Activity No. 14.1	
Course Code: CPE311	**Program: BSCPE**
Course Title: Python Computational Thinking	**Date Performed: 05/13/2025**
Section: CPE22S3	**Date Submitted: 05/13/2025**
Name: Anduque, Kurt Gabriel **Bautista, Jhon Hendricks**	**Instructor: Engr. Richard Roman**

1. Discussion

Objective: To create an outline and draft of information for storyboarding for ADSE.

Title of the Study: Food Waste Maker to Composter, An Exploration of Household Food Waste in ASEAN

Initial Draft Flow:

1. Present a hook story which is to be related toward food wastes in households.
2. Show data regarding food waste in ASEAN and Filipino Households.
    a. General ASEAN
    b. Specify the found type of food wastes in households
3. Show that food wastes in landfills result in generation of greenhouse gas
    a. Specify that METHANE is more harmful than common carbon dioxide
    b. Show the harmful effects
    c. If possible show something about landfill?
4. Show Government initiatives that mitigate the problem
    a. Show laws and DENR events something that encourage people
    b. Show municipal efforts
    c. Focus on composting(can use CAMBODIA as BASIS since they are practicing this to lessen their food waste)
5. Show the barriers in gathering more participation
    a. Reasons what hinders these movements to lessen food waste
    b. Reason1 = Not all segregates
    c. Reason2 = Not all know how to COMPOST
6. Present the Solution

Introduction of the Problem and Story:
ASEAN countries are considered as agricultural powerhouses with their strong affinity to crop and food production. In 2022, the region produced 195.5 million tons of rice, 44.7 million tons of corn, and 82.1 million tons of cassava. Rice production this year is forecast to increase by 0.95% by 2023 to 202.34 million tons. Along with this growth in production is the growth of food waste among the member countries in the region.

REFERENCE:
Agriculture. (n.d.). ASEAN Investment. Retrieved May 13, 2025, from https://investasean.asean.org/agriculture

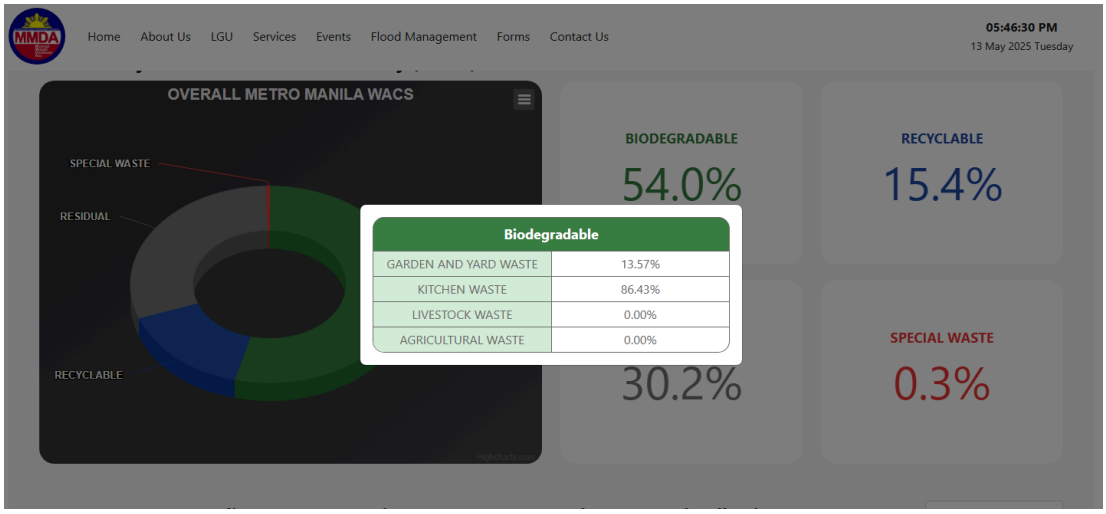
Back in 2022, a farmer from San Jose, Gemma Tabian experienced great loss in the many sacks of rice left to rot in their warehouses. Many are still left unprocessed and are only waiting to rot and wasted.

Now not only farmers experience food wastage in the Philippines but also our very own households. According to a study by DOST, 39% of Filipino families had rice waste, 11% had vegetable waste, and 8% had meat waste.

WHAT ARE THE DATA REGARDING FOOD WASTE IN HOUSEHOLDS?
Food waste studies in Southeast Asia are limited, especially those comparing urban and rural areas. This study analyzed household food waste in both settings, finding that rice, tubers, and vegetables made up most of the edible waste, while fruits dominated inedible waste. Common reasons for waste included spoilage, short shelf life, and cooking too much. Urban households generated more food waste, particularly edible waste, though the causes were similar in both areas. Understanding these patterns is key to creating effective campaigns to reduce household food waste.

The most discarded edible waste per capita annually was rice (14.2 kg), carrots (0.9 kg), Chinese cabbage (0.7 kg), cabbage (0.6 kg), tempeh (0.6 kg), tofu (0.4 kg), guava (0.2 kg), and water apples (0.2 kg). Among the beverages, coffee (0.3 kg) and tea (0.2 kg) had the highest annual per capita waste, with animal food per capita being less than 0.1 kg (S2 Table).

