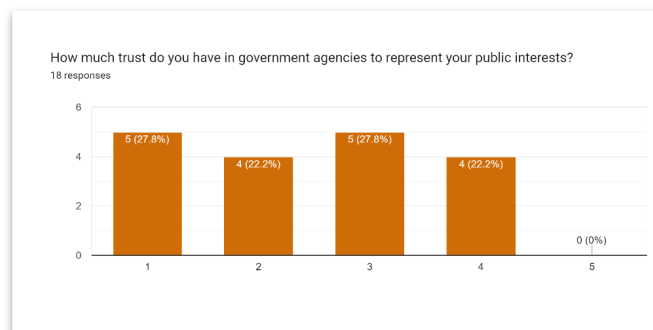


Chart 6. Concerns Survey Question 9

My survey also revealed some interesting results with respect to socioeconomic questions. This data set was much smaller than archival FR research with only 23 respondents conversely, I do believe I reached saturation as many comments tended to be repeated in the open-ended questions section of the survey. 14 out of 18 respondents rated their feelings on socioeconomic areas such as job creation, a reduction in energy costs and renewable energy benefits as “*positive*” or “*very positive*”. Another economic related

discussion points of coastal MA residents revolved around aesthetic views which my research shows are deeply tied to environmental justice which I will discuss next.

Overall, my research yielded that the topic of Economy is less focused on how the U.S. will pay for this renewable energy transition as previously mentioned in literature but rather, how will coastal communities be affected as it relates to their individualized socioeconomic factors.

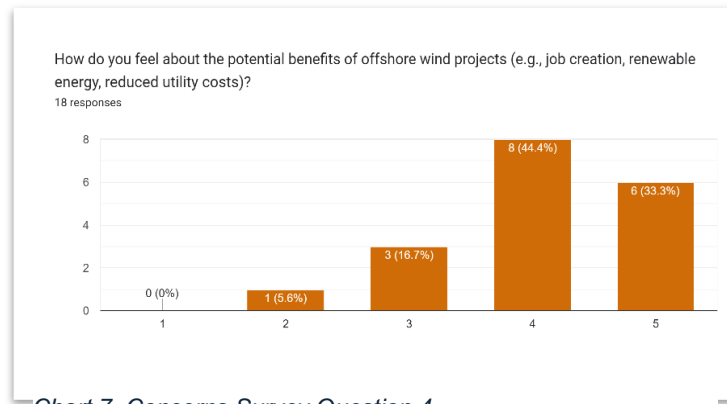


Chart 7. Concerns Survey Question 4

Aesthetic Views and Environmental Justice (EJ)

The ArcGIS data set displayed in Figures 5. & 6. the *Vineyard Wind 1* EJ map is based on the U.S. Census Bureau data released in October 2021, March 2022, and most recently updated November of 2022. The Commonwealth of MA states that EJ principally means that “*all people have a right to be protected from environmental hazards and to live in and enjoy a clean and*

healthful environment” ([Cape Cod Commission, 2022](#)). A colored block group denotes the reasons for state identification as an EJ population. There are two color block groups within ½ a mile of the coast with community affected by the *Vineyard Wind 1* cable landfall site in Lewis Bay, MA. There are no EJ groups less than 6 miles from the Westport, MA cable landing site at the *Vineyard Wind Northeast* site so I did not include a site image in this portion of the discussion.

