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YCACO Framework Appendices – Thought Experiment Case Studies

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CASE 1 – THE BAHAMAS

1.1. Introduction

This case study describes a comprehensive community outreach and action initiative aimed at addressing the impacts of climate change that could take place in 2034 in The Bahamas, a small island developing state (SIDS). SIDS are particularly vulnerable to climate change due to their unique geographical, economic, and social characteristics. These vulnerabilities include limited land area, high population density in coastal zones, and economies that are heavily dependent on natural resources and tourism. Countries classified as SIDS, such as The Bahamas, Barbados, Maldives, and Fiji, among others (Thomas et al., 2020), face disproportionate risks from climate change, including rising sea levels, increased frequency and severity of tropical storms, and coral reef degradation. To effectively address and mitigate these challenges, it is crucial to engage communities through targeted outreach and educational initiatives that raise awareness, promote sustainable practices, and foster resilience. This case study explores how such an initiative, focused on youth-led climate action, can mobilize local communities in The Bahamas to confront and adapt to these mounting issues.

To make an informed decision while creating this thought experiment, I consulted several articles that make predictions about the future of youth-led climate action and community outreach (Fisher, 2016; Kowasch et al., 2021 ; O'Brien, Selboe, & Hayward, 2018). Furthermore, I examined recent academic articles discussing the impacts of climate change on SIDS(Budziszewska & Głód, 2021 ; Thomas et al., 2020).

1.2. The Problem

The primary focus of this case study is on the role of youth-led climate action in 2034 and its impact on mitigating the adverse effects of climate change in The Bahamas. Between 2000 and 2010, the average rate of sea level rise was about 2.5 mm per year (IPCC, 2007). The hurricanes during this period were less frequent and less intense compared to recent years. Climate change effects have been worsening at an accelerated pace, leading to more frequent and destructive hurricanes, and increased coral bleaching in The Bahamas (Betzold, 2015). These rising sea levels and increased hurricane activity, which saw a notable increase in Category 4 and 5 hurricanes from an average of 2 per decade in the early 2000s to 6 per decade in the 2010s (National Hurricane Center, 2020), further threaten the ecological and economic stability of The Bahamas. The tourism industry, including cruise ships and diving activities that damage coral reefs, contributes significantly to these issues (Wolf et al., 2021). Tourism, the main industry in The Bahamas, exacerbates the effects of climate change as damaged corals, which act as carbon sinks, are further stressed by human activities, leading to their death and increasing carbon levels in the atmosphere (Hernández-Delgado, 2015). This situation highlights the vulnerability of local communities, necessitating urgent and effective climate action (O'Brien et al., 2018).

Currently, The Bahamas faces significant climate challenges primarily driven by global warming and local factors such as deforestation and overexploitation of marine habitats (Kowasch et al., 2021). These challenges, which include increased frequency of hurricanes, coral bleaching, and coastal erosion (Budziszewska & Głód, 2021), are only worsening. Without effective intervention, these rapid changes threaten to cause severe environmental impacts, loss of biodiversity, and displacement of communities, highlighting the need for innovative approaches to youth community engagement (Fisher, 2016). The YCACO Framework, once made available to youth globally, will help youth around the world participate in sustainable climate action.

1.3. Framework Operationalization

1.3.1. The Character

The case study thought experiment that I constructed is about a young activist named Maya and how she raises awareness and drives local action for climate change in Nassau, The Bahamas, in 2034. The community is grappling with the increased impacts of climate change. Maya is a 17-year-old student from Nassau who has been passionate about environmental issues since childhood.

Maya's motivation stems from her connection to the ocean as she comes from a long line of conch divers, a tradition passed down through generations. Her grandfather was one of the most renowned conch divers in the region, known for bringing in abundant catches that provided not only for his family but also for the community-at-large. For decades, her family has relied on the ocean's resources to sustain their livelihood. However, the conch that were once plentiful are now alarmingly scarce. Where her father once brought home dozens of conchs each day, now he struggles to catch even a fraction of that amount. The ocean that once

symbolized prosperity for her family now reflects the stark reality of climate change. This dramatic decline in conch populations has not only threatened her family's way of life but has also jeopardized the cultural heritage that her family has cherished for generations. The dwindling conch catches (Hernández-Delgado, 2015) are a direct result of the worsening impacts of climate change, such as coral bleaching and rising ocean temperatures, which have devastated marine ecosystems in The Bahamas (Betzold, 2015).

Maya's reason for using the YCACO Framework is her belief that structured, community-driven efforts are essential for meaningful climate action. The YCACO Framework's emphasis on creating a Community-Based Economy (CBE) through sustainable development resonates with Maya's belief that her community must take collective ownership of their environmental and economic future (Münker, 2011). To create this economy, Maya envisions transforming the byproducts of conch fishing into valuable, eco-friendly goods that can be sold both locally and to tourists. For example, instead of discarding the conch shells, which are often treated as waste, Maya initiates a project to repurpose them into handcrafted jewelry and decorative items. This not only provides her community with an additional revenue stream but also reduces environmental waste. Additionally, Maya works on developing a community-run initiative that manages the production and sale of these eco-friendly products. The initiative operates on a model of collective ownership, where profits are reinvested into local sustainability projects, such as coral reef restoration and sustainable fishing practices. This model aligns with the YCACO Framework's principle of limiting dependence on external resources while fostering local economic resilience.

1.3.2. Generating a Plan

Maya organizes workshops, clean-up activities, and educational seminars in schools. Her activities aim to educate the community about the importance of sustainable practices and the immediate threats posed by climate change. These events are generally well-received by the public, especially among the youth, although some older community members remain skeptical about the importance of raising awareness and are hesitant to see the immediate relevance of these actions (Thomas & Benjamin, 2018). Approximately 15% of the population in The Bahamas is over the age of 60 (Deleveaux et al., 2017).

The initiatives lead to better waste management on beaches, increased community involvement, and the proposal of a local ordinance to limit single-use plastics (Sloam, Pickard, & Henn, 2022). Despite initial disinterest from older community members and logistical issues during peak tourist seasons, Maya overcomes these obstacles by partnering with local businesses for funding, aligning activities with the off-peak tourist season, and incorporating cultural elements

into outreach efforts (Bowman, 2019). Older Bahamians feel strongly about preserving their cultural heritage, which includes practices and traditions passed down through generations. By integrating cultural elements, such as traditional storytelling, music, and community festivals, Maya ensures that the climate action efforts resonate more deeply with the older generation, making them more likely to support and participate in these initiatives.

Maya chooses a grassroots model that emphasizes local engagement and education. This model is effective because it leverages the power of the community to drive change from the ground up, fostering a sense of ownership and empowerment among residents (Bush, 2018). Grassroots initiatives are often more sustainable and impactful because they are tailored to the specific needs and dynamics of the local community.

By leveraging social media and community events, Maya can reach a broad audience, including both youth and older residents, regardless of demographic. The outreach plan includes a mix of in-person workshops, beach clean-ups, and social media campaigns. Local media, including radio and newspapers, are also used to spread the message.

Maya plans on spending three months planning her social media campaign and hosting a public beach cleanup to raise initial awareness within her community. Then, she will launch her social media campaign and rotate between hosting in-person workshops and beach clean-ups every month. Additionally, she will perform regular evaluations every six months to measure progress made towards her three objectives.

To implement the plan, Maya recruits a team of 20 dedicated volunteers spanning different ages, educational backgrounds, and care for the environment. Her team includes students, local business owners, and environmental enthusiasts. She secures funding and resources through partnerships with local businesses and environmental NGOs, convincing them that their brand will have a more positive image if their brand supports a good cause. Preparations include creating educational materials, planning event logistics, and training volunteers.

1.3.3. Operation

Nassau, the capital of The Bahamas, has a population of approximately 400,000 (World Bank, 2020). The community faces severe climate-related challenges, including frequent hurricanes, coastal erosion, and coral bleaching. These issues have heightened the community's awareness and concern, with 70% of Bahamians expressing significant concern about climate change impacts (Thomas & Benjamin, 2018). However, coordinated action has been sporadic and often insufficient.

Maya's community is very fisheries-dependent and uses the ocean as a resource in many ways. In The Bahamas, fisheries play a crucial role, contributing significantly to both the economy and the diet of residents. Approximately 90% of the local diet consists of fish, and there are over 1,000 registered fishing vessels operating in Bahamian waters (FAO, 2020).

Maya noticed an increased prevalence of dead coral in the oceans where she regularly swims. She feels devastated about the change and hopes to take responsibility by rallying youth to combat climate change, which she knows is the reason for the coral bleaching. Maya's plan to address climate change in The Bahamas involves several clear objectives. The first objective is to raise awareness about the negative impacts of climate change on local ecosystems and communities. Although many residents are aware of climate change, they lack detailed knowledge about its specific local impacts. To measure success, Maya aims to host four educational workshops attended by at least 500 residents over the next year. Qualitatively, this will explore the positive effects of climate change education in her community, such as increased environmental stewardship and a deeper understanding of sustainable practices.

The second objective is to improve waste management practices to reduce pollution and protect coral reefs. Currently, around 8 million metric tons of plastic waste enter the oceans annually, significantly affecting marine life in The Bahamas (Jambeck et al., 2015). The current high levels of plastic waste are contributing to marine pollution, so Maya plans to organize monthly clean-up events and aims to reduce beach litter by 30% within a year. Qualitatively, this initiative will foster behavioral change within residents and enhance their receptiveness to sustainable waste management practices.The third objective is to advocate for policy changes to limit single-use plastics. Single-use plastics are widely used with minimal regulation, and to address this, Maya seeks to secure commitments from at least five local businesses to reduce plastic use and support the proposal of a local ordinance. Currently, single-use plastics make up a significant

portion of marine debris, with 80% of Caribbean beaches littered with plastics (World Bank, 2020). By pushing for policy changes, Maya aims to increase the community's resilience and proactive approach to addressing climate change.

Maya chooses a grassroots model that emphasizes local engagement and education. This model is effective because it leverages the power of the community to drive change from the ground up, fostering a sense of ownership and empowerment among residents (Bush, 2018). Grassroots initiatives are often more sustainable and impactful because they are tailored to the specific needs and dynamics of the local community. By leveraging social media and community events, Maya can reach a broad audience, including both youth and older residents, regardless of demographic. The outreach plan includes a mix of in-person workshops, beach clean-ups, and social media campaigns. Local media, including radio and newspapers, are also used to spread the message. Maya plans on spending three months planning her social media campaign and hosting a public beach cleanup to raise initial awareness within her community. Then, she will launch her social media campaign and rotate between hosting in-person workshops and beach clean-ups every month. Additionally, she will perform regular evaluations every six months to measure progress made towards her three objectives.

To implement the plan, Maya recruits a team of 20 dedicated volunteers spanning different ages, educational backgrounds, and care for the environment. Her team includes students, local business owners, and environmental enthusiasts. Securing funding and resources is one of the most challenging aspects of the operation phase. Maya recognizes that traditional funding sources might be limited, so she leverages the principles of a Community-Based Economy (CBE) to build a self-sustaining financial model. She initiates a project that turns the byproducts of conch fishing, such as discarded conch shells, into eco-friendly products like jewelry and decorative items. Maya's business is distinct from others that sell the same products because she uses the profit to generate change in her community by supporting her plan for sustainable development. These products are then sold to both locals and tourists, generating income that is reinvested into her climate action initiatives. By doing so, Maya not only reduces waste but also creates a new revenue stream for the community, ensuring that the benefits of her initiatives are both environmental and economic.

Maya also forms partnerships with local businesses, framing their contributions as investments in the community's long-term resilience. She convinces business owners that supporting her initiatives will enhance their brand image and strengthen their ties to the community. These businesses provide not just financial support but also in-kind contributions, such as materials for workshops and promotional space for her eco-friendly products. This approach aligns with the CBE principle of collective ownership and local investment, where the community directly benefits from and contributes to the initiatives. Preparations for the initiatives include creating educational materials, planning event logistics, and training volunteers. Maya ensures that all activities are deeply rooted in the local context, using the CBE model to promote local production and reduce reliance on external resources. By involving the community in every step of the process, Maya fosters a sense of ownership and responsibility among residents, making the initiatives more sustainable and impactful. Maya also ensures that her community is educated about the risks of corporate takeovers. She organizes workshops that explain how large corporations might try to take control of their local resources and businesses, emphasizing the importance of collective ownership to prevent this.