Reference:
Diana, R. (2024, June 12). The quantity and composition of household food waste: Implications for policy. PLOSone. Retrieved May 13, 2025, from https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0305087#pone.0305087.s002



Reference:https://swmis.mmda.gov.ph/events

Overall perspective:

The capital region generates around 2,000 tons or 2 million kilograms of food waste daily, according to 2017 data from the Philippine Institute of Development Studies.
Reference:
https://www.pids.gov.ph/details/news/in-the-news/food-wasted-by-the-tons-while-millions-of-filipinos-go-hungry

	Waste Generation (kg/day)	Waste Composition (kg/day)				Waste Diversion (%)
		Biodegradable	Recyclable	Special	Residual	
Caloocan City	846,396	409,873	205,780	215,310	15,433	49.0%
Las Piñas City	345,278	95,746	134,728	69,988	44,817	54.7%
Makati City	655,001	238,355	306,671	1,310	108,655	50.0%
Malabon City	301,930	126,629	66,727	21,890	86,684	69.6%
Mandaluyong City	273,178	127,026	86,885	38,607	20,660	53%
Manila City	1,030,160	515,080	329,651	133,921	51,508	32%
Marikina City	449,815	69,503	167,303	131,719	81,290	50%
Pateros Municipality	46,166	26,530	14,479	4,654	503	10%
Muntilupa City	202,898	88,090	62,429	51,750	629	39%
Navotas City	82,020	32,562	26,657	8,571	14,230	59%
Parañaque City	697,931	197,953	347,185	66,450	86,343	58%
Pasay City	340,000	140,080	138,380	39,440	22,100	59%
Pasig City	392,000	148,960	1,776,400	7,840	58,800	56%
Quezon City	2,645,001	1,426,978	536,935	1,185,150	495,938	55%
San Juan City	49,166	29,761	13,392	5,649	488	15%
Taguig City	94,133	101,566	48,485	16,543	27,539	75%
Valenzuela City	200,000	92,000	76,000	2,000	30,000	

Data from Environmental Management Bureau public statistics

Effect of food waste in the environment?

Each year, around 24 percent of all food produced for human consumption[1] —approximately 1.95 billion tons[2]—is either lost or wasted.

Food loss and waste contribute up to 10 percent of total anthropogenic (human-caused) greenhouse gas emissions, with an estimated 3.3 billion tons of CO2 equivalent released into the atmosphere annually.[3]

In Metro Manila alone, an estimated 2,175 tons of food scraps are thrown away daily.[4]

When food waste ends up in landfills, it decomposes and releases methane, a greenhouse gas 28 times more potent than carbon dioxide in trapping heat.[5]

What are the possible effects of long-term exposure to methane?

Methane gas is naturally an odorless and colorless gas, which makes it particularly dangerous. Methane also occurs naturally in wetland and landfill areas through the anaerobic decomposition of animal and organic matter. Methane exposure, particularly when experiend in high concentrations, can lead to methane gas poisoning. While low concentrations are generally not harmful, higher concentrations lead a range of symptoms may be experienced, including:

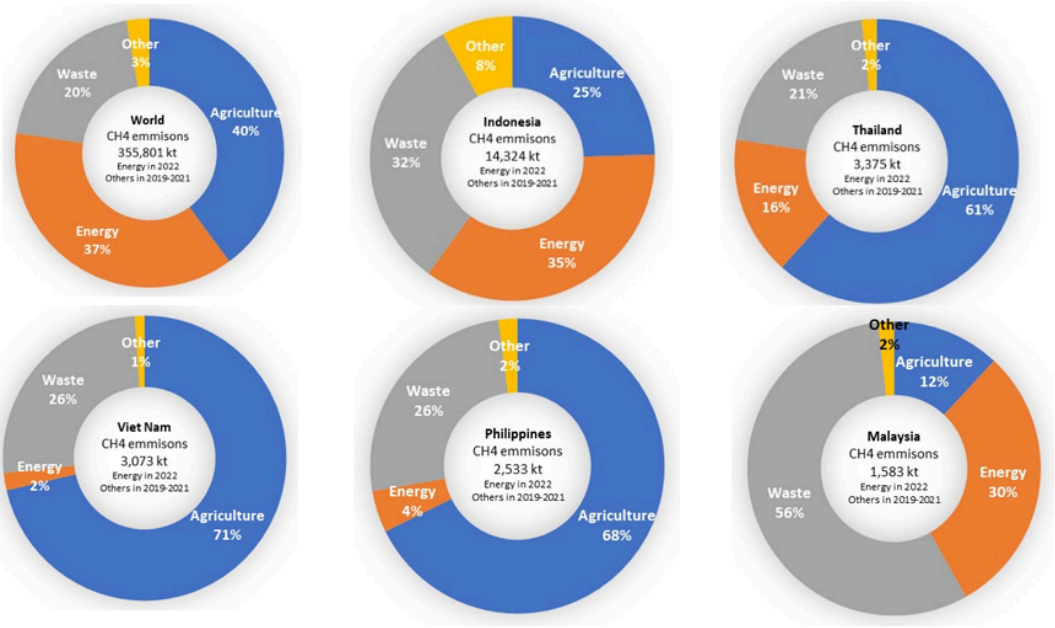
- Rapid breathing
- Increased heart rate
- Clumsiness and dizziness
- Decreased vision, especially in low lights