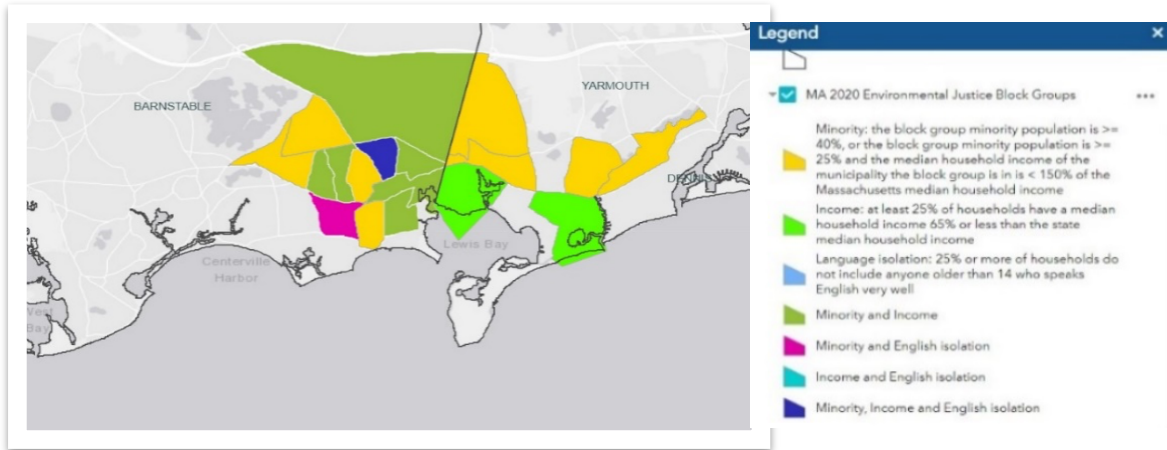


Figure 5. Vineyard Wind 1 Environmental Justice (EJ) map (HYPERLINK "<https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations>"*Massgis*)

The two EJ populations that are located near the coast are categorized as homes with household incomes not more than 65% of the statewide annual median household income (neon green) or Minorities comprise 40% or more of the population (yellow). It is important to note that throughout the stretch of coastline depicted in Figure 6, over 95% do not meet any EJ category, this means much of the ocean coastal property is owned

by predominantly White households earning more than the median household income (MHHI). Each blue marker on the map indicates the coastal communities and their associated MHHI's. The two EJ coded communities also located on the coast have MHHI's that are 55-70% less than the rest of the coastal communities' views and access to the ocean.

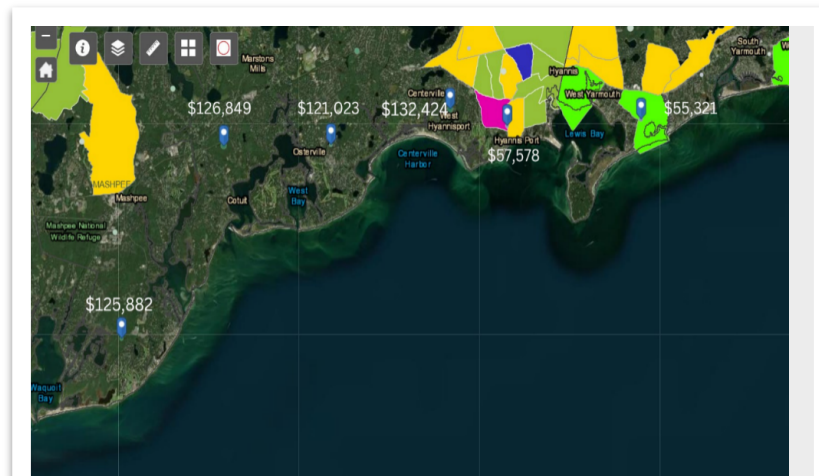


Figure 6. Median Household Income of EJ vs Non-EJ (White) Coastal MA Populations ([Data.gov](https://data.gov))

Within FR comments, I noted only two direct comments mentioning EJ which were neutral and requested more information regarding the impacts of OWF projects located near largely populated areas and/or EJ communities. After analyzing the MA census bureau data alongside my survey, the FR and literature, all invariably make clear that communities along the coast of MA with access to ocean views near these two specific Vineyard Wind OWF construction sites are not EJ communities but instead are predominantly white, living above the MHHI of MA residents arguing OWF construction will be detrimental to their already privileged community. I will discuss more details to further support this in the subsequent paragraphs.