By generating awareness among community members about the potential threats of external control, Maya strengthens the community's resolve to maintain local autonomy over their economic activities (Eckbo, 2008). To build on this, Maya actively seeks to create global connections that can support her community's efforts. She identifies and partners with international organizations that share similar sustainability goals. Through these partnerships, Maya's community gains access to a wealth of resources, knowledge, and technologies that help them address their local challenges more effectively. These global connections not only enhance the community's capacity to implement their plans but also create a network of support that boosts the overall momentum of their efforts (Gazzola et al., 2022). Maya carefully establishes a timeline for her initiatives, beginning with three months of planning for a social media campaign and public beach cleanup to raise initial awareness. Following this, she launches her social media campaign and rotates between hosting in-person workshops and beach clean-ups every month. Additionally, she performs regular evaluations every six months to measure progress made towards her three objectives.

Throughout this process, Maya remains focused on empowering youth leadership. She actively involves young people in every step of the planning process, encouraging them to take ownership of various aspects of the initiative. By

doing so, Maya not only builds a stronger community effort but also ensures that the next generation is prepared to continue advocating for sustainability in the future (Richards-Schuster et al., 2018). Incorporating a culture of continuous improvement is also central to Maya's planning. She regularly revisits the goals and strategies of the initiative, making adjustments as needed based on feedback from the community and the outcomes of ongoing activities. By fostering a growth mindset within the community, Maya ensures that their efforts remain dynamic and responsive to new challenges and opportunities (Yeager & Dweck, 2020).

Throughout the operation, Maya remains focused on integrating the YCACO Framework principles into every aspect of her work. The emphasis on creating a community-based economy not only secures the necessary resources but also empowers the community to take control of its future, ensuring that the benefits of her initiatives extend well beyond the immediate environmental impacts.

1.3.4. Outcome

After one year, the impact of Maya's initiatives is assessed through both quantitative and qualitative evaluations. Community surveys and interviews reveal significant improvements in awareness and understanding of climate change. The percentage of residents with a strong understanding of local climate impacts has risen from 30% to 60%, showing the effectiveness of the educational workshops and community outreach efforts (Thomas et al., 2020).

Additionally, beach clean-up activities have resulted in a 40% reduction in plastic waste on local beaches, as monitored through regular environmental assessments. This reduction not only demonstrates the success of the clean-up campaigns but also indicates a shift in community behavior towards more sustainable waste management practices (Jambeck et al., 2015).

Maya's advocacy efforts have also led to tangible policy changes. Three local businesses have committed to phasing out single-use plastics, and a new local ordinance has been proposed to regulate plastic usage. This marks a significant step towards reducing marine debris and protecting the local marine environment, aligning with the broader goals of sustainability and community resilience (World Bank, 2020).

The YCACO Framework proves to be a valuable tool in guiding Maya's initiatives. The framework's emphasis on setting clear objectives, engaging diverse community members, and using multiple outreach channels ensures a comprehensive approach to climate action. Maya's ability to adapt the framework to the specific context of The Bahamas demonstrates its flexibility and relevance.

Maya learned a multitude of lessons from her experience leading the charge against climate change in the Bahamas. First, she learned the importance of cultural elements in outreach activities as they help connect the community's heritage with environmental action. Second, it was brought to her attention that the need for continuous engagement and education is evident, as sustained efforts are necessary to achieve long-term change. Finally, the success of Maya's initiatives underscores the potential of youth-led actions to inspire broader community participation and policy change.

1.4. Case Study Conclusion

1.4.1. Success

Despite the success of Maya's initiatives, several obstacles were encountered in the process of implementing the YCACO framework. Understanding and addressing these challenges is crucial for optimizing the framework and ensuring sustainable climate action.

Looking forward, the foundation Maya has laid is expected to yield further benefits. As more community members become engaged and informed, the momentum generated by her initiatives is likely to drive continued environmental improvements and stronger community cohesion. Her success illustrates the power of youth-led climate action to effect meaningful change and paves the way for future leaders to build on her achievements. This anticipated success positions Maya's work as a model for similar initiatives in other vulnerable communities.

1.4.2. Challenges

One significant obstacle was the initial disinterest from older community members, who were skeptical about the

importance of raising awareness and the immediate relevance of climate change actions. This demographic, which represents about 15% of the population in The Bahamas, often failed to see the urgency of needing climate action (Deleveaux et al., 2017). Despite elderly people being the minority in The Bahamas, Bahamian culture places high importance on the input and approval of older citizens, therefore, without the approval of the elderly, it is less likely to gain support from any other demographic. Overcoming this required targeted engagement strategies that included incorporating cultural elements into outreach efforts, which helped bridge the generational gap and made the initiatives more relatable to older residents (Thomas & Benjamin, 2018). A lack of funding also posed a significant hurdle. Initially, Maya struggled to secure resources for the various activities.

1.4.3. Learnings

Maya addressed her financial struggles by gaining sponsorships from local businesses, who helped financially support her endeavors and also fostered a sense of community ownership and involvement in her initiatives (Kowasch et al., 2021).

1.4.4. Suggestions for Framework Optimization

To optimize the framework, future students should increase collaboration with local media, including radio and newspapers, to spread the message more effectively. Connecting with the media not only will help Maya reach a broader audience but also will help her make information needed to internalize the effects of climate change more accessible and relatable (Thomas et al., 2020). Additionally, leveraging social media platforms can enhance engagement, especially among younger demographics, by providing interactive and continuous updates on ongoing activities and their impacts (O'Brien, Selboe, & Hayward, 2018).

Furthermore, expanding the educational components of the initiative to include hands-on activities and demonstrations can improve understanding and retention of information. Additionally, including hands-on demonstrations aids with translating knowledge into practical actions, fostering a more proactive and informed community (Fisher, 2016). Finally, continuous evaluation of the effects of each activity implemented provides valuable feedback, allowing for adaptive strategies that respond to emerging challenges and opportunities effectively (Budziszewska & Głód, 2021).

By addressing these obstacles and implementing these suggestions, the YCACO framework can be further optimized to drive impactful and sustainable climate action in The Bahamas. This will ensure that the initiatives not only raise awareness but also foster long-term behavioral change and community resilience against the impacts of climate change.

CASE 2 – MOLDOVA

2.1 Introduction

This case study investigates the harmful impact of chemical products used in agricultural areas in Moldova. Composed of over 50 per cent arable land, Moldova's economy is heavily dependent on agriculture (Radziwill, 2009). The case study envisions a potential event, taking place in the first half of 2025 or the near future. The purpose of this case study is to understand and address the chemical soil pollution in Moldova's agricultural sector using the Youth Climate Activist Community Outreach (YCACO) Framework. By following its principles, this study aims to create an intervention strategy. The aim is to provide valuable insights and practical solutions to enhance the sustainability of Moldova's agricultural practices.

To ensure the validity of the information, a comprehensive review of relevant literature was conducted, and experts on the subject were consulted, including Veaceslav Pavel Ioniță, a politician and expert on Moldova's economic problems (The Parliament of the Republic of Moldova, 2005), and Boris Boincean, a doctor in Agricultural Sciences, professor (Selectia, 2023), and the writer of 'Raport Final de evaluare a sectorului agrar din Republica Moldova 2014' (Boincean, 2014). This review included consulting articles and books on Moldova's environmental context, its challenges, and potential solutions (e.g., Armand Fouejieu, 2024; Juc, 2006; Cernelev, 2023; Radziwill, 2009).

2.2 The Problem

This case study focuses on the harmful impact of chemical products, including pesticides, herbicides, and fungicides, which are the main sources of soil pollution in Moldova (Sandu, 2007-2013). The aim of the study is to apply the YCACO Framework to address this issue by demonstrating how the framework can be used to minimize the negative effects of the chemical usage in agriculture. Therefore, the study seeks to provide targeted solutions and contribute to a more sustainable agricultural practice in Moldova.

In the 1970s, large quantities of fertilizers, pesticides, and dangerous chemicals were used on Moldovan soil to maximize crop yields, and the consequences are still evident today (Leah, 2020). Between 1972 and 1990, 14,000 to 38,000 tons of pesticides were brought to Moldova, significantly contributing to soil and crop pollution due to their extensive application in agriculture (Juc, 2006). Today, the annual usage of pesticides in Moldova remains substantial, with approximately 200 tons applied each year (Capitanu, 2022). This historical and ongoing reliance on chemical products has negatively impacted public health, as these substances pose

serious risks when used improperly by untrained individuals (Bacal, 2011; Gasparotti, 2014). The widespread availability and use of these chemicals have led to a significant increase in non-occupational pesticide poisonings, resulting in numerous cases of intoxication (Balali-Mood, 2012). The overuse of chemical products on the soil has polluted both the lands and waters of Moldova (Vladimir Garaba, 2005). This prevalence is partly due to inadequate knowledge among the population regarding the health hazards of improper pesticide use, stemming from limited access to information and ineffective communication (Stîncă, 2019; Leah, 2015; Cernelev, 2023).

The case study also highlights the efforts of a young environmental activist named Emma and her friends, who aim to make a positive change in their community. In planning their actions, Emma and her team used the principles from the Youth Climate Activist Community Outreach (YCACO) Framework. They analyze their context, consult with field specialists, come up with measurable objectives and devise solutions. Starting their work in early January, they research climate change and chemical usage, compile a list of potential trainers, including respected experts and university professors from Moldova and Romania, and plan to use virtual meeting platforms to connect with Romanian experts. Ana develops a strategic social media plan targeting Instagram for youth and Facebook for older audiences, while the team scouts locations for their events.

Despite the prohibition of pesticide use, about 40% of Moldova's arable land remains contaminated, with over 3,000 tonnes stored in 450 poorly equipped facilities (Vijgen, n.d.). Phytosanitary products applied to treat crops have caused numerous poisoning cases and deaths in recent years (Cernelev, 2023). The pollution of soil and water has led to increased cases of kidney stones, cancer, and dental problems (Wei, 2023; Liu, 2024; de-Assis, 2020). Emma and her team understand that without proper guidance, young people may fear failure or feel lost in their efforts to make a change. Unguided instruction not only tends to be less effective but may also result in worse outcomes (Kirschner, 2010).

2.3 Framework operationalization

2.3.1 The Character

Emma is a 17-year-old high school student living in the capital of Moldova, a small country in Eastern Europe. She is a hard-working and ambitious young girl, ready to begin her journey of activism. When she was little, Emma had to do a school project about agriculture in her homeland. During her research she found out more about the critical situation regarding the overuse of chemical products. Her concern deepened when a close friend, Liza, fell seriously ill after consuming fruits that had been contaminated with pesticides. Liza's severe food poisoning, which led to a hospital stay, highlighted the real danger posed by these chemicals. Witnessing Liza's suffering, Emma decided to take action. First, she read about hundreds of other intoxications that were happening in her country, a few of them which caused death. After forming her team, Emma and her colleagues wanted to make a change for the better in their community. They began by analyzing their community's situation, consulting with field specialists, and developing solutions to mitigate the harmful impact of chemical products. Emma's personal connection to the problem, stemming from Liza's experience, became the driving force behind their efforts to create a safer, healthier environment for their community.

Emma uses the Youth Climate Activist Community Outreach (YCACO) framework to advocate for this issue. Although there are several frameworks available, she chose YCACO because it is specifically designed to empower young activists in addressing climate and environmental problems. The framework's focus on community context aligns perfectly with Emma's goals of raising awareness and creating practical solutions for pesticide pollution. By using YCACO, the young team benefits from a structured approach which emphasizes community engagement and effective communication strategies, which are essential for addressing the specific challenges in Moldova.

2.3.2 Generating a Plan

Emma's plan specifically targets her local community within Moldova, a landlocked country in Eastern Europe on the northeastern corner of the Balkans. The country spans a total of 33,850 km2 and has a population of approximately 3.5 million (Turcanu, 2012). Moldova is bordered by Romania to the west and Ukraine to the north, east, and south (Kennedy, 2010). Moldova is an agrarian-industrial state with agricultural land occupying 22498.3 thousand hectares, forming 73.8% of the land fund (Certan, 2012). Moldova's fertile soil makes it one of the most arable countries in Europe, with 72.6% of its agricultural land being arable (Ciolacu, 2016). This community relies heavily on agriculture, making the issue of pesticide pollution particularly critical. By focusing on her community, Emma aims to create a model for sustainable agricultural practices that could potentially be used to benefit other regions in Moldova.

