

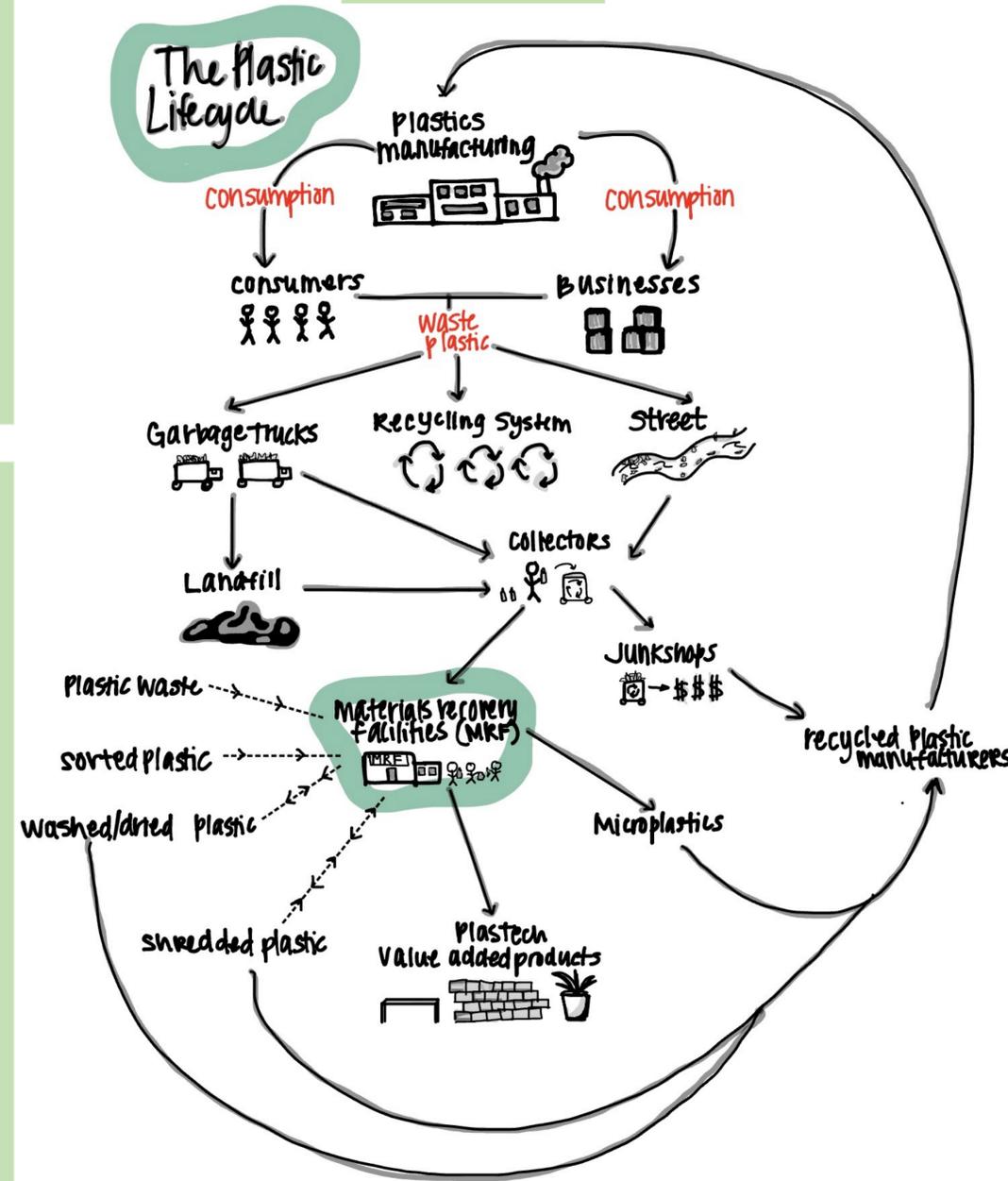
Abstract

My project was designed to shed light on the plastic lifecycle in the Philippines, specifically in Metro Manila. In order to achieve our goals and objectives, the PlasTech team traveled to the Philippines and met with organizations and individuals representing each part of the plastic waste value chain. We discovered that by creating MRFs, we can add value to plastic waste that would otherwise go to the landfill while also creating an income opportunity for local entrepreneurs. In time, we could also add machinery to create value added products from the post-consumer plastic waste.