The Principles of Environmental Justice were introduced in 1991 at the first multinational People of Color Environmental Leadership Summit to establish a comprehensive working understanding of Environmental Justice. Principal 3 states *Environmental Justice mandates the right to ethical, balanced and responsible uses of land and renewable resources focusing on a sustainable planet for all living things* (Pulido, 2000). This highlights the importance of responsible uses of land that benefit all individuals while ensuring the planet remains as unharmed as possible. This is a cornerstone principle in line with distributive justice and energy security and justice. To be environmentally just we must be able to equitably distribute BOTH the environmental harms and/or benefits to ALL groups of people. When this isn't balanced, society runs into the issues we see historically in the U.S. such as increased placement of industrial zones in majority Minority and low income communities while predominantly White communities experiencing White privilege have access to clean air, water, and abundant green spaces (Pulido, 2000). Or the

injustice continues like right now within these predominately white coastal MA communities exercising NIMBY views and attempting to control use of waters for their benefit alone which fuels contentious attitudes. There is already literature which supports this large concern from predominantly white, wealthy communities living on high value coastal property insisting OWFs will disturb their ocean view and drive down property values (Palmstrom, 2023).

Approximately 67% of my survey respondents own or rent a home on the MA coast and 50% provided comments about OWFs hindering aesthetic coastal views to include;

"We need better sources of energy but not at the cost of my view."

Survey Comment 4.

"There is the illusion that nature is untouched when you stare at the ocean; this ruins that"

Survey Comment 5.

Additionally, 45% of comments from the FR data against OWF construction noted damage to aesthetic views as a large issue. These public commenters and survey respondents appear to be providing a one-sided view that discounts the environmental need for more energy sources solely to protect the privilege of a select group of individuals (Taylor, 2024), (EJNET, 1996). The below images are simulated projections of what the coastline with installed wind turbines at *Vineyard Wind Northeast* site could potentially be once OWF construction and full turbine installation is complete. Both images have wind turbines, in the daytime image you can just make out the turbine shapes on the horizon. The nighttime image is a little more difficult, so I have circled it in red. Within the red oval is an illuminated light that engages only when a vessel or plane is close enough to the

structure and it remains illuminated for a short time before automatically being extinguished. As a researcher of OWF construction discourse, personally, I do not see any aesthetic issue with the coastline after turbine installation both during the day and at

night. I recognize I'm not a lifelong coastal resident of MA and I do not share their same experiences. However, it appears to me that the installation of wind turbines on the coast will only negligibly alter the coastline view.



Animation Visual Day (BOEM, 2018)



Animation Visual Night (BOEM, 2018)

FURTHER DISCUSSION

The literature surrounding OWF construction highlighted explicit areas of concern to include sustainability of offshore wind and renewable energy infrastructures, ecological health, and the economy. I focused my research on public controversy and discourse surrounding OWFs within these topic bounds. Furthermore, I analyzed my data with an intent to answer the following research questions: *"Why is the construction of offshore wind farms in Massachusetts federal waters contentious among coastal community populations?"* and *"How are sustainability, health, and the economy discussed in public discourse and opinion?"*

So, why is the construction of OWFs in federal waters contentious among Massachusetts coastal community populations? After analyzing my various data sources, I found a dichotomy form within my research between two themes, *Energy Transition* and *Uncertainty*. The theme of energy transition paired alongside a feeling of uncertainty started to reveal front and

center in my interviews, thematic coding of archival FR public opinions, survey results and field notes/observations.

The interviews with BOEM representatives and a review of public comments revealed that the level of care taken by federal regulators regarding public outreach aspects of the renewable energy transition in the U.S. appears to be misaligned from what the public perceives. BOEM believes they have engaged a wide variety of stakeholders by convening or participating in hundreds of virtual and in-person meetings when OWF lease area projects begin. They create task force meetings, public meetings, and targeted engagement meetings with specific stakeholder groups to include commercial fishermen and environmentalists in Massachusetts. My survey revealed that only 11% of respondents have ever participated in the decision-making process for offshore wind projects such as commenting on potential upcoming projects in the FR, community survey participation, town hall meetings, and other events in their local area.