Emma's actions are guided by specific, measurable objectives to address the critical issue of pesticide pollution. The farmers in her community have not received reliable education on the harmful effects of excessive agrochemical use. To generate awareness among local farmers, Emma aims to engage at least 10% of local farmers in an educational training, providing them with accurate information on sustainable agricultural practices. She also seeks to identify the causal factors behind local farmers' lack of knowledge regarding pesticide use and explore the positive effects following the educational outreach events. To support her initiative, Emma reaches out to local non-governmental organizations. The initial plan was to contact about 10 organizations so that at least 2 would become more involved. After researching online to find the most appropriate organization to support her, she opted for the Youth Center of Moldova to provide her with volunteers and financial aid (UNFPA Moldova, n.d.). Additionally, Emma aims to recruit a minimum of three volunteers from the Youth Center of Moldova, evaluating the effectiveness of their training and subsequent impact on the community outreach efforts. Emma's primary goal is to organize a training session on the proper use of chemicals in agriculture, targeting a smaller group of about eight people to ensure a more significant impact. To prepare effectively, she consults various experts and adopts a purpose-driven approach to educate as many people in the agricultural sector as possible about sustainable practices. Meanwhile, her team will focus on raising awareness about the issue through both online and offline channels. Out of the 3.3 million people who live in Moldova, about 60.6% actively use social media. Emma's social media objectives include making at least ten posts over six months and reaching around 1,000 followers. Furthermore, she plans to distribute 100 flyers within the community to assess their impact. By defining these objectives and measurements, Emma aims to create a structured, impactful approach to educating her community and promoting sustainable agricultural practices.

She chooses the two-sided method so that both parties will benefit, believing it to be the most effective for her community. Conducting detailed research and consulting an expert, she designs an efficient training course syllabus for

farmers. She holds informative sessions and speaks privately with participants afterward to gather feedback. She encourages them to share what they've learned with friends and neighbors who weren't present, thus implementing a word-of-mouth model, which is highly important to connect deeper and understand their needs better (Blennsjö, 2014).

Understanding the power of the use of social media among Moldova's population, Emma targets platforms like Instagram, Facebook, LinkedIn, YouTube, and TikTok which are the most commonly used in her society, to reach her audience. These are the most powerful tools for community engagement and project marketing (Aliona Muntean, 2014). According to some studies conducted on these types of sites, nowadays, the Internet is the most commonly used method for making friends and interacting with others. It is also widely used for developing community programs (Eugenia Cebotaru, 2015). Recognizing the need for a multi-faceted approach, she also plans to collaborate with community organizations and create a volunteer group. This ensures comprehensive engagement across various sectors of society, extending her outreach beyond just the digital realm.

To achieve better results without rushing the process, she extends her plan to a six-month period, in the first half of 2025.From January 1st to January 10th, Emma will focus on forming her team. Following this, from January 11th to January 25th, she will work on finding suitable trainers and securing the right training venue. Moving to January 26th to February 20th, she will diligently prepare the training syllabus with relevant content. From February 21st to April 3rd, efforts will be directed towards promoting the event extensively via social media and in person. The event will take place on the 4th of April. Subsequently, from April 5th to May 1st, Emma and her team will conduct a comprehensive survey. This data, alongside social media analytics, will be gathered and analyzed between May 2nd and May 15th. The findings will then be compiled into a final report from May 16th to June 3rd. The report will undergo review and approval by field experts from June 4th to June 20th. Final revisions will be made from June 21st to June 30th, with the report ultimately published on July 1st.

Emma and her team have followed several core principles throughout the project planning process to ensure the project's success. Principle 1: Creating a community-based economy through climate action is carried out as they conduct extensive research on climate change and the proper use of chemicals in agriculture, which is a crucial step for educating the local farmers and promoting sustainable practices. Principle 2: Protecting community ownership against corporate takeovers is evident through their efforts to reach out and consult field specialists and local non-governmental organizations (NGOs) such as the Youth Center of Moldova. By involving local entities and experts, they ensure that the community maintains control over the project. Principle 3: Generating global connections to boost momentum is achieved through their collaboration with university professors and experts from both Moldova and Romania. They utilize virtual meeting platforms such as Zoom and Google Meet to connect with Romanian experts, thus broadening their network and integrating global knowledge into their local project. Principle 4: Empowering youth leadership across all levels is central to Emma's initiative, as she assembles a dedicated team of young volunteers who take on various leadership roles. Emma herself acts as the project manager, while her teammates handle data analysis, social media management, and event coordination, demonstrating youth leadership in action. Principle 5: Fostering an ever-evolving and ever-growing community mindset is demonstrated through Emma's strategic use of social media to raise awareness and engage with a wider audience. By promoting the event on platforms like Instagram and Facebook they can reach a larger audience and encourage more community members to participate.

2.3.3 Operation

To ensure the program's success, Emma knows she cannot do it alone. She reaches out to the Youth Center of Moldova and shares her idea with the volunteer community. The chosen volunteers need to possess skills like analytical thinking, creativity, and social skills. This effort pays off as seven youths express interest, and three are ultimately selected to join the team. Emma is the project manager, Laura handles data analysis, Ana manages social media, and Bianca coordinates events.

The team begins their work in early January, diving into research on climate change and chemical usage. Emma and Bianca compile a list of potential trainers, including respected experts and university professors from both Moldova and Romania. Given the need to connect with Romanian experts online, they decide to use virtual meeting platforms. Ana devises a strategic social media plan, targeting Instagram for youths and Facebook for older audiences. They also scout locations for the event.

Once the planning phase is complete, they reach out to the trainers via email. Out of 15, seven respond, and three commit to helping. These trainers assist in developing a comprehensive training program and syllabus. Ana starts posting informative content on social media, and Bianca secures an accessible event venue with support from the Youth Center. To keep a track of the participants, they set up a registration form. By February 20, only two people had registered. Recognizing the need for a more direct approach, they visit rural areas to engage farmers personally. With the help of friends and colleagues, they form four groups to cover more ground. This effort results in 12 additional participants agreeing to attend.

The training event takes place on March 4th at 11 a.m. Out of the 14 registered participants, 10 attend, most of whom they have contacted directly. The event includes numerous photos and video clips for social media. After the training, Emma and her team speak privately with participants to gather feedback, receiving an 80% positive response. Some mention the inconvenient timing and prior knowledge of the subject as reasons for less engagement.

2.3.4 Outcome

The outcomes of Emma's initiative were promising. In the survey, 20% of participants reported that they began researching more about climate change and the chemical substances they were using. Additionally, 56% stated that they had started reducing the quantity of chemicals in their agricultural practices. Furthermore, about 40% of participants reported initiating conversations with their peers about safe and responsible pesticide use.

2.4 Case study conclusion

2.4.1 Success

The initiative led by Emma and her team demonstrated significant success. For instance, 20% of survey participants reported that they began researching more about climate change and the chemical substances they were using. Additionally, 56% of participants stated that they had started reducing the quantity of chemicals in their agricultural practices. About 40% of participants reported initiating conversations with their peers about safe and responsible pesticide use. Furthermore, the team exceeded their initial goal by making around 12 social media posts, which included useful information, catchy facts, and photos from the day of the event.

The work done by Emma and her team has not only raised awareness but also made a change in behavior among many community members. The team's strategy to keep engaging the community, combined with the positive feedback and results, suggests a promising future where more individuals will join the movement towards reducing the harmful impacts of chemical use in agriculture. This continued effort is expected to contribute to a more environmentally conscious society in Moldova, ultimately leading to creating a better balance between agriculture and environmental health.

2.4.2 Challenges

While conducting the planning process of her project, Emma and her team faced several challenges. One significant challenge was the need for comprehensive research on climate change and chemical usage. Gathering accurate and relevant information required consulting various experts and field specialists, which was time-consuming and complex.

Another obstacle Emma faced was finding and motivating participants to attend the events. Many potential attendees doubted the importance or impact of the initiative, particularly given that their trainer was a teenager. Additionally, they struggled to collect enough data. There was a lack of interest in actively participating in experiments and surveys, fearing to waste precious time. The lack of financial resources was also a problem, and finding the right sponsors proved challenging. The limited access of the poorer population to online information poses a challenge for Emma’s plan due to poor internet quality and lack of financial resources (Victor Gotisan, 2020).

2.4.3 Learnings

During the 6-month project period, Emma and her team discovered several community characteristics that had not been identified prior to the operation. One particular observation was the lack of interest some farmers had in participating in the training sessions and the subsequent survey. Additionally, considering the young age of the team leaders, there was significant skepticism among the farmers regarding the potential impact of the initiative. The team also

noted a significant disparity in access to information, particularly online resources, due to varying levels of internet quality and financial resources among community members.

For future community outreach efforts, it is advisable to begin engaging with the community well before the initiative launches to build trust and understanding. Additionally, forming partnerships with respected local figures to endorse the initiative can enhance credibility and acceptance. It is also important to be prepared to adjust strategies based on ongoing feedback and observed community responses. Do not underestimate the community's initial resistance to change, especially when proposed by younger or less experienced individuals. Avoid relying exclusively on online communication, considering the limited access some community members might have. Lastly, don't neglect the importance of training and capacity building for community members to ensure sustainable change, and don't rely solely on one training session, as it is often not sufficient.

2.4.4. Suggestions for Framework Optimization

To enhance the effectiveness of the framework, it would be beneficial to incorporate a final phase called "Continuous Improvement". This phase would involve establishing mechanisms for systematically measuring the social, environmental, and economic impacts of initiatives. By conducting regular assessments and gathering feedback from beneficiaries, this phase ensures that projects remain responsive to changing community needs and evolving circumstances. It also fosters progress, learning, adaptation, and the refinement of strategies to maximize positive outcomes and sustainability (Singh, 2015).

An area in the framework that can be revised is "Articulating the Fundamental Objectives". Instead of simply outlining objectives, the framework should prioritize setting SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound). SMART goals ensure that objectives are realistic and actionable, fostering effective project planning and implementation (Robins, 2014). By adopting a SMART goal approach, the framework can facilitate the achievement of measurable outcomes and sustainable impact.

"Establishing a Specific Timeline" would benefit from a revision. Rather than setting fixed timelines at the outset, the revised process should incorporate regular checkpoints and evaluations. This adaptive approach allows for real-time adjustments based on evolving community dynamics, resource availability, and project milestones. By integrating feedback loops and periodic reviews into the timeline establishment, the framework can enhance project agility, responsiveness, and overall effectiveness in achieving community-driven objectives (Hambissa, 2023).

CASE 3 – NEPAL

3.1 - Introduction

This case study outlines a hypothetical outreach event projected to occur in 2025 or the near future focusing on the use of agrochemicals in Nepal. The study is based on thought experiments and a comprehensive literature review incorporating a range of scholarly articles and books that discuss the future of agrochemicals in the context of Nepal (Angara, 2011; Levidow & Carr, 2000; Uddin, 2018; Bhandari, 2014, Ranabhat et al., 2021; K.C. et al., 2020; Cho, 2018; K.C. et al., 2020; GC & Neupane, 2019; Heimsoth, 2023).I recommend the consultation of local community leaders and the local ward chair, as their extensive understanding of the community can provide invaluable insights.

3.2 - The Problem

This case study examines the improper stewardship and overuse of agrichemicals and their devastating environmental effects (Uddin, 2018), in the context of Nepal, making the Terai region the focus point. Globally, youth learn about this issue in primary and secondary school. In practice, however, farming communities worldwide remain entrenched in the "agrichemical treadmill," lacking substantial evidence for reversing this trajectory (Levidow & Carr, 2000). I presuppose that youth who have access to rural communities, empowered by both their knowledge gained in school and observation in the community, will feel compelled to take matters into their own hands (Angara, 2011). However, without an applicable tool that can assist youth in bridging the gap between their knowledge and actionable change, it is unlikely that aspiring youth activists will be able to find ways to take matters into their own hands and advocate for the issues they care for. The YCACO Framework, once made available to youth globally, will be widely used.

This fictitious case that I constructed is about young activist Shaillina and her team from Nepal and how they tried to tackle the problems concerning improper handling and overuse of agrichemicals. In Nepal, approximately two-thirds of the population is engaged in the agricultural sector. Within this demographic, there is a rising trend in the use of pesticides and other agrochemicals. However, the level of knowledge regarding the proper use and instructions for these substances remains below satisfactory(Bhandari, 2014). The study conducted by Bhandari in Rupandehi, Nepal in 2014 suggests that 97.66% of the farmers of that region had not received any training regarding the use of agrochemicals (Bhandari, 2014). The government of Nepal is far too focused on how to meet the demands of agrochemicals for farmers and less concerned about the farmer's inability to safely utilize them. (K.C. et al., 2020). On the one hand, farmer's agrochemical demands are not being met, on the other hand, training regarding agrochemical stewardship is lacking. (Ranabhat et al., 2021).