- Euphoria
- Decreased alertness
- Loss of memory
- Weakness
- Fatigue
- Emotional responses
- Nausea and vomiting
- Fainting and collapse
- Convulsions
- Coma
- Death

Symptoms will become more severe as the concentration and the time of exposure increase.

Source: https://nevadanano.com/methane-gas-poisoning-and-exposure/

Figure 1.4. CH_4 Emissions by Country (World, Indonesia, Thailand) (2022)



Source:
https://www.eria.org/uploads/Effective-Management-of-Methane-Emissions-in-ASEAN.pdf

In the multiple pie graphs shown above, shows the composition of the sectors that contributes to the emission of the methane gas. It shows that foodwaste can contribute to the emission of the methane if it is imporperly managed, such as being disposed in the landfill and letting it decompose in the landfill.

What does the GOVERNMENT do?

As an advocate for food security, Legarda has co-authored House Bill No. 7956, or the Food Surplus Reduction Act, which aims to extensively lessen food waste in the community through public awareness campaigns and redistribution of discarded but edible food management of food wastes.

There are initiatives from the government it is still considered a growing problem.

In a press statement, QC Mayor Joy Belmonte said, "Food waste constitutes 43% of the total waste generated in the city so we must establish a robust and effective food waste recovery program."

"These biodigesters and food waste-on-wheels from UNDP and the Japanese Government will help the city attain a low-carbon future," she added

REALTION TO OTHER ASEAN COUNTRY:
The UNDP said last week that most of Cambodia's urban waste is organic and forms a potent greenhouse gas called methane when accumulating in landfills.

"One of the solutions that businesses can help with is by composting organic waste. Start now!" it said in a statement.

Sonali Dayaratne, UNDP's officer-in-charge, said over 50 per cent of waste in Cambodia is organic. If all of that organic waste is just taken to the new landfills now being built or planned, it will fill them up very quickly.

Reference: https://www.phnompenhpost.com/national/undp-urges-compost-organic-waste

In the Philippines, there are no laws yet that direct food suppliers or distributors to do the same—and this is precisely why this research topic was chosen. Although there are no laws in the country exactly like the ones implemented in France, there is one that merely *encourages* the donation of food for charitable purposes, which is Republic Act No. 9803, also known as the "Food Donation Act of 2009."

Section 2 of the said law states, "It is the policy of the State to alleviate national poverty and reduce food wastage. As such, the State shall implement measures to encourage the donation of apparently wholesome food for charitable purposes." ("Republic Act No. 9803 | GOVPH")

Read more:
https://www.gmanetwork.com/news/lifestyle/healthandwellness/875495/food-waste-quezon-city-is-looking-to-turn-it-into-renewable-fuel/story/?fbclid=IwY2xjawKQMhhleHRuA2FlbQIxMABicmlkETFWZDNBT25iSHJ0a0syT0ZIAR5k_puRL_SPh6EiVHHNalhntlNPfp9ozst15bziyJl5BpFUxJ_Q9q1qeJIOSg_aem_Hq_lvH-uiVem8d1IZ5gO2Q

https://youtu.be/5ydPGSFFGtU?si=adgcn_anX0qd8kKq

What are the possible reasons why some people don't implement food waste composting in their households?

Poor waste segregation

- In the Philippines, people don't implement food composting in their households due to the mismanagement of waste segregation at the local level. Although laws on solid waste management have already been enacted that mandate segregation at the barangay level, however, some LGUs have not yet strictly enforced the law.

Source:
https://denr.gov.ph/news-events/sampulna-solid-waste-segregation-remains-a-major-challenge-in-ph/

Lack of Knowledge and Education

- One of the main reasons why people don't implement food waste composting is mainly due to the lack of knowledge and education. Because many people don't know how to do it, or people don't know why it's important. Additionally, many people are not aware of the environmental benefits of composting and how it can contribute to a more sustainable future.

Limited Space and Resources

- The lack of resources and space is another obstacle to composting. A lot of people reside in cities or apartments with little outdoor space. Most people picture an outdoor compost pile or bin when they think of composting. Outdoor composting does not work well in apartments or small yards.

Time and Effort Required

- Because it can take several months for organic materials to decompose into usable compost, conventional composting is not a quick process. Some people may be discouraged from composting because of the time and effort involved, particularly if they want to see results in their garden right away.

https://byndgrn.com/blogs/news-1/why-isnt-composting-done-more-often#:~:text=Lack%20of%20Knowledge%20and%20Education,immediate%20results%20in%20their%20garden.