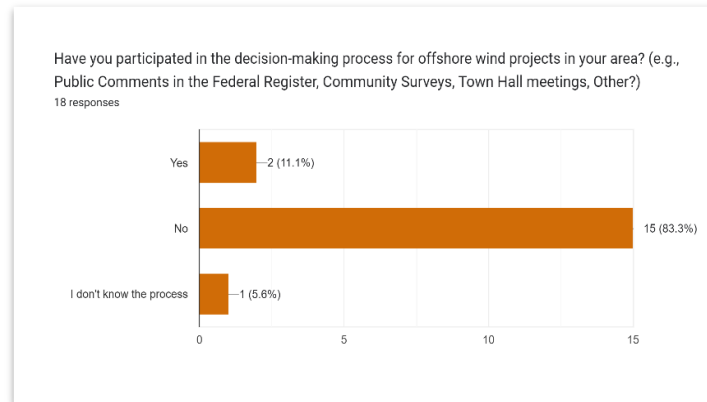


Chart 8. Concerns Survey Question 6

However, many citizens are worried about the day-to-day changes to their livelihood. There is a perception that an energy transition toward OWFs and renewable energy sources will somehow disturb the status quo of their coastal communities at the front lines of energy change, and this is generating tension. The coastal community members personal uncertainty paired with a seemingly unstoppable forward movement of energy transition to OWFs has upset many individuals. This has entrenched many into thinking that any energy shift is negative, no matter what information is being provided by the stakeholders like federal regulators, energy companies and even their own fellow community residents.

This uncertainty and myopic viewpoint are a recurring theme identified throughout my research and is a large contributor to why OWF construction is a contentious topic in MA. Figure 11. is a public comment from a coastal MA resident and commercial fisherman. It is clear his disposition toward OFWs is negative and he provides a personal reason why, the longfin squid fishery. This individual relies on a fishery to support his family and although there is limited research on the effects of OWFs and fisheries in the U.S. there is a copious amount of research to support that climate change already affects

fisheries ([Methratta et al., 2023](#)). His stance is that OWFs will personally hurt him however, the Intergovernmental Panel on Climate Change (IPCC) has published that a warming ocean is currently impacting fisheries with large scale implications for food production and human communities ([IPCC, 2022](#)). We should not discount the personal struggles of individuals; however this myopic point of view is an area of concern when discussing the contentious nature surrounding OWF construction. Research has shown that the greater public favors policies that offer more proximate payoffs over policies that provide distant, long-term rewards ([Jacobs & Matthews, 2012](#)). Longer term global and policy benefits such as decreasing the anthropogenic acceleration of climate change via OWF construction appear to be less important to coastal community members than their own perceived immediate potential drawbacks or discomfort. Even though there is minimal research to support his assertion of the impact OWFs will have on the squid fishery, and despite BOEM's active engagement with his community, the fisherman is vehemently against the construction. There were numerous comments of this nature, all with a myopic disposition and unwillingness to look past their own immediate distress. Comments ranged from fishery concerns and loss of

marine animals to unwanted aesthetic views caused by turbine placement offshore. The greater issue with this type of myopic perspective is that by prioritizing one's own short-term interests over the longer-term well-being of their community, societies and global ecosystems, everyone becomes more at risk to climate impacts accelerated by inaction. Effective climate action steps such as OWF construction and infrastructure development work to balance immediate energy needs with more sustainable methods to reach a long-term goal of a more livable future for future generations.

AS A LIFE LONG COMMERCIAL FISHERMAN, I OPPOSE THE LOCATION OF THE WIND FARM. MY MAIN CONCERN IS THE AFFECT IT WILL HAVE ON THE LONGFIN SAID FISHERY. IT HAS BEEN MY LIVELIHOOD AND ONLY SOURCE OF INCOME TO SUPPORT MY FAMILY. I WOULD LIKE TO SEE THE TURBINES LOCATED ON LAND. IE LANDFILLS, DUMPS OR FREEWAYS.

Figure 7. FR Comment 11.

All forms of energy production have impact. Wind energy has the fewest negative impact. Please approved Vineyard Wind Energy Project. Fishermen by and large created their own problems by drag net fishing over fishing. ~~and~~ They are not victims here. Approve this project.