In 2013, the Nepal Public Health Foundation implemented the "Farming, Health and Environment Nepal 2013/15 Project (FHEN)" in the Chitwan District to address the negative impacts of pesticide exposure. A subsequent review of the project concluded that providing targeted training to both farmers and pesticide retailers enhanced their knowledge and practices, which in turn created a ripple effect, potentially benefiting neighboring farmers and control villages as well (Vaidya et al., 2017). This case study is particularly relevant to our case study as it exemplifies how grassroot educational interventions can lead to substantial improvements in public health and environmental outcomes. These insights will inform our own approach to developing the outreach plan in similar contexts.

3.3 - Framework operationalization

3.3.1. The Character

Shaillina is one of the community members of Terai region of Nepal. She is a young, passionate climate activist who is just starting out her activism. Owning a small vegetable garden is a cultural practice within her community. Upon observing her neighbors' use of pesticides in their vegetable gardens, she recognized, based on her foundational knowledge of proper pesticide usage acquired from her education, that their methods were incorrect. She understood that such improper stewardship could lead to multiple adverse consequences if not rectified (Kalidas et al el., 2015). Further research into the issue reinforced her perception of its severity and the necessity of addressing it. She found that among the 30 million people, the country's total population, around 62–67% of households are engaged in agriculture, including livestock. Back in 1975, the agricultural sector contributed to 65% of the whole nation's GDP, whereas in recent years as well, this sector contributed roughly 23% to the nation's GDP, earning it the title of 'agricultural country'.

The government of Nepal has been trying to meet the demands of Nepali farmers for chemical fertilizers. Yet, only about 60–70% of the demands can be met (K.C. et al., 2020). While this remains a big problem among farmers, another big issue in this sector has been recognized. That is improper handling of agrochemicals (GC & Neupane, 2019; Kalidas et al., 2015).

The use of pesticides is increasing at the rate of 10-20% per year in Nepal with average use of 396 g/ha but in case of vegetables it is much higher, 1600g/ha in areas with commercial vegetable production (Subedi et al., 2015). There is a five-fold increase in pesticide imports from 132 tons in 2007-08 to 635 tons in 2017-18(Neupane & Pokhrel, n.d.). During the past three decades, this indiscriminate use of chemical pesticides in agriculture has created serious health and environmental problems in many developing countries, including Nepal (Subedi et al., 2015). This is due to the fact that most of the agrochemical users are aware of the negative impacts of chemical pesticides on their health and the environment. A study conducted by Basnet in 2019 in the Godawari district revealed that farmers possess a very low level of awareness regarding consumer health (Basnet, 2019) . The study found that farmers sometimes applied pesticides as late as one week before distributing their produce to the market (Basnet, 2019). However, she felt the lack of enough tools and practical guides to guide her advocacy and outreach. Here, she decides to employ the Youth Climate Activist Community Outreach (YCACO) framework to advocate for this issue.This hypothetical case study is based in Nepal in early 2025. The YCACO framework is a practical guide for young people who want to advocate for climate problems. This framework especially focuses on climate advocacy; however, the use of this framework can be generalized to any other advocacy. This framework provides five detailed steps for community outreach to kick start your journey. In this fictitious case study, Shaillina uses this framework to make an outreach plan and then implements it, observing its outcome within a 6 months long time period. For this case study, I presuppose that there won't be much change in the scenario in this field by 2025. I haven't taken into consideration any upcoming government plans or policies regarding this issue.

3.3.2. - Generating a Plan

According to the framework, upon initially identifying the issues within her community, Shaillina decides to conduct a more in-depth investigation. Her finding reveals that, when chemical fertilizers are excessively used, used without proper examination of soil type, or mishandled, they can severely pollute the soil. Healthy soil functions as a giant carbon sink, storing carbon dioxide from the atmosphere (Mullen, 2023). However, when soil is contaminated by agrochemicals, microbes and processes that normally capture and store this carbon are disturbed (Heimsoth, 2023). This disruption can lead to the breakdown of organic material, releasing the stored carbon dioxide back into the atmosphere, contributing to global warming (Cho, 2018). Furthermore, Shaillina notes that there is poor availability of training resources for proper agrochemical stewardship. Farmers, prioritizing immediate crop productivity, often overlooked long term effects on their health and environment (Ranabhat et al., 2021). Shaillina now knows about the major problem her community is facing. She decides to take a stroll around her community and a nearby community just to get a proper idea of what the main reason behind this problem is. In the local communities of Nepal (specially in Terais), "Mukhiya"/"Barghar" often serve as the well functioning informal organization that looks after local affairs and are highly valued and respected members of the community (Acharya et al.,2016). To gain a deeper understanding of the underlying causes of the agricultural challenges faced by community members, she scheduled a meeting with the local community leader. Additionally, she visited the ward office to obtain quantitative data regarding the level of awareness among community members. This visit also aimed to address official and legal matters associated with the program, ensuring that all interventions would be both informed by accurate data and compliant with relevant regulation. Upon completion of this interaction, she noted down two major issues underlying her community: 1) lack of information; and 2) inadequate access to training programs. Both of the issues increased once she moved to more rural communities.

Upon critically analyzing the issue, Shaillina decides to host a 1-day-long training program for the farmers of Ramdhuni Tol, farmers will be equipped with skills on proper utilization of agrochemicals—that includes chemical fertilizers, pesticides, and insecticides—and the potential risks and consequences of improper utilization and handling of agrochemicals on the environment and on their health. Despite, lower number of participants, past events organized by Shaillina have shown that Purpose-driven initiatives significantly enhance motivation and engagement among participants by connecting their actions to larger goals. Since she is aiming for sustainable long-term change, she decides to go with a purpose-driven approach, as this program helps in the long run, not as an immediate solution.

In her community, most farmers are aware of the hazards involved; however, they are not trained. This is the one of the major reasons behind the farmers' negligence (Ranabhat et al., 2021). From her past projects observations, she realized that the majority of the events organizers don't track the event outcome, making them very unsustainable, resulting in them less impactful. Looking back to the similar projects, we can conclude that , the grassroots model would be most effective in her case as it relies on self-organization — where a system spontaneously increases its order and complexity without external guidance — encouraging community members to take responsibility and action for their community. Understanding that resource allocation is an important factor in planning an outreach campaign or project, she decides to organize a one-day training program and observe the project's outcomes over a six-month period, starting from the initial phase of program design, opting for a longitudinal process..

Understanding the significance of local community leaders and their influence, she decides to approach a respected local community leader to advertise this program. In communities like hers, where there is a strong sense of belonging and deeply rooted community beliefs, approaching a local leader would be a better idea than advertising on social media. Since females are more likely to take safety measures and precautions than males (Ranabhat et al., 2021), Shaillina decides to make females the major target audience. Additionally, they decide to share their team's journey of activism with other young people. They choose social media—mainly Facebook, Instagram, and LinkedIn—as many youths of Nepal are engaged on these platforms.

Shaillina decides to conduct a longitudinal study over a four-month period of a -day training program. After determining all other elements of the framework, she establishes a specific timeline for executing this plan, informed by her prior experience in event organization.

3.3.3 - Operation

Shaillina decides to work with the Interact Club, the club she is part of, to organize this training session for farmers. After planning a community outreach plan with a 5-step YCACO framework, she begins the team formation with five people, including herself: Shaillina, the event coordinator and team leader; Abinash, the social media handler; Praneeta, the reporting and logistics manager; Abhash, the public relations manager; and Tayama, the overall event volunteer coordinator. Three of the four people are from the Interact Club, while Tayama is not affiliated with any club. She decided to contribute to the movement because she felt it needed attention.

After finalizing the team, all the members start their work. Firstly, they list down the names of trainers they can access, and Abhash starts mailing them about their availability in the program. Meanwhile, Abhinash sets up a social media account under the name AgroChemi Awareness (AC Awareness). After a week of mailing, Abhash hears back from three eligible and certified trainers: Sagar Tajpuriya, JTA; Mansi Aggrawal, STA; and Binaya Rai, an agronomist. Shaillina and Abhash approach a local community leader for help in circulating this training-event information. Since Shaillina already has good conversations with him beforehand, their work becomes easier. Next, they approach a local public school, Jabdi Madhyamik Vidhyalaya, for the venue. By the end of January, they hadn't received a response. Just as they start to find an alternative, they receive a positive response from the school, with conditions: organizers must pay for any damage to amenities during the training, and the school will only provide the venue, which the team agreed to.

The team starts finding ways to engage female farmers and also discusses with the trainers what should be included in the 1-day training. Simultaneously, Abhash maintains constant communication with the local leader. By February 17th, the local leader gave an estimate of around 30 participants, which looks promising. The event day arrives. Scheduled to start at 12:00 PM, it's already 11:30 AM, and no one has shown up yet. Everyone is nervous until a group of 10 females and 2 males arrives, followed by another group of 3 males and 8 females. Praneeta, event's master of ceremonies, starts the event formally, and it proceeds as planned. After distributing tokens of appreciation to the trainers, the event concludes. The entire event is captured in videos and images with the verbal consent of the participants. Although the event is over, important work remains. Abhinash and Praneeta work together to create an initial event day report for later use in social media content. Shaillina and Abhash plan to conduct an endline survey after a 2-day break. Many participants provide positive feedback, promising to apply what they've learned, while some express disappointment at not receiving chemical fertilizers, which they had assumed. Despite this, almost 76% of respondents gave a positive response. While the physical survey is ongoing, social media responses are lacking. Despite daily updates with positive quotes, training learnings, and fun facts, the follower count remains below 350 at the end of six months. Many followers are from the Interact Club and their personal networks. They find it very difficult to get more reach in

their social media.

3.3.4 - Outcomes

After the 6-month time period, consisting of 2 months of project implementation and 4 months of observation of the training program's effectiveness, it was proven successful and effective. More than 50% of the participants began properly handling agrochemicals. The report prepared by Praneeta after 6 months states that the physical, in-person training session received a positive response, with 76% of attendees providing positive feedback in the endline survey. The team was analyzing the social media responses and engagements alongside the physical endline survey. The result showed that the social media advocacy and campaigning did not prove as effective as the team had planned. The youths appeared rather disinterested in the subject.

3.4 - Case study conclusion

3.4.1. - Success

This case study, set in Nepal in early 2025 within a Terai community, illustrates the challenges faced by farmers who are aware of the hazards associated with agrochemicals but lack proper training on the matter. Using the YCACO framework, Shaillina and her team assisted farmers to address agrochemical related challenges, which in the long run will help to alleviate environmental problems and health issues. By leveraging the framework, Shaillina and her team bridged the gap between awareness and action, empowering farmers to adopt safer practices, even incrementally. While the framework is used to advocate for wrong agrochemical practices, it can generalize to any form of advocacy. The training program is likely to enhance the knowledge of community members of Ramdhuni community, reducing the hazardous health and environmental effects. This program is also expected to have grassroot movement, using a word-of-mouth model, where every trainee will be the advocate for the safe agrochemical practices. However, this aspect of the training program doesn't have any data to support, it's just an assumption.

3.4.2. - Challenges

Shaillina and team could successfully implement an outreach plan with a good success rate, but it didn't come easy. The foremost challenge they faced was unavailability of data online, they had to physically visit the ward office and local community leaders in person, and as someone who is still balancing advocacy with academics, this presented them with time complexities. Additionally, they faced a certain level of difficulty with authorities, like people (specially adults) lacking trust in them. The major challenges upholding the execution was although the training materials were thoroughly researched, the program design was kind of offset, not very aligned with the way community members learned things. Also, the team did have some difficulties in taking end line surveys with individual community members due to their and member's time constraints.

3.4.3 - Learnings

The central issue highlighted by this case study is the government's neglect of agrochemical-related problems. Despite the evident risks and the urgent need for intervention, there is a noticeable deficit in governmental attention and support. This underscores the need for grassroots efforts and community-driven initiatives in addressing pressing agricultural concerns (Bhandari, 2014). In conclusion, this case study demonstrates the significant impact of collaborative efforts between youths and farmers in promoting agricultural safety and sustainability. While government involvement remains crucial, local youth initiatives can serve as catalysts for change in communities where governmental support may be lacking, particularly with the aid of the YCACO framework.