PROPOSED SOLUTION:
A mobile app that uses a camera to detect which food waste are to be composted. App contains a step by step guide to make compost and you can ask questions about how to properly make a compost out of food waste. This addresses the lack of knowledge of people about composting. This also promotes segregation and community engagement in reducing food waste in their own households.

2. Materials and Equipment

What materials did you use? Explain in detail.

3. Procedure

What are the procedures that you performed?

4. Output

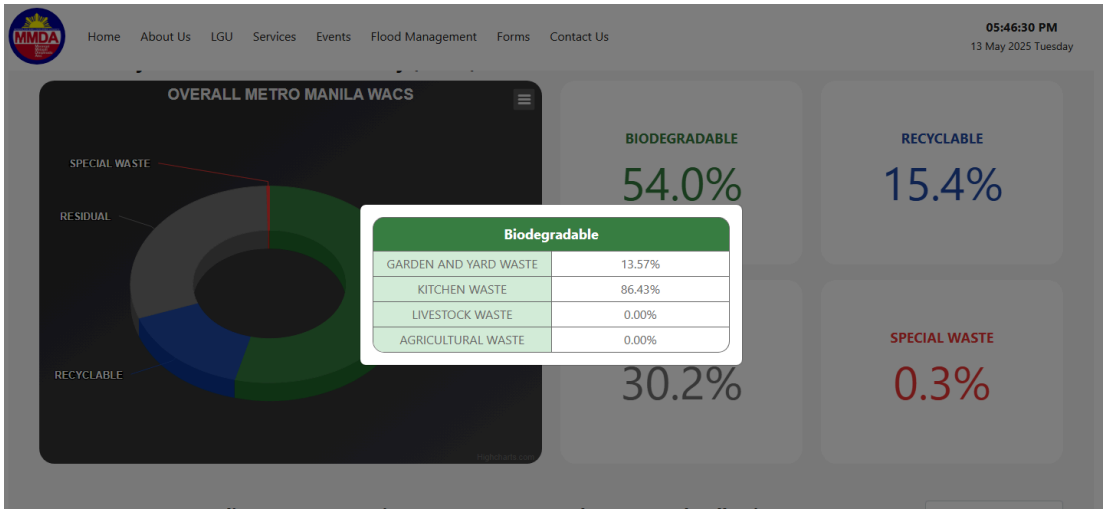


Figure 1

Figure 2

Figure 3

Figure 1.4. CH_4 Emissions by Country (World, Indonesia, Thailand) (2022)

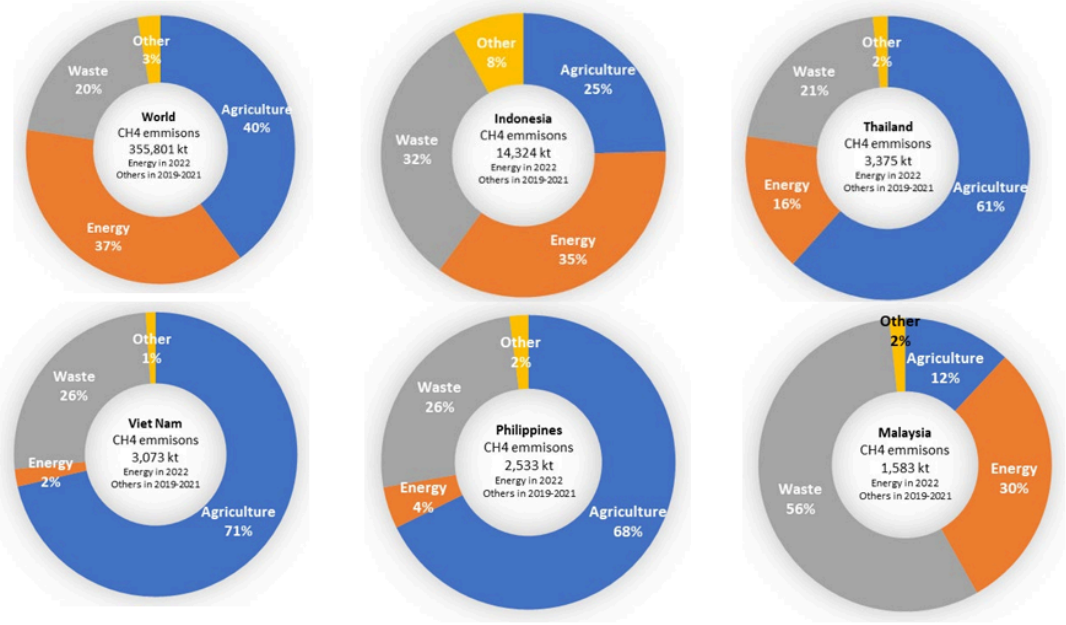


Figure 4.