Figure 8. FR Comment 12.

However, it is important to note there were many comments taking the exact opposite stance. One instance can be seen in Figure 8. A coastal Massachusetts resident blames fishermen for a declining fishery and states it is the irresponsible commercial fishing habits that have ruined fisheries and notes a strong positive support for OWF development. These are just singular examples of the larger theme of my research which supports the notion that an energy transition toward OWFs drives uncertainty and breeds contentious discussions.

In addition to the deeply ingrained myopic view of some coastal residents there is also an internal clash between residents. Residents more focused on immediate climate change concerns support OWFs and they appear to have a less myopic view. They

are more willing to accept immediate life changes to progress climate goals such as OWF construction and infrastructure development of renewable energy sources. This separation of resident beliefs is fueling the contentious discussion surrounding OWFs.

Also, Dr. Daniel Yergin, the Vice Chairman of S & P Global and a highly regarded subject matter expert on energy, international politics, and economics spoke at the energy security conference I attended. Fortune magazine called him "one of the planet's foremost thinkers about energy and its implications" (USEA, 2012). Dr. Yergin started off the conference as the keynote speaker (USEA, 2012). After listening to his speech, I was already re-thinking my view of what "energy transition" for the U.S. truly means. When beginning my research, I was operating under the assumption that the U.S. transition to renewable energy sources such as offshore wind was the first large energy transition of its kind. However, Dr. Yergin, using history to paint a picture, explained that was not the case. Our country has been working through energy transitions since its inception (Yergin, 2024). Converting from the use of whale oil to kerosene with the discovery of natural petroleum (Marder et al., 2016). Then again from domesticating animals for transit to powering vehicles with gasoline (Marder et al., 2016). So, energy and in turn fuel transition is nothing new to the U.S. but does the energy transition into renewables need to be rethought?

This question was posed during Dr. Yergin's speech, and I think it aligns with my core research question of why are OWF discussions contentious in coastal MA communities. Given my research thus far some supplemental challenges which make OWF contentious are:

1. Scale and complexity: Energy transition is not new but it will be difficult to transition away from our current energy processes, which are 100+ years old, in less than 25 years which has been proposed by the Biden Administration, the IPCC, and various other institutions ([House, 2022](#)).

2. Energy Security: Affordable, Reliable, and Sustainable are three pillars Dr. Yergin stated must be met to bring energy security to society ([Yergin, 2024](#)). The feelings of uncertainty among the public could be an indication that they do not believe all three of these markers are currently being met by federal regulators and renewable energy advocates.

3. Access to key minerals; Globalization has generated a competitive market and over time other countries such as China are now dominating the “green supply chain” controlling things like copper and other materials necessary to the production processes of updated energy technologies like OWF turbines ([Yergin, 2024](#)).

4. Emerging, Developing, and Developed communities: Dr. Tinker, a Director Emeritus of the Bureau of Economic Geology and founder of the nonprofit Switch Energy Alliance said, “energy security means different things to different people”. The contentious nature of OWF construction is a prime example where community needs are seemingly not being met which spurs negative discourse and a need for a change in the tools and tactics

currently being used to address energy security.

SUMMARY

Unlike other popular and academic sources, my research took a closer look at the many reasons some residents of coastal MA remain deeply uncertain about the OWF projects in their area, reflecting the opinions about the broader transition into renewable wind energy. Skeptics worry about community industrialization, displaced livelihood, and degraded ecological and personal health, while supporters highlight mitigation of climate change, and socioeconomic benefits. Lack of comprehensive research and literature on the impact of OWF construction, myopic viewpoints and closed lines of communication between interested stakeholders and the community contribute significantly to contentious attitudes about these projects. Furthermore, the uncertainty felt by the residents identified in my research suggests a community-driven regulatory scheme should be pursued over the present complex, transactional and impersonal system. Unfortunately, the complexity of OWFs and their implementation has created a situation in which the sides are talking past each other and preventing productive discussions about well-defined problems.

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