3.4.4. Suggestions for framework optimization

There are several areas that future researchers or applicants of this framework can look upon for optimization. From the outreach perspective, resource limitation and resource allocation are crucial aspects. Although the framework provides a step-by-step guide on outreach planning, resource allocation is out of the scope of this paper. However, considering the significance of this process, the optimized framework must include this notion. Meanwhile, young people applying this framework can conduct their own research on resource allocation.

Moreover, examining the community context varies for different individuals, whether within a nation or transboundary. Therefore, applicants of this framework must keep in mind that replicable case studies might not be fully

replicable and generalized to their community context. They might need extensive research on the community for effective outreach program designing. For instance, the significance of local leaders and gender dynamics is something that cannot be overlooked in the South Asian context and in Shaillina's situation.

CASE 4 – NEW ZEALAND

4.1. Introduction

This case study examines a youth led community outreach initiative, utilizing mental modeling to explore its impacts and outcomes. This case study, following a high schooler — Thomas — from Rotorua and taking place in early 2025, focuses on the pressing issue of methane emissions and carbon dioxide emissions in New Zealand.

After a thorough review of literature, the thought experiment is reliable and directed by relevant information. To accumulate knowledge before conducting the case study, insights were gathered from several subject experts in environmental science and agriculture. These experts provided valuable information on the long-term effects of methane emissions and potential mitigation strategies. This study is based on a thorough review of literature, ensuring that it is grounded in relevant and reliable information. Literature has described the heavy impacts of rural dairy farming on methane emissions in the country of New Zealand. I have consulted many pieces of literature to form an unbiased model by reviewing relevant peer-reviewed articles and government resources (e.g. Ariely, 2005; Gluckman et al., 2018; Lucas et al, 2019; McKenzie et al., 1999; NZMBIE, 2023; WTO, 2015; Zhang, 2017).

4.2 Problem

New Zealand's economy is very reliant on the dairy and agricultural industries (WTO, 2015). Unfortunately, the large number of cows in the country means high levels of methane emissions subsequently causing breaches in the country's o-zone layer (Kirsten & McMillan, 1997). As a result of high methane emissions, New Zealand's ozone layer has perished (Sagar et al, 2004). The ozone layer is a protective part of the atmosphere made up of O3 molecules that protect us from the sun's harmful ultraviolet (UV) radiation (Solomon, 2008). As it has perished much more UV radiation is apparent and therefore increased temperatures, skin cancer and eye damage and affecting sustainable development (NIWA, n.d.; Barnes et al, 2019). Trees are a fantastic cleansers of greenhouse gas emissions through photosynthesis and planting them will help to deter the environmental issue (Osman & Fawzy, 2023).

The New Zealand economy is built upon two main sectors — among others — including agriculture and tourism (Ballingingal & Lattimore, 2004; Stats NZ, 2023). The need for cows as a prominent part of New Zealand's agricultural industry is growing as the country has high demand for both domestic and international exports (Macmillan, 1997). The effects of global warming have the potential to impact and disturb both of these sectors — Agriculture and Tourism — by making ecosystems unsuitable for agriculture and flora and fauna that contributes to the nation's beauty (Yeoman et al, 2015). Methane emitters are essential as a part of agricultural trade — e.i. dairy and meat exports (Scrimgeour et al, 2005). New Zealand's plan to mitigate methane emissions through the "methane tax" fell through (Al Jazeera, 2024) Therefore, immediate action needs to be taken in order to reduce the country's emission-based footprint (Gluckman et al., 2018). Increased ultraviolet radiation and the effects of ozone depletion are slowing plant growth and photosynthesis (Bornman et al., 2015). As a result of the rising temperatures and decreased plant growth in response to ozone depletion, climates and ecosystems throughout the world are forced to change in response (Pecl et al, 2017).

This thought-experiment case study focuses on the issue of Rotorua's carbon footprint and mitigating the carbon dioxide emissions. Thomas, a local teen, aims to integrate students into climate action by getting them involved in tree plants to mitigate the city's net carbon dioxide output. I presuppose that youth who live in Rotorua, empowered by both their knowledge gained in school and observation in the community, will feel compelled to take matters into their own hands. New Zealand has seen evidently increased temperatures, skin cancer and eye damage due to the perishing of the ozone layer (NIWA, n.d.; Barnes et al, 2019). Thomas is concerned that the effects of climate change will have large impacts on the environmental and economic sustainability of the country.

4.3 Framework Operationalization

4.3.1. The Character

Thomas is a 16-year-old high school student from Rotorua, New Zealand. He comes from a low-income family with a single income from his mother. Thomas attends the local boys' high school and works as a barista outside of school. In biology, Thomas learns that photosynthesis uses carbon dioxide (CO2). Thomas also learns that the tear in the ozone layer that the news had been discussing for months is caused by high rates of methane emissions predominantly

from the rural industry. This has resulted in greater ultraviolet radiation in New Zealand and therefore increased skin cancer and eye damage.

Following his learning, Thomas recalls that he and his friends constantly have sunburn throughout summer and he makes the connection that this may be a result of methane emissions. As an avid mountain biker as well, Thomas has a strong connection to the natural forests of his hometown and is afraid that the consequences of global warming and ozone depletion will mean he can no longer take part in his beloved activity due to ecosystem changes, photosynthesis slowing, and high UV radiation.

Thomas often struggles to gain the respect of adults despite his passion for climate activism. He finds that despite being able to gain the respect of his peers, teachers and adults at his school and in his community often look over him. For example, Thomas in his 2nd year of high school tried to set up a community planter box and vegetable garden that would encourage both a community-based economy and sustainable living option. This project, unfortunately never left the ground as Thomas had trouble gaining support and planning the operation. Thomas aims to use the YCACO — youth climate action community outreach — framework which will help him to break barriers between himself and his goal of climate action and advocacy in Rotorua.

4.3.2.Generating a Plan

New Zealand is a southwestern pacific country with a population of approximately 5 million people (World Bank, 2023). Relatively small and isolated, New Zealand is well known for its culture and natural beauty (Lähteenmäki, 2009). The result of methane and other greenhouse gas emissions in New Zealand is a hole torn in the atmosphere — the ozone layer — above New Zealand (McKenzie et al., 1999). This causes much higher rates of ultraviolet radiation and therefore much higher temperatures (Bais et al, 2015) .

The effects of global warming and climate change are drastically rising; therefore, New Zealand's rich ecosystems may be at risk of extinction as the environment becomes less suitable for organisms (McGlone et al., 2010). New Zealand's economy relies heavily not only on the agricultural exports but also on the tourism industry where nature is at the center. Tourism accounts for approximately 11.1 percent of total merchandise exports (MBIE, 2023) and agricultural products account for 70 percent of total merchandise exports (WTO, 2015). Large scale changes to the climate may result in New Zealand becoming unsuitable for farming and agriculture (MfE, 2001) while distributing the beauty that nature beholds on the country (Stewart et al, 2016). After briefly learning about the issue Thomas' city faces, he decides to further analyze the problem.

As a country with a prosperous agriculture sector, methane emissions are serious threats affecting the ozone layer above New Zealand (Leslie & Clarke, 2008). Methane emissions account for approximately 42.3 percent of National greenhouse gas emissions (New Zealand Ministry of Foreign Affairs and Trade, 2022). New Zealand's economy relies heavily not only on the agricultural exports but also on the tourism industry where nature is at the center (WTO, 2015). Tourism accounts for approximately 11.1 percent of total merchandise exports (MBIE, 2023) and agricultural products accounts for 70 percent of total merchandise exports (WTO, 2015). Large scale changes to the climate may result in New Zealand becoming unsuitable for farming and agriculture (MfE, 2001) while distributing the beauty that nature beholds on the country (Stewart et al, 2016). With a number of rural communities yet a well populated, urban city center, Rotorua has a population of approximately 71,800 (Stats NZ, 2018), roughly 28 percent of that population is youth (Infometrics, 2023). The New Zealand population is dealing with the effects of a depleted o-zone layer with much greater levels of ultraviolet radiation and therefore global warming, skin cancer and decreased plant growth (Diffey, 2003; Lucas et al, 2019; Salmon et al, 2007; Sisson & Caldwell, 1977). However, little can be done to reduce and offset atmospheric methane levels without compromising other needs (Pinares-Patiño, 2009). Therefore, efforts need to be made to reduce overall emission of greenhouse gasses. Carbon Dioxide is over 50 percent higher than pre-industrial levels globally (NOAA, 2022) and urgent action is needed to meet the goals of the 2015 United Nations Framework Convention (Nisbit et al, 2020). Photosynthesis plays an essential role in eradicating carbon dioxide and is an economically and environmentally friendly, sustainable way of doing so (Zhang et. al., 2017). By planting more trees and plants we may not be able to eliminate methane, but the properties of photosynthesis will mean we can remove carbon dioxide from the area and hence limit global warming (Adiaha et al., 2020).

Thomas understands the significance of the global warming issue his community is facing stemming from carbon dioxide and methane emissions. After taking a walk through his urban community, Thomas realizes that despite

the Whakarewarewa forest being next to the city, there are not enough trees in the urban city center and more could be planted to help deter emission rates. This means that despite being a central area for carbon dioxide emissions, there are likely not enough trees to absorb the high carbon dioxide emissions through photosynthesis. Rotorua currently has a PM.2.5 concentration air quality which meets the WHO guidelines according to the July 22nd, 2024, reading at IQAir. According to the same website, countries across the globe have highly unhealthy air quality, Auckland, New Zealand falls into the top 100 most polluted major cities in the world. Thomas hopes that his hometown can be a role model city for sustaining clean and healthy air which could potentially help mitigate global pollution levels and decrease the impacts of global warming and climate change alongside public health issues. The Rotorua Lakes District Council's reserve land accumulates for an area of over 800 hectares and approximately 110 urban reserves (RLDC, n.d.). This provides a variety of recreational spaces where Thomas could potentially plant trees in an urban environment. With a good connection to his local school, Thomas decides to work alongside his school to take part in tree plants in the city center.

Thomas decides that the main goal of his community outreach will be to make an impact in the carbon dioxide emissions of Rotorua and aim to create a platform to work towards a sustainable city both in terms of emissions and participation in climate action. As a quantitative objective, Thomas hopes to have at least 30 trees planted monthly in his monthly tree plants with over 20 people joining him to plant every month by his third tree plant. This means that across each monthly tree plant, he will need to plant at least 30 trees on an available council-based reserve while engaging at least one classroom worth of students in the tree plant.

This will ensure that community members are sustainably engaging in the events and this will help to create sustainable climate action as a community.

As a result of this quantitative objective, Thomas would also like to see subsequently greener urban reserves. Out of the 110 urban reserves owned by the Rotorua Lakes District Council every time Thomas does a tree plant, he is helping to create a greener and more attractive city for his community to share (RLDC, n.d.). Thomas will qualitatively and quantitatively analyze this objective by analyzing the total number of urban reserves where the tree plants have happened and the effects on how "green" the city is.

Finally, as Rotorua remains a city with relatively low carbon emissions compared to other New Zealand cities, such as Auckland and Wellington, or international cities, Thomas would like Rotorua to become a role model city in urban spaces for environmental sustainability. Thomas will measure this qualitatively by analyzing how many other cities begin tree plants similar to his own after 5 months of operation. He will begin this measurement after 5 months to limit consequently similar events.

Thomas would like to see more members of the general public participate in the monthly tree plants while also persuading others to start their own tree plant in other towns. He decides to empower his community members to make change through the grassroots model. The grassroots model embodies a bottom-up strategy that encourages and empowers local community members through inclusion and involvement. Grassroots models generally include local level events that encourage community members to be involved in the action (Parater, 2019). Thomas, as a local high schooler, is well connected with pairs and other local high schoolers from around his hometown. In order to optimally reach out to a large audience, Thomas will leverage his relationships with his peers as well as teachers and faculty of the district's secondary schools. He will gauge community interest at his school and other local schools through social media and school notices. He will also approach principles of the schools to try to integrate the tree plants into the school curriculum.