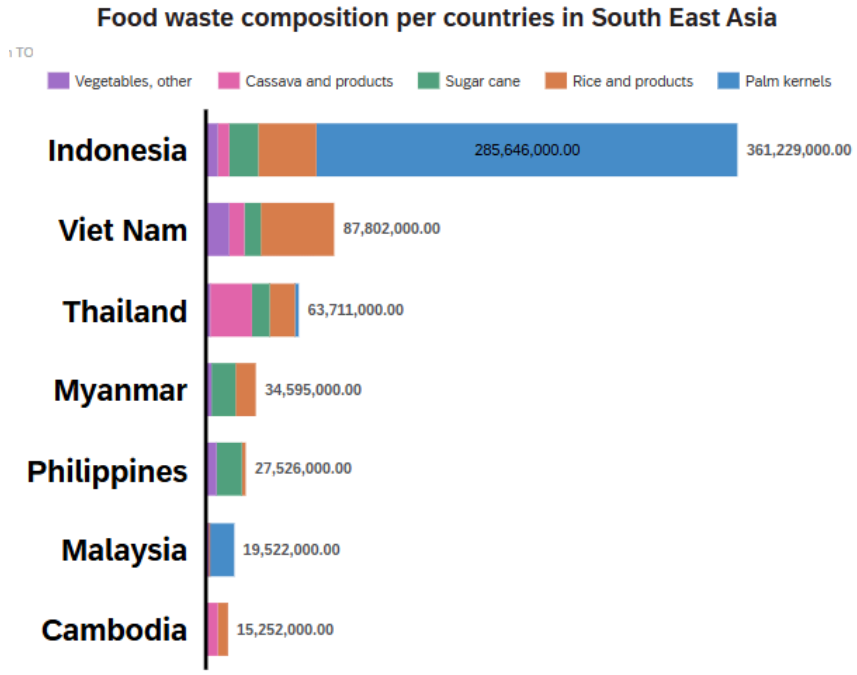
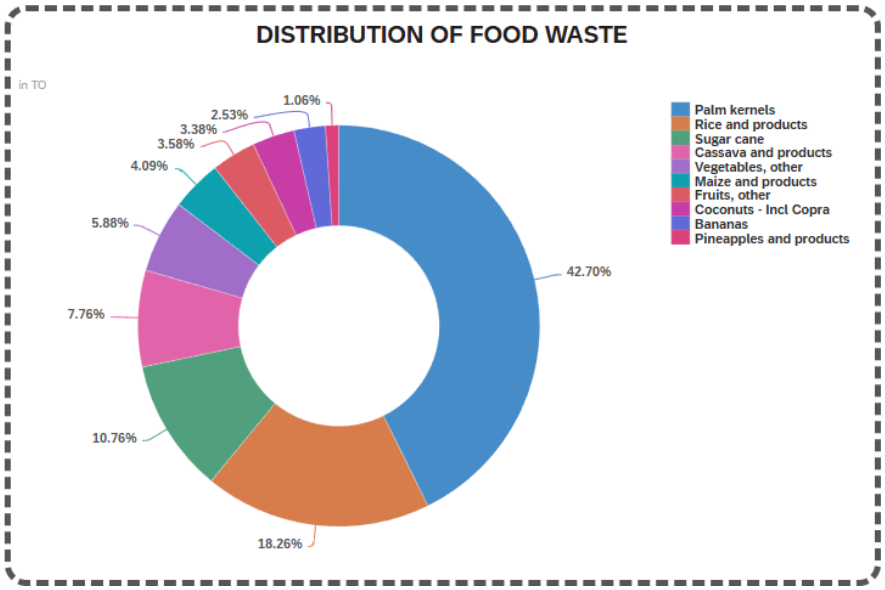


Figure 5.



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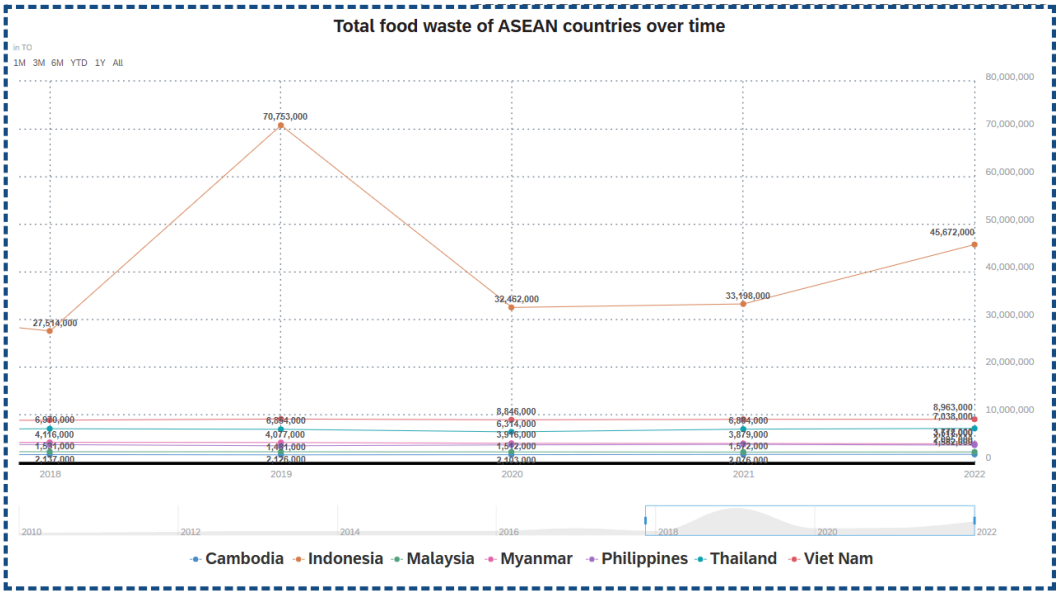
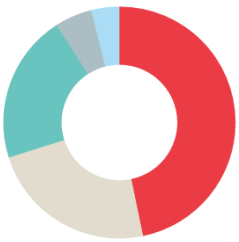