Introduction: Project Objectives, Goals, and Methods

PlasTech Ventures' main focus is the overarching problem of single-use plastic pollution. 12.7 million tones of plastic are polluting the ocean each year (Plastic). According to Our World In Data, (Ritchie and Roser) the Philippines emits the most plastic into our oceans, (36% of the global total) more than any other nation. Furthermore, the Philippines is home to, "7 of the top 10" largest plastic emitting rivers in the world (Ritchie and Roser). Surprisingly, the plastic waste has value as, "78% of the material value of the key plastic resins— upwards of US\$890 million per year – is lost in the Philippines when recyclable plastic products are discarded rather than recycled into valuable materials" (Market). The overarching goal of the project was to understand more about the plastic waste value chain in Manila, Philippines. In order to accomplish that goal, the team had objectives to meet with new and existing partners, gather data from each part of the plastic supply chain, and gain a deeper understanding of the plastic waste crisis, specifically in Manila. In order to deepen our local partnerships we planned to meet with University of Philippines Diliman (Jill Manapat and UPD students) to discuss topics such as machinery and materials updates and questions and our shift from PET to LDPE, Habitat for Humanity Philippines to understand more about the housing market and receive information on building materials and designs best suited for the community, The Plastic Flamingo to speak with the organization further about their machinery and plastic supply process and recycled products, the Philippine Plastics Industry Association to increase our knowledge about the larger picture of the plastic lifecycle in the Philippines, Plastic Credit Exchange to understand more about cost estimates of LDPE plastics, and Cloop to see how their recycled plastic manufacturing process has progressed since we visited them last and update them on our progress as well. We also planned to discuss how Cloop deals with machinery maintenance, as this has been a topic of discussion between us before. While meeting with our partners would help us meet our objective of gather additional data on each part of the plastic supply chain, we also planned to visit a recycling center/transfer station to gain insight on the current waste management infrastructure and understand the plastic stream that Manila recycling centers are receiving, a junk shop to understand how plastic supply options for our entrepreneurs work and their cost structure, and a potential manufacturing facility to learn more about what our local machinery manufacturing process for the plastics would look like and cost.

Results



Data interpretation and impacts

During our trip to Manila, we met with an organization or individual from each stage of the plastic lifecycle: plastics manufacturing, plastics consumption, the collection process, materials recovery facilities, recycled plastic manufacturers, value added products, and legislation.

We were able to see large scale virgin plastic production and what plastic products were currently on the market, learn more about the plastics ecosystem and plastic product production machinery, got prices for waste plastic, and saw how junk shops interacted with the community. We were also able to understand more about a cooperative model of work, cutting, washing, drying, and sorting methods, business challenges, housing and brick demand, legislation and government initiatives, and what is desirable in a plastic building material.

We discovered that we could add value to the plastic lifecycle system by setting up MRFs, material recovery facilities. MRFs would be able to facilitate companies' abilities to buy plastic materials that they can then utilize to create recycled products instead of the plastic going to landfills. We would divert this plastic waste and add value to the system by selling the machinery and methodology to set up a successful MRF. Past the initial investment of machinery, the community would be able to gain a profit for themselves based on the income generated by the MRF. There is already an established demand for these materials, and with the right methodology and throughput, this can be a profitable business for local entrepreneurs in the Philippines. After material testing is finished from the Lehigh end, we will also be able to provide machinery and molds to create post consumer plastic products, for example bricks or planters, to add to the income the MRF is already generating while meeting an additional product need as well.

Future work

This coming semester the team plans to continue sharing our venture's progress by presenting at the Why It Matters Conference in Salt Lake City, Utah and starting to write two papers: one focused on business and the other on materials. We will onboard more members of the team as we move forward and will focus on determining what our facility will contain, working on the washer and dryer, testing samples of the plastic, identifying what quality checks need to be done, and determining what our costs will be. We will also keep in contact with our partners through monthly emails.

Citations and Acknowledgements

"Market Study for Philippines: Plastics Circularity Opportunities and Barriers." *The World Bank*, The World Bank, 21 March 2021, <https://www.worldbank.org/en/country/philippines/publication/market-study-for-philippines-plastics-circularity-opportunities-and-barriers-report-landing-page>.
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 I would like to thank my faculty advisors: Don Morris, Brian Slocum, and Khanjan Mehta for their support and the PlasTech team for the work we did and allowing me to use their graphics to craft my own and information.