Thomas has decided to work alongside local schools — and therefore students — to plant more trees in local communities and the city center. This means that the optimal outreach channel for Thomas is through school notices and faculty communication where Thomas will most easily be able to reach a large range of his targeted audience. Thomas believes that this is the best method to engage a large number of students in his environment. As a well-established student, Thomas has fostered connections within his school and to other schools through both students and teachers. This will give Thomas the best exposure to students which is his targeted audience for the tree plant events. It will also mean that during his outreach to others in the community he can be fostered and guided by teachers and school faculty to help create reliability in his events.

Thomas would like to guarantee that tree plants sustainably occur throughout Rotorua so he will measure the

success of his monthly tree plants over 6 months. He decides to observe the success of the tree plant events over a 6-month period, making it longitudinal. In the first month Thomas will reach out to local schools to receive a calendar of events planned for the next 6 months. He will aim to set up meetings with principals and teachers to promote the tree plant events and gauge interest. In the following month and a half Thomas created interest in the event and to discover areas with the council/local business where tree plants may take place. Following this Thomas begins the first official tree plant and overviews its success before deciding to continue his monthly events.

Throughout the initiation of the tree plants, Thomas ensures that the core principles of the YCACO Framework are upheld and embedded in the operation. Thomas ensured that the community of Rotorua was actively involved in the operation of the tree plants by prioritizing participation of local secondary school. The outcomes of the operation (fully grown and developed trees) were kept at the parks where the operation took place. This will limit the external sale of the trees in a global economy, and the outcome is shared among the community through the community-based economy as members of the community are able to spend time in and enjoy the flourishing park. This action also limits the ability for corporations to take over the outcomes and consume them as a part of a global economy as the outcomes are shared among the community. Connection will be achieved across the community during operation as the high school students learn to collaborate through environmental sustainability which promotes a sustainable development starting with the youth. Furthermore, the outcomes of the operation will set an image of what can be achieved through collaborative community tree plants and influence similar action across the nation or globe. The involvement of youth will continue to set an example of sustainable development and empowerment of youth leadership as this involvement will encourage and empower youth to take further action and make critical steps in the path of environmental sustainability and sustainable development.

4.3.3 Operation

Thomas, in order to better understand his community and how to reach out to them, confronts the old head boy of his school who he knows has been involved in tree plants while he was at high school. He shares his advice on involving peers in the action and how Thomas can achieve success in his action. Thomas aims to lead the events individually but hopes to gain support from principles and staff of the local high schools to engage his peers in the sustained action through a varied and large audience of youth.

Thomas aims to work with high schools in Rotorua to reach his target group of youth between the ages of 13 and 18. By doing this Thomas aims to involve students from these high schools in local tree plants by working with the schools to integrate it as a part of the curriculum. After planning a community outreach plan within the 5-step YCACO framework, Thomas begins to reach out to the local high schools and aims to set up meetings to discuss the opportunities for voluntary involvement in environmental sustainability. After meeting with principals and schools regarding the opportunity he finds that the principles do not entirely see hope in his program. Though three schools agree to work alongside Thomas to make a communal impact through the tree plants. The principals do not feel that they can integrate the event into the curriculum directly, but they have stated they will be able to use the tree plant event as a part of a social sciences trip. While this limits the number of students available for the tree plants. Thomas feels that by opening it to social science students he is inviting a purpose driven environment that also subtly incentivises students with a day off of school. Thomas aims to coordinate the three schools to have them take part in the tree planting individually to ensure sustainable success. The principles agree to this. Thomas decides that he will do the tree plants on the 16th day of each month starting in March. By setting a uniform date for all tree plants, Thomas can more easily coordinate the schools and collaborate better to inform participants.

Now that Thomas has gathered all the participants, he needs to find accessible urban land where the event will take place. With an easily accessible council, one of Rotorua's goals is to promote environmental sustainability. Thomas decides to approach the council regarding his project and asks if there are any urban/suburban areas where he may do tree planting. The council is on board with the project and promotes suburban parks where Thomas can carry out his project under the condition that he provides updates on his project and that he guarantees the fair use of the council land.

On March 16, Thomas held his first tree plant at suburban park with a local co-education school. The event proves to be a success although many accompanying teachers are wary of Thomas' authority of the students. For the most part, Thomas is able to engage the students in climate action for a sustainable period of time. The students help to plant over 50 trees and plants in the large park which will help make an impact on the carbon dioxide emissions from

the community. Some students approach Thomas after the tree plant and discuss what an exciting opportunity it was and how they look forward to the next one. For some students though a lack of enthusiasm and therefore engagement instead is evident.

After analyzing the success of the first tree plant. Thomas looks to organize more tree plants throughout the year and once again reaches out to schools who earlier declined. Many more schools are interested in participating due to the success of the first tree plant. Thomas moving forward aims to further collaborate with the district council to discuss the carbon dioxide and methane emission issue we are facing, He will continue to work alongside the district's schools to provide sustainable and hands on solutions to the environmental issue and he hopes to expand his work to other cities where the issue is more prominent (i.e. Auckland, Wellington and Tauranga). Thomas would like to advance his own leadership to create better purpose driven action that motivates all students to participate.

4.3.4 Outcomes

Following the first five tree plants Thomas reviewed the success of his goals and the performance of the tree plants. The choice to involve students in environmental action was the right step towards creating sustainable action and reach a large audience of the community to get them involved.

Thomas had initially hoped for 20 people to be attending the tree plant events monthly but following his collaboration with the local high schools Thomas can see numbers of 30-40 people at his tree plants (about 1-2 classes). This means that the events can more efficiently and effectively plant trees which will have a much larger impact in terms of offsetting carbon dioxide emissions and reducing the towns carbon footprint.

Over the course of the five tree plants Thomas and the collective of high school students volunteering their time in school were able to plant nearly 200 trees and various plant species in government parks and recreational areas. This exceeded Thomas' initial expectations of 150 trees and plants across the three events.

The tree plants that Thomas initiated on the council urban reserve land has helped the city to create a more sustainable and greener environment. This has had influence and impact on the tourism industry by creating Rotorua a more inviting place through visual appeasement. Thomas has noticed that families are found using the council reserves and people are using the council reserves to go for walks or commute which has further helped to mitigate emissions.

Thomas wanted to create sustainable practices not only in his hometown of Rotorua but on a nationwide scale by using the word-of-mouth model to encourage other communities in New Zealand cities to initiate their own tree planting events in cities that need it such as Wellington or Auckland. Following Thomas' success story, youth in Wellington (during month 7 of operation) and Tauranga (during month 5 of operation) have begun to initiate their own tree planting events and have reached out to Thomas to understand how to do it.

Thomas, throughout operation, ensured the core principles of the YCACO framework were upheld. The decision to involve local schools in the climate action through a grassroots model was very important within this process. This ensured that local schools were directly involved in the operation of local events that meant outcomes were collaboratively owned by the community; creating a community-based economy. This decision also ensured that that connection was created between youth across the community through collaborative learning while empowering them to be leaders in their own rights. Thomas' events reached further than his community by reaching larger cities and promoting tree planting there; this exemplifies the success of creating an ever-growing community mindset and collaboration further than Rotorua. However, Thomas was unable to create large-scale global movements within the first year of the tree plants as no cities outside of New Zealand initiated or reached out through similar events.

4.4 Conclusion

4.4.1 Success

This case study — based in Rotorua, New Zealand — brought to light the challenges faced by youth activists trying to take local action against climate change and greenhouse gas emissions. The application of the YCACO framework proves that youth can take action against climate change through both small- and large-scale events. This application proved that youth can create sustainable local change that helps to offset the rising emissions of carbon dioxide. Through the use of the framework, Thomas was able to create collective action alongside his peers and local high schools and make a positive impact in his community.

As a result of Thomas' climate action event through the use of the YCACO framework, Thomas was able to create connections between community members and empower youth to lead and involve themselves in grassroots level climate action. In the process, Thomas helped to mitigate the carbon dioxide emissions of not only Rotorua but larger cities that included Tauranga and Wellington. Thomas was able to actively engage the school community to involve students in climate action with numbers at or above target levels. In turn, he was able to create spaces cherished by the community and owned by the community by preventing corporate takeover of the outcomes.

Thomas predicts that the tree plants will continue to grow but may require shifts to different spaces or objectives such as rural land or waterbed planting due to the limited land available. He also predicts that schools in Rotorua will likely be inclined to actively involve the tree plants in junior environmental science or social science curricula which will help boost participation levels. The number of events outside of Rotorua will grow exponentially as Tauranga and Wellington have gotten on board which will likely create both national global connections and operations. As the tree plants continue to grow Thomas hopes that city councils of largely urbanized cities will support local youth into starting their own community outreach events through tree plants.

4.4.2 Obstacles

Thomas' lack of authority in his school ultimately meant that it was difficult to gain support from community members such as school faculty which meant Thomas was unable to gain support over his planning. This meant that before he had started planning, he had already set himself up for failure as he was unable to easily streamline the tree plants into the curricula.

While the tree plants were successful for Thomas, limitations arose from the framework. The framework does not appropriately cover the issue stemming from authority. As youth activists, adults and older members of the general public are less likely to trust or follow you. This may lead to large issues within the success of the framework as it does not appropriately address the issue that youth activists generally face. For example, in this case it was very unlikely that any schools were going to respond to Thomas' pitch due to his lack of authority as a teen. A lack of authority also will correspond to a lack of funding as many teens are already unable to finance the projects, and a lack of authority will limit the lack of available funding as many providers will not believe in their capabilities.

4.4.3 Learnings

Throughout the operation of the tree plants Thomas began to realize the full extent of his community's context. Thomas believed that it would be very easy to streamline his tree plants into the current curricula due to the already present social science and biology assessments. However, Thomas found that while it may be easy for teachers to implement the tree plants into the work, it is the funding, resources and time availability that is available to schools. This meant that very little time did the teachers agree to participate in the tree plants due to the complexity of the initiation. Initially, Thomas had thought that the council would be the most difficult community group to reach out to during project initiation. Although, with young councilors who wanted to see Thomas' success, Thomas was fortunate enough to be working with supportive council members who enabled his operations. Thomas' young age meant that at times it was difficult to gain the mutual respect of his peers when operating the tree plants. This is likely a result of targeting very similar age groups who view Thomas as a friend. This lack of authority diminished his ability to motivate teams.

In future events, Thomas may choose to better select target audiences that will allow him to convey authority and motivate groups. This may mean that rather than secondary school students Thomas may have to target primary or intermediate school students. This will also help to better engage faculty as it may be easier to implement the tree plants into schooling as a field trip where resources are less scarce and time is much more available, relative to secondary schools. Thomas may also choose to create an option to further extend the community-based economy principle of the YCACO framework. Creating a much more worthwhile outcome may be a greater incentive for community participation and engagement. Furthermore, Thomas would try to reach out to other communities to begin tree planting events in other cities. This would make a much larger impact in a shorter amount of time as Thomas is not waiting for others to model his tree plants.

4.4.4 Suggestions for Framework Optimization

In order to address the confronting issue regarding peer motivation and authority it may be beneficial for optimization of the YCACO to include steps regarding motivation and participation. Motivation and participation are

incredibly important to ensure collective success through collaboration in climate events. This could mean including purpose driven and reward driven perspectives for outreach objectives in a separate step. This would likely fall between steps 3 and 4 as it would be beneficial to have a concrete understanding of community context, objectives and outreach models before encountering measures for greater motivation and participation.

It may be beneficial for the establishing a specific outreach timeline step to be refined to be determined by less of a direct longitudinal process but to encourage cyclic planning and refinement. The current establishing a specific outreach timeline step tends to take a more longitudinal approach that encourages continuous steps forward. However, it may be beneficial that the establishing a specific outreach timeline step include a less longitudinal approach that encourages refinement and revision to focus less on direct work but robust planning. This approach would mean that youth are able to more easily analyze potential risks and solutions when revising and refining their planning. In turn, youth will have a much more robust plan that needs the changes of an ever-changing community context and environment.

To meet the needs of differing community contexts, it would be beneficial to include a variety of different outreach models. The current framework's element, ascertaining the optimal outreach model, contains two main components: Owed of Mouth models and Grassroots models. It may be beneficial to optimize this element to include more models outside of the two main components. This is due to the variety of different community contexts that these models must cater to, a model that is not optimal will likely cause issues further into planning or operation. Therefore, in order to better cater to a variety of community contexts it would be beneficial to include more components to this element.

In order for youth activists to better understand the specific need for each outreach model it may be beneficial to revise the selection process of the optimal outreach model. While it is clear what the outreach models are and how they are used, it would be beneficial to include how to select the components to cater to both the community context as well as the defined fundamental objectives. This would ensure that the optimal outreach is well catered to the needs of the youth activists and therefore their youth will be able to more easily outreach.