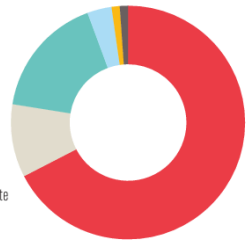
Figure 7.

MSW composition (%) in Brunei Darussalam



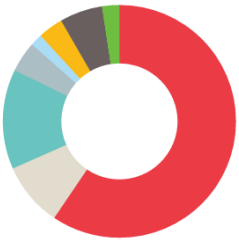
36%	Fppt/organic waste
18%	Paper
16%	Plastic
4%	Metal
3%	Glass
0%	Textile
0%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
0%	Others

MSW composition (%) in Cambodia



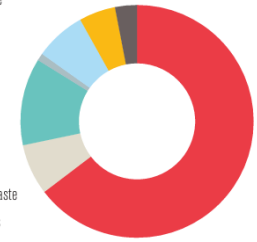
60%	Fppt/organic waste
9%	Paper
15%	Plastic
0%	Metal
3%	Glass
1%	Textile
1%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
0%	Others

MSW composition (%) in Indonesia



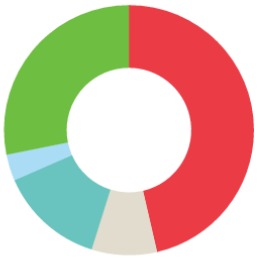
60%	Food/organic waste
9%	Paper
14%	Plastic
4.3%	Metal
1.7%	Glass
3.5%	Textile
6%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
2.4%	Others

MSW composition (%) in Lao PDR



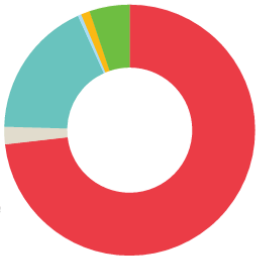
64%	Food/organic waste
7%	Paper
12%	Plastic
1%	Metal
7%	Glass
5%	Textile
3%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
0%	Others

MSW composition (%) in Malaysia



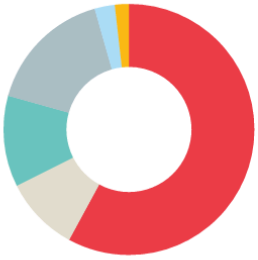
45%	Food/organic waste
8.2%	Paper
13.2%	Plastic
0%	Metal
3.3%	Glass
0%	Textile
0%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
27.3%	Others

MSW composition (%) in Myanmae



73%	Food/organic waste
2.24%	Paper
17.75%	Plastic
0%	Metal
0.45%	Glass
1.14%	Textile
0%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
5.15%	Others

MSW composition (%) in Philippines



52%	Food/organic waste
8.7%	Paper
10.55%	Plastic
14.6%	Metal
2.34%	Glass
1.61%	Textile
0%	Rubber
0%	Grass/wood, etc waste
0%	Construction debris
0%	Others

MSW composition (%) in Singapore

10.5%	Food/organic waste
16.5%	Paper
11.6%	Plastic
20.8%	Metal
1.1%	Glass
2.1%	Textile
0%	Rubber
8.6%	Grass/wood, etc waste
17%	Construction debris
11.9%	Others

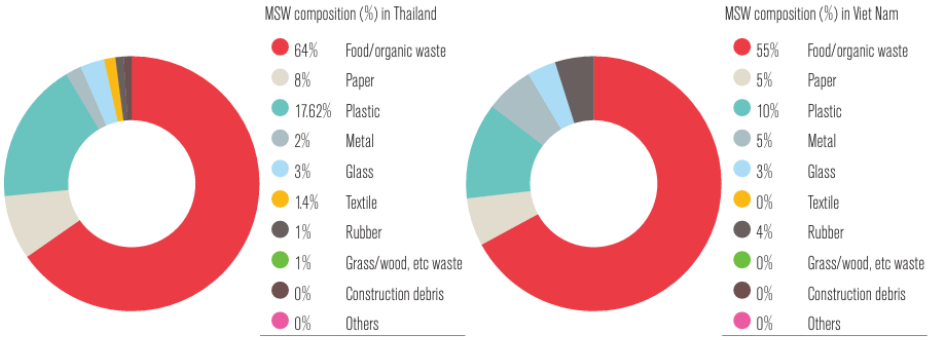


Figure 8.