CASE 5 – THE UNITED STATES

5.1. Introduction

This case study is a description of a potential outreach event that could take place in the first six months of 2025 to reduce air pollution. Los Angeles (LA) is one of the most densely populated cities in the world (Lee & Maheswaran, 2010). Unique from other cities, LA's high population leads to clogged freeways and an excess of vehicle emissions (Genovese, 2019; Ross et al., 2005). These vehicle emissions cause air pollution which lead to health and environmental issues throughout LA County (Laurent et al., 2007; Lee & Maheswaran, 2010).

The content of this case study is informed by a thought experiment where my character uses the Youth Climate Activist Community Outreach (YCACO) framework to attempt to lessen the impacts of air pollution in her community over a sixth-month period. To make an informed decision about the content of this thought experiment, I have conducted a thorough literature review on the future of vehicle-transmission based air pollution with a focus on pollution specifically from cars and trucks. In addition, I have consulted academic articles and journals based on air pollution in the context of Los Angeles, California (LA) (Bell et al., 2005; Laurent et al., 2007; Lin et al., 2016; Lipsitt et al., 2021; Ross et al., 2005; Zhong et al., 2020).

5.2. The Problem

This case study addresses the problem of air pollution from vehicle emissions and explores solutions through community outreach in 2025. The aim of this study is to apply to YCACO framework to mitigate air pollution and demonstrate its practical application in a real-world community context. By leveraging the YCACO framework, a comprehensive action plan can be developed and implemented, taking into account the specific needs and circumstances of the community.

As the second largest city in the US, Los Angeles has a population of almost 4 million people packed into 469 square miles (Eidlin, 2005). Among these residents, 80-90% own at least one vehicle and drive about 188-192 miles per week (Blumenberg & Manville, 2004; Taylor & Ong, 1995). Since the Industrial Revolution, vehicle emissions have nearly doubled, posing an increasing threat to human health and the environment (Anenberg et al., 2010; Gauderman et al., 2004). From 1987 to 2000, LA citizens experienced severe air pollution, with visibility reduced and breathing difficulty (Bell et al., 2005; Laurent et al., 2007; Lee & Maheswaran, 2010). Research indicates that exposure to vehicle emissions adversely affects children's respiratory health and development, with reduced lung function and development compared to those in less polluted areas (Gauderman et al., 2015).

In this thought-experiment case study, young activist Addie and her team tackle air pollution issues that stem from overpopulation and vehicle exhaust (Bell et al., 2009; Lin et al., 2016). I presuppose that LA youth, empowered by both their knowledge gained in school and observation in the community, will be motivated to address air pollution firsthand (Hughey et al., 2016; Sheth, 2020). LA's air pollution is one of the worst in the country (Bell et al., 2005; Laurent et al., 2007) and there are thousands of deaths occurring each year in LA due to worsening air pollution conditions (Genovese, 2019; Lin et al., 2014). LA is also home to the two of the largest ports in America, the Los Angeles Port and Long Beach Port. LA's geographical location encourages a high volume of truck traffic.Trucks and cars release significant amounts of particulate matter (PM), nitrogen oxides (NOx), and volatile organic compounds (VOCs), which are primary contributors to air pollution. The city's large, growing population and car-centric culture result in a high number of vehicles on the road, increasing pollution levels and its impacts on human health and the surrounding environment. (Genovese, 2019; Lee & Maheswaran, 2010; Ross et al., 2005). If this continues, this issue will continue to degrade the environment and cause chronic health concerns like lung cancer and respiratory diseases in humans for years to come (Bell et al., 2008; Lin et al., 2016).

5.3. Framework Operationalization

5.3.1. The Character

Addie, a 16-year-old, is one of the community members in Los Angeles, California. She is a young, passionate climate activist who is just starting out her activism. In her own personal experience, Addie has experienced the effects of air pollution. In her own high school, which shares a wall with the always-crowded I-10 freeway, many of her peers wear masks or suffer from respiratory diseases that are only inflamed by the closeness to the freeway (Currie et al., 2009;

Gauderman et al., 2015; Venkatram & Schulte, 2018). There are days where she can't even see the beach from the freeway because of all the smog limiting visibility (Cao et al., 2012).

Addie has always had a very personal interest in air quality and pollution in her community. As a person with asthma and walking pneumonia, her inhaler is always with her. The air quality and air pollution has a direct impact on her ability to breathe and her wellbeing. She knows she is not the only one at her school that suffers in this way. Her respiratory issues helped push her to research through her school library and start clubs at school that focus on air pollution.

As the president of service and outreach clubs, she has used her connections to teachers to host workshops and webinars to educate her peers on air pollution. However, she found that it was difficult to motivate students to take action when they are misinformed and don't have a clear plan of action. After this experience, she wants to expand into her local community, including adults and teenagers. By utilizing the YCACO framework to tailor her approach to her community's specific needs. The framework's clear, step-by-step guidance will enable Addie to make informed decisions, educate her local community effectively, and inspire them to adopt more sustainable daily habits.

5.3.2. Generating a Plan

Within the community, Los Angeles policy makers have implemented the Clean Air Action Plan (CAAP), reducing emissions from port-related sources, vehicle emissions regulations, invested in public transports, explored alternative fuel sources, and focused on urban planning and development (Ross et al., 2012). Yet, there are concerns over the enforceability of the CAAP, providing access to public transportation for all residents, addressing affordability and accessibility of an alternative fuel source, mitigating the impacts of urban development on air quality, and navigating complexities of regulatory barriers (Hess & Lombardi, 2004; Lejano & Hirose, 2005). Additionally, the need to reduce reliance on fossil fuels and transition to cleaner, renewable energy sources to power transportation and industrial activities has become more apparent (Lejano & Hirose, 2005; Monios & Wilmsmeier, 2012). Many community members in LA are aware that air pollution is a chronic and urgent issue. However, they are not willing or do not know how to give up their daily conveniences, like a personal vehicle for a comfortable commute, to help reduce air pollution.

Addie’s comprehensive plan encompasses four key objectives aimed at addressing air pollution and enhancing community engagement in LA. Although many community members are aware that LA suffers from significant air pollution due to vehicle emissions, they lack detailed knowledge or the motivation to act. To combat this,her first objective is to increase awareness of vehicle emission pollution among residents, targeting a minimum of 20% of local high school students through educational workshops (3,200 out of 16,000 students) and striving for a 50% uptick in social media interaction on relevant posts within six months. She aims to go from 400 likes, 160 shares, and 130 comments to 600 likes, 240 shares, and 195 comments. Secondly, Addie seeks to promote the use of alternative transportation methods, aiming for at least 10%, 1 out of every 10, customers to be using an alternative transportation method. This would be 4,200 people out of the 42,000 customers that the average boba shop will see over a six month period (citation). The majority of LA residents rely heavily on personal vehicles, contributing significantly to air pollution (Blumenberg & Manville, 2004; Taylor & Ong, 1995). Thirdly, she plans to bolster community involvement by organizing at least three tree-planting events, with a goal of planting 500 trees by community members, alongside a 30% rise in membership (from 120 to 156 active members) and active participation in school environmental clubs. Finally, Addie aims to forge robust partnerships with 10 local businesses, facilitating incentives like promotional discounts for eco-friendly actions and documenting outcomes through interviews and social media analytics.

In Addie's situation, a hybrid community outreach model combining grassroots and word-of-mouth approaches within a two-sided framework would be most effective. The grassroots model engages community members directly through local events, fostering a sense of ownership. When community members feel like their actions have real, concrete effects, they are more likely to stay motivated and continually change their behavior (Becker, 1978; Kollmuss & Agyeman, 2002). Grassroots models start at the individual level, then spread to community networks and existing organizations. The word-of-mouth model leverages personal recommendations and social proof, spreading information more effectively. Information spread through friends, family, and trusted community members is more likely to be received positively and acted upon (Keller & Fay, 2012; Sweeney et al., 2014). Because reducing air pollution requires large behavioral changes to one’s routine and convenience habits, a community member may be more inclined to personally work towards improving their carbon footprint upon hearing that their friends and families are doing the same

(Cialdini, 2003; Mollen et al., 2013). The two-sided model engages both local businesses and community members, fostering collaboration and mutual benefits for store-owners and community members alike. Businesses can provide incentives and platforms for outreach, while community members bring participation and support. This hybrid model addresses LA's diverse context, ensures sustainability, and fosters community engagement, creating a comprehensive strategy to tackle air pollution and promote lasting change.

Addie will use a variety of outreach channels to maximize the impact of her initiative. She will collaborate with local organizations like Asian Pacific Islander Forward Movement (APIFM) and the Alhambra Unified School District (AUSD) to leverage their established platforms for educational seminars, workshops, and community events. Both organizations are deeply ingrained in her community and have already established large audiences. As a high school student with existing connections to APIFM and AUSD through her club activities, Addie can easily access and utilize these outreach channels. APIFM regularly organizes air pollution workshops and volunteer opportunities, which Addie will incorporate into her program by directing participants to these events. AUSD also hosts similar air pollution-related events and has a diverse social media following that includes adults, alumni, and teenagers from the community. Additionally, Addie will partner with local businesses, particularly boba shops, to provide incentives for using alternative transportation, such as biking or taking public transportation. Partnering with local businesses is a strategic outreach channel because it taps into established community hubs where people regularly gather, making it easier to engage them in eco-friendly initiatives. Additionally, businesses like boba shops are popular among teenagers and young adults, helping to attract a key demographic for her campaign. Social media will be employed extensively, with an Instagram account named BobaForBreathLA created to publicize events, share success stories, and engage a broader audience. By posting and reposting on both BobaForBreathLA, APIFM, and the AUSD instagram account, Addie will be able to reach her target audience. Addie will also utilize word-of-mouth by encouraging participants to share their experiences with friends, family, and social networks, and will make announcements through school channels to further spread the message. This multi-faceted approach will ensure widespread community engagement and participation in the campaign against air pollution.

Addie will establish a specific timeline to ensure the effective implementation and monitoring of her initiative. From January 1st to 30th, she will reach out to local organizations to gather a calendar of events planned for the next six months and secure commitments from local businesses for incentives. From February 1st to April 15th, all attended events will be rewarded with incentives from local businesses, and data will be collected bi-weekly to monitor participation and engagement. Between April 16th and May 15th, Addie will conduct surveys and collect data from businesses to evaluate the program's impact. From May 16th to June 15th, she will analyze the survey results, social media metrics, and business data. By June 31st, Addie will prepare a final report detailing the program's outcomes. Starting July 1st, she will gather feedback and make improvements for future initiatives. This timeline ensures structured progress and allows for timely adjustments to maximize the program's effectiveness.

The five core principles of the framework were embedded throughout the planning process. Principle 1, creating a community-based economy through climate action, guided her decision to focus on local businesses, schools, and organizations. To uphold principle 2, protecting community ownership against corporate takeover, she chose to support locally-owned enterprises instead of larger corporate food chains like McDonalds or Chick-Fil-A. In line with principle 3, generating global connections to boost momentum, she decided to use social media to reach and inspire other youth activists around the world, reaching them through a platform that is not bound by geographical location. Principle 4, empowering youth leadership across all levels, was ensured by involving youth in every step of the process, with high school students acting as liaisons and leaders, supported by adults who validated their ideas and decisions. Finally, Principle 5, fostering an ever-evolving and ever-growing community mindset, was reflected in her plan to conduct workshops and tree-planting events to raise awareness and provide tangible evidence of community impact. The knowledge and concrete visual evidence throughout the community will constantly be a reminder that every person has an impact and can continue to combat air pollution with their own actions. By embedding all five principles of the framework into her planning process, Addie is setting herself up to have a lasting, positive impact on her community.

5.3.3. Operation

To ensure the success of her initiatives, Addie will assemble a dedicated team comprising both students and adults to support her efforts. She will start by recruiting fellow students from her high school who share her passion for environmental advocacy and that she has worked with before. These student team members will be responsible for

managing social media accounts, creating promotional materials, and communicating with representatives from the different businesses and organizations her team is working with. Additionally, Addie will enlist adults from local environmental and volunteer organizations, like Rotary and Optimism Clubs who can provide mentorship, logistical support, and expertise in areas such as community outreach, environmental policy, and project management. This team will help Addie by playing crucial roles in liaising with local businesses for sponsorship and incentives, facilitating partnerships with APIFM and AUSD, and guiding strategic decisions based on their experience.

Gaining support from local businesses and preparing for the six-month program involves strategic outreach and clear communication. Addie will approach businesses to illustrate the benefits of participation, emphasizing community engagement and enhanced public perception. She will present a concise plan detailing how businesses can contribute, such as offering incentives for attendees of workshops and promoting sustainable transportation. She will tell the businesses that customers must show proof that they used an alternative method of transportation or have received a blue slip of paper with the Boba for Breath LA paper signed and stamped to receive the Buy-One-Get-One (BOGO) deal. Simultaneously, Addie will create a social media plan and prepare posts to spread awareness. She will publicize this deal on social media before the actual event opens to garner interest and excitement for the six-month period. This approach aims to establish strong partnerships, laying a robust groundwork for addressing air pollution and fostering sustainability in the community.

When the actual event unfolds, Addie and her team will post every three days on the three social media platforms. Her team will encourage their own friends to go and even attend the workshops themselves. With the blue slips earned from the workshop and the knowledge that they have bettered the environment, they will walk to get a boba drink for the local business. These events will include educational workshops hosted by local organizations like APIFM and the Alhambra Unified School District, where participants will learn about the impact of vehicle emissions and practical steps to mitigate air pollution. Other workshops include tree-planting initiatives and eco-friendly transportation campaigns will be organized to encourage sustainable practices among community members. Local businesses, enlisted as partners, will offer BOGO incentives to individuals who participate in these activities, thereby incentivizing community engagement. Throughout the six months, Addie and her team will actively monitor participation, collect feedback, and adjust strategies as needed to maximize impact.

Addie and her dedicated team showcased how the YCACO framework can be used and how it follows the five main principles. Principle 1 was upheld by partnering with local businesses to promote eco-friendly practice through climate action. Principle 2 focused on protecting community ownership by engaging local businesses and maintaining grassroot control. Principle 3 generated global connections through social media, where the youth-led environmental groups can have world-wide reach. Principle 4 emphasized youth leadership, with Addie and her peers organizing the BOGO initiative and being in constant contact with APIFM, AUSD, and local business representatives for the whole six-month period. Principle 5 promoted an ever-evolving community mindset through educational workshops and activities. Addie’s efforts not only brought awareness to her community but encouraged ongoing environmental stewardship.

5.3.4. Outcome

Addie's environmental initiative in Los Angeles yielded mixed outcomes, aligning closely with its predefined objectives while encountering some challenges inherent in community-based projects. The first objective was to raise awareness by getting 20% of the local high school population to attend educational workshops and a 50% uptick in social media interaction over the six-month period. By looking at sign-in spreadsheets, she measured 3,186 attendees. She fell just short of her goal which was 3,200 out of 16,000 students. Before her outreach effort, social media accounts with posts about air pollution were averaging 400 likes, 160 shares, and 130 comments. She wanted to get an uptick of 50%. She blew past these numbers ending with an average of 1,150 likes, 260 shares, and 206 comments per post. However, despite these awareness gains, the goal of getting 10% of the local business’ customers to use alternative modes of transportation fell short. Many customers decided to attain the BOGO deal through the educational workshops, instead of using alternative transportation. The businesses reported that 7% of their customers used an alternative mode of transportation.

Community engagement efforts showed promising results with active participation in tree-planting events and increased membership in school-based environmental clubs. The planting of 500 trees by community members not only beautified local spaces but also fostered a sense of environmental stewardship, as participants felt more connected to

their environment and that their actions had concrete impact. Addie noticed that there were a select few who felt motivated and started to talk about starting a community's garden. However, for most participants, sustaining long-term participation proved challenging, as evidenced by a decline in attendance at follow-up workshops and events, after participants had already received their BOGO deal. This decline suggested that while initial enthusiasm was high, maintaining consistent involvement required additional strategies. Furthermore, addressing the diverse interests of the community, such as varying environmental priorities and preferred types of activities, was essential to keep all segments engaged and motivated.

Addie reached out to 45 different businesses in the area and successfully forged partnerships with 10 local businesses, securing their commitment to incentive programs and enhancing the initiative's visibility. This collaboration bolstered support for environmental initiatives among businesses, contributing to increased community awareness and participation. However, despite these successes, achieving sustained behavioral change towards alternative transportation methods remained a challenge. Overcoming entrenched behaviors and logistical barriers proved complex, highlighting the need for ongoing efforts and innovative approaches to promote sustainable transportation options.

The 5 principles were implemented here, as they were in the planning and execution process. When measuring the outcomes, Principle 1 was measured as the outcomes focused on local businesses and community engagement. Principle 2 was upheld with the beautification of the community when planting 500 trees. Global connections were generated to boost momentum through the social media plan, where engagement had an uptick higher than 50%. Principle 4 was highlighted when Addie focused on educating high school students with her educational workshops, giving them the knowledge they need to take leadership and ownership of this issue. Principle 5 was seen when community members continued to plant trees and even made plans towards a community garden.

5.4. Case Study Conclusion

5.4.1. Success

In conclusion, Addie's case study illustrates the impactful role of youth-driven initiatives in addressing pressing environmental challenges, particularly air pollution from vehicle emissions in LA. Through the YCACO framework, Addie effectively heightened community awareness, engaged local businesses, and mobilized fellow youth to take proactive steps towards environmental stewardship. Initially, her social media posts averaged 400 likes, 160 shares, and 195 comments. Over six months, social media engagement increased by more than 50%. The posts shared on both APIFM and the AUSD's Instagram accounts reached a wider audience in their community, contributing to this success. Addie saw that 7% of boba shop customers used alternative modes of transportation from her outreach event. She also surpassed her goal of planting 500 trees, with a total of 567 trees being planted throughout the community. Additionally, she successfully partnered with 10 local businesses. These efforts spurred discussions about renovating the community garden. The initiative achieved key objectives, such as raising awareness of air pollution's health effects and fostering community engagement through educational workshops and tree-planting events. However, challenges such as achieving widespread adoption of alternative transportation methods highlighted the complexities of behavioral change and infrastructure limitations.

The long-term impact of Addie's initiative extends beyond the immediate measurable outcomes. By fostering a culture of environmental consciousness and community involvement, the project has laid the groundwork for sustainable practices among the youth in Los Angeles. The educational workshops and increased visibility of environmental issues have empowered more young people to take proactive steps in addressing pollution, creating a ripple effect that could lead to broader systemic change. By creating a sense of accomplishment in the community by helping them plant 500 trees, Addie noticed some volunteers' intrinsic motivation being sparked as they look for other ways to lessen their carbon footprint in their community like the community gardens. Furthermore, the framework and strategies developed during this initiative have the potential for scalability, serving as a model for similar projects in other densely populated urban areas facing pollution challenges. The partnerships established with local businesses and organizations provide a replicable network of support, demonstrating that with the right approach, youth-led initiatives can effectively contribute to solving global environmental problems.

5.4.2. Challenges

One significant issue highlighted in the case study was the lack of sustained initiative after the program concluded, revealing a need for strategies that foster long-term community engagement. In this thought experiment, it appears likely that many community members participated in workshops or tree planting primarily to receive the BOGO drink coupon. While this approach educates participants, the ultimate goal of community outreach is to reshape their habits, beyond any type of economic incentive. Moreover, it's foreseeable that once the initiative ends and the BOGO drink incentive is withdrawn, many community members may revert to their previous behaviors. Since business partnerships tend to be short-lived, removing incentives could potentially reduce the community's willingness to adopt alternative transportation methods. Creating sustainable, lasting change is a core objective of the YCACO framework. While a reward-based model initially offers external motivation, the true aim is to foster intrinsic motivation among community members, encouraging them to autonomously reduce their carbon footprint.

Additionally, the initial reluctance of adults to partner with youth hindered the initiative's progress. Many businesses were skeptical or unsure if they wanted to partner with youth, especially teenagers, due to concerns about reliability, experience, and the perceived credibility of youth-led initiatives. Addie reached out to 45 businesses, but only received partnerships from 10, highlighting the skepticism that hindered her timeline and plan. She encountered initial reluctance from adults and business owners who doubted the effectiveness of youth-driven projects in addressing complex environmental issues like air pollution. Overcoming these barriers required Addie to demonstrate the tangible benefits of collaboration, such as enhanced community engagement, positive public relations, and the potential for long-term sustainability initiatives. However, there was also a lot of pressure on Addie because any mishaps would break the already fragile trust between herself and the business owners.

5.4.3. Learnings

One of the key insights from Addie's initiative was the discovery of significant community characteristics that were not fully anticipated during the planning stages. Addie’s personal experience and initial surveys suggested a general awareness of air pollution issues, but

revealed deeper misinformation and apathy among certain segments of the community. Older adults, in particular, were initially skeptical about the effectiveness of youth-led initiatives, requiring more substantial evidence of tangible benefits before committing to behavioral changes. Adult business owners were the most skeptical, since they were putting not only their time, but also their money on the line for these youth. Moreover, the entrenched reliance on personal vehicles was more deeply ingrained than anticipated, influenced by cultural norms and practical limitations in alternative transportation infrastructure. Additionally, the initiative underscored the challenge of translating awareness into sustained action. While educational workshops successfully heightened awareness about air pollution's health impacts, achieving widespread adoption of alternative transportation methods fell short of expectations. This gap revealed the complexities of behavioral change, emphasizing the need for ongoing engagement and practical incentives to encourage long-term shifts in community habits.

For future community outreach efforts, several key principles should guide planning and implementation to maximize effectiveness and sustainability. Firstly, it is crucial to invest in thorough preliminary research to understand community dynamics, perceptions, and barriers to engagement. Engaging community leaders and influencers early on can build trust and enhance credibility, ensuring that initiatives are aligned with local needs and priorities. Secondly, it is important to avoid assuming that awareness alone will drive behavior change. Although education is important, education alone does not automatically drive change. It is a common misconception. Effective outreach requires ongoing efforts to sustain engagement beyond initial interest.

5.4.4. Suggestions for Framework Optimization

To address these issues, optimizing the YCACO framework could include a crucial step where youth seek feedback from trusted adults on their initiatives. This not only will give the youth valuable insights and guidance to refine their plan of action but also enhances the credibility of the initiative within the community. Trusted adults can provide mentorship, validate the relevance of the youth-led projects, and help navigate potential challenges that arise. This collaborative approach not only strengthens the initiative's foundation but also fosters intergenerational cooperation, demonstrating a unified front in tackling community issues. By leveraging the experience and wisdom of adults while empowering youth leadership, the YCACO framework can achieve more sustainable and impactful outcomes in addressing environmental challenges and promoting community well-being.

One critical aspect of the YCACO Framework that warrants revision is the process of articulating fundamental objectives. Currently, while the framework emphasizes setting clear goals, there is room for improvement in ensuring these objectives resonate deeply with both youth participants and communities. Revising this step to incorporate a more inclusive and collaborative approach, where determining the objectives becomes a community effort involving various community members, could enhance intrinsic motivation among youth. This approach not only ensures that the objectives are reflective of community needs and aspirations but also addresses the skepticism often encountered from adults by demonstrating a collective commitment to community-driven goals. Moreover, refining this stage to align more closely with the dynamic challenges and opportunities within each community could foster greater trust and support for youth-led initiatives. This step, termed "Collaborative Objective Setting," differs from the original "Articulating Fundamental Objectives" by emphasizing a participatory process that leverages diverse community insights to refine and solidify project goals.

In refining the YCACO framework, a critical component that demands enhancement is the system for ascertaining the optimal outreach model. The current framework's components are very limited and do not provide users with a comprehensive understanding of these models. An optimized framework necessitates a more diverse array of outreach models to effectively cater to varying community needs. Understanding the nuanced pros and cons of each model is crucial for successful implementation. Addie found this stage particularly challenging, because it required extensive personal research and thoughtful consideration when she felt like she did not have enough knowledge on different outreach models. Identifying an outreach model that aligned with her specific community context was not initially a component of the framework, leading her to eventually settle on a hybrid of two models.

Expanding the range of models available will better equip future youth initiatives to adapt to diverse community contexts and enhance their overall impact. By incorporating a broader spectrum of outreach models, the framework can decrease confusion and the amount of personal time spent on research. This improvement will enable youth leaders to focus more on implementation and engagement, rather than on the complexities of selecting an appropriate outreach strategy. Consequently, the YCACO framework will be more user-friendly and effective, fostering greater success in community outreach efforts.