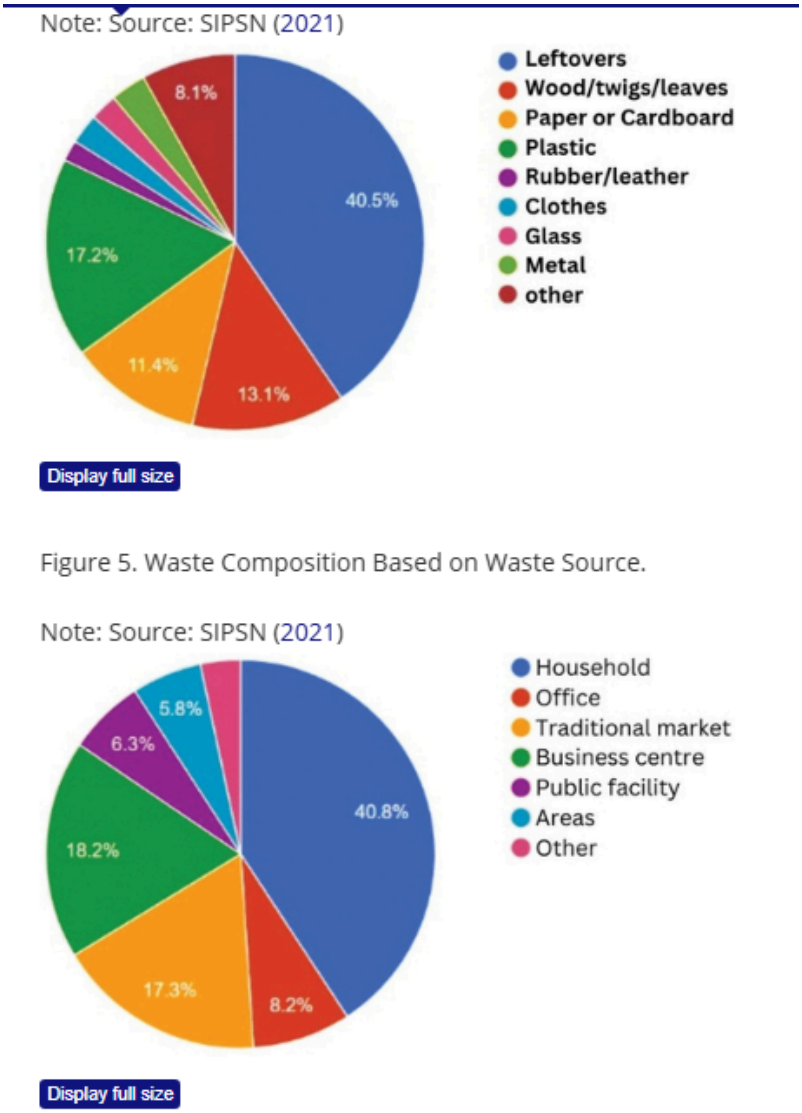


Figure 9.

5. Supplementary Activity

Include here screenshots of the module completion test.

1. Map out your datasets to your described objective.
    - Show data regarding food waste in ASEAN and Filipino Households.
        - General ASEAN
        - Specify the found type of food wastes in households
    - Show that food wastes in landfills result in generation of greenhouse gas
        - Specify that METHANE is more harmful than common carbon dioxide
        - Show the harmful effects
        - If possible show something about landfill?
    - Show Government initiatives that mitigate the problem
        - Show laws and DENR events something that encourage people
        - Show municipal efforts
        - Focus on composting(can use CAMBODIA as BASIS since they are practicing this to lessen their food waste)
    - Show the barriers in gathering more participation
        - Reasons what hinders these movements to lessen food waste
        - Reason1 = Not all segregates
        - Reason2 = Not all know how to COMPOST
2. Link and cite all your data.

Resources:

- https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0305087#pone.0305087.s002
- https://swmis.mmda.gov.ph/events
- https://www.pids.gov.ph/details/news/in-the-news/food-wasted-by-the-tons-while-millions-of-filipinos-go-hungry
- https://nevadanano.com/methane-gas-poisoning-and-exposure/
- https://www.eria.org/uploads/Effective-Management-of-Methane-Emissions-in-ASEAN.pdf
- https://www.phnompenhpost.com/national/undp-urges-compost-organic-waste
- https://www.gmanetwork.com/news/lifestyle/healthandwellness/875495/food-waste-quezon-city-is-looking-to-turn-it-into-renewable-fuel/story/?fbclid=IwY2xjawKQMhhleHRuA2FlbQIxMABicmlkETFWZDNBT25iSHJ0a0syT0ZlAR5k_puRL_SPh6EiVHHNalhntlNPfp9ozst15bziyJl5BpFUxJ_Q9q1qeJIOSg_aem_Hq_IvH-uiVem8d1IZ5gO2Q
- https://denr.gov.ph/news-events/sampulna-solid-waste-segregation-remains-a-major-challenge-in-ph/
- https://byndgrn.com/blogs/news-1/why-isnt-composting-done-more-often#:~:text=Lack%20of%20Knowledge%20and%20Education,immediate%20results%20in%20their%20garden.
- https://www.rrcap.ait.ac.th/Publications/Waste_Management_in_ASEAN_Countries_Summary_Report.pdf

3. What do you aim to prove with your dataset and visualization?
    - The main point of our datasets is to show that in the food waste collected, most of it stems from our households. Basically we want to show that in the food waste generation, households are a major sector or factor that needs to be addressed.

4. What is the narrative you want to write based on your data?
    - Based on our data about the major food waste in ASEAN, we discuss that our region is an agricultural powerhouse in crop and food production. Now we put into perspective the amount of waste that is produced from reported incidents in the Philippines, and relate that report to data about food waste in the common folk of the country which is their household. This then transitioned to discussion of the food wastes in the Philippines and even in ASEAN countries. Now, to give meaning to the information regarding food waste we will discuss the negative effects of food waste to the environment. This will now transition to the government initiatives about decreasing food wastes, and we will focus on Composting since it is the focus of our solution. We want to say that rather than letting food waste rot in the landfill, we use it for something better.

Canva link:
https://www.canva.com/design/DAGnRcafzcM/LZJiRjEqnqCyM5GxzOpyvA/edit?utm_content=DAGnRcafzcM&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

CONCLUSION

Anduque - After doing this activity, when it comes to creating a storyboard, the complexity of the visualization is not necessary. Since the key in creating an effective storyboard is just a proper storyline and supporting visuals that can be easily understood by the audience. I also learned how to connect different ideas and dataset and forming an information or finding the answer to the problem.

Bautista - After doing this activity, I learned that in creating a storyboard it is not just about having the correct data but also needs a proper story to go along with it. I learned that we have to learn in connecting the purpose of the data towards the life of the common folk for us to say that our research has a connection to society. I learned this and I tried to apply it to our project and for now I think it has a simple story that we can work on more for it to be an effective story to address the food waste problem in the country.

6. Assessment Rubric

Lab Activity Rubric

Criteria	Ratings						Pts
SO 7 PI 1 **Student Outcome 7.1** Acquire and apply new knowledge from outside sources. threshold: 4.8 pts	6 pts Excellent | Educational interests and pursuits exist and flourish outside classroom requirements,knowledge and/or experiences are pursued independently and applies knowledge learned into practice	5 pts Good | Educational interests and pursuits exist and flourish outside classroom requirements,knowledge and/or experiences are pursued independently	4 pts Satisfactory | Look beyond classroom requirements, showing interest in pursuing knowledge independently	3 pts Unsatisfactory | Begins to look beyond classroom requirements, showing interest in pursuing knowledge independently	2 pts Poor | Relies on classroom instruction only	1 pts Very Poor | No initiative or interest in acquiring new knowledge	6 pts
SO 7 PI 2 **Student Outcome 7.2** Learn independently threshold: 4.8 pts	6 pts Excellent | Completes an assigned task independently and practices continuous improvement	5 pts Good | Completes an assigned task without supervision or guidance	4 pts Satisfactory | Requires minimal guidance to complete an assigned task	3 pts Unsatisfactory | Requires detailed or step-by-step instructions to complete a task	2 pts Poor | Shows little interest to complete a task independently	1 pts Very Poor | No interest to complete a task independently	6 pts
SO 7 PI 3 **Student Outcome 7.3** Critical thinking in the broadest context of technological change threshold: 4.8 pts	6 pts Excellent | Synthesizes and integrates information from a variety of sources; formulates a clear and precise perspective; draws appropriate conclusions	5 pts Good | Evaluate information from a variety of sources; formulates a clear and precise perspective.	4 pts Satisfactory | Analyze information from a variety of sources; formulates a clear and precise perspective.	3 pts Unsatisfactory | Apply the gathered information to formulate the problem	2 pts Poor | Gather and summarized the information from a variety of sources but failed to formulate the problem	1 pts Very Poor | Gather information from a variety of sources	6 pts
SO 7 PI 4 **Student Outcome 7.4** Creativity and adaptability to new and emerging technologies threshold: 4.8 pts	6 pts Excellent | Ideas are combined in original and creative ways in line with the new and emerging technology trends to solve a problem or address an issue.	5 pts Good | Ideas are creative and adapt the new knowledge to solve a problem or address an issue	4 pts Satisfactory | Ideas are creative in solving a problem, or address an issue	3 pts Unsatisfactory | Shows some creative ways to solve the problem	2 pts Poor | Shows initiative and attempt to develop creative ideas to solve the problem	1 pts Very Poor | Ideas are copied or restated from the sources consulted	6 pts

Total Points: 24