Portfolio for the
Norman Foster
Foundation's
Sustainability
Workshop 2022

created by

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ABOUT THIS PORTFOLIO

This portfolio highlights designs I have made that pertains to the subject of sustainability, ranging from raising awareness about the issue to finding proactive solutions to mitigate its already discernible effects. In relation to the Shelters Workshop, the works within this portfolio have been compiled into a timeline demonstrating their potential to 1) prevent habitat loss for humans, 2) respond to the effects of climate change, and 3) sustain communities with limited access to resources.

My works not only address the issue of climate change, but acknowledges the disparities between developed and developing countries as well, focusing on how inequality hinders certain regions from pursuing sustainability. Subsequently, these very same regions are the ones that are most susceptible to the effects of climate change due to a multitude of reasons, some of which will be further explored in the latter parts of this portfolio. Having the opportunity to live in regions at various stages of development, moving from Thailand to the UK, and currently studying in Hong Kong, has brought forth the differences in how each country faces the global threat of climate change.

ABOUT ME

Ever since I was little, I have always found a myriad of ways to express my creativity. From drawing on the walls of my house with crayons to making birthday cards for various family members. As I grew up, this creativity manifested itself among many of my other interests. Soon, my process of creating art transformed into a process of designing instead, adding an element of practicality to my works. I have found that I make the most impact with my designs when I combine it with sustainability–another field I have developed an interest in and one whose relevance can only grow with time.

With that said, I hope you will find the works included in this portfolio to be insightful. If you have any queries regarding them, please do not hesitate to contact me at amanda.ycr@gmail.com or discover more of my works at www.charoen.art.

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ECOCITY: Preventing habitat loss for humans

Habitat loss due to climate change is an issue that disproportionately affects developing regions of the world. EcoCity is a project that explores the potential to turn the abundance of trash exported to poorer countries into eco-bricks, a sustainable construction material that could be used to build housing for poverty-stricken areas.

THE FUTURE OF AMPAWA: Responding to the effects of climate change

Imagining a future where it is too late to mitigate the effects of climate change, this project envisions how Ampawa, a long-standing floating market on the outskirts of Bangkok, could evolve into an environment of underwater submersion.

REFOOD: Sustaining communities with limited resources

Food scarcity is another issue the developing world faces, and one that may continue to worsen with climate change as more and more soil becomes infertile due to modern unsustainable agricultural practices. ReFood aims to lessen the amount of food waste generated by common households, subsequently decreasing the need for large-scale farms to further expand and continue with their harmful farming techniques.

INTRODUCTION TO ECOCITY

Thousands upon thousands of tonnes of recyclable waste are shipped to developing countries annually as an easy solution for richer nations to dispose of their garbage. Exporting waste is typically cheaper than the cost of developing recycling infrastructures locally, and the mass counts towards the country's recycling rates as well. Since the year 2000, the European Union's export of recyclable waste has increased by over 70 percent, according to Statista.

This global waste trade currently values over hundreds of billions of euros and is still continually growing. Many Southeast Asian nations, including my home country of Thailand, are the destination of many of these shipping containers brimming with trash. To further add to the problem, many people residing in these developing countries face housing insecurity, especially those living in flood-prone areas in settlements near rivers.

EcoCity is a mobile game developed by a team of six high schoolers, including me as the Artistic Director of the project, at Atlantic College in order to begin tackling these issues. The aim of the game is to encourage students at our school to recycle their waste by creating eco-bricks; essentially empty liter-sized plastic bottles densely filled with soft plastics usable as construction material.

Due to our location in the UK, we were able to deal with the problem at its root cause–preventing the need to export waste from developed countries. Instead, these eco-bricks have successfully repurposed materials that would otherwise be considered unusable again (such as crisp packets and other soft plastics). Now, they can be exported to developing countries for better purposes such as constructing schools and other important buildings. Many of these projects are already being executed by organizations such as ecobricks.org, EcoCity merely aims to bridge the gap between the trash produced in developed countries and developing regions that are in dire need of sturdy construction material.

The following pages illustrate my process of helping to create EcoCity and the impact we were able to make on our local community. To see more of EcoCity, please visit www.charoen.art/ecocity-portfolio.

ECOCITY Concept Development

A mobile game created by a team of six students to encourage the Atlantic College community to recycle through the process of making eco-bricks.

Fig. 1.1
A screenshot from *Monument Valley*, a mobile game whose MC Escher-inspired art style heavily influenced *EcoCity*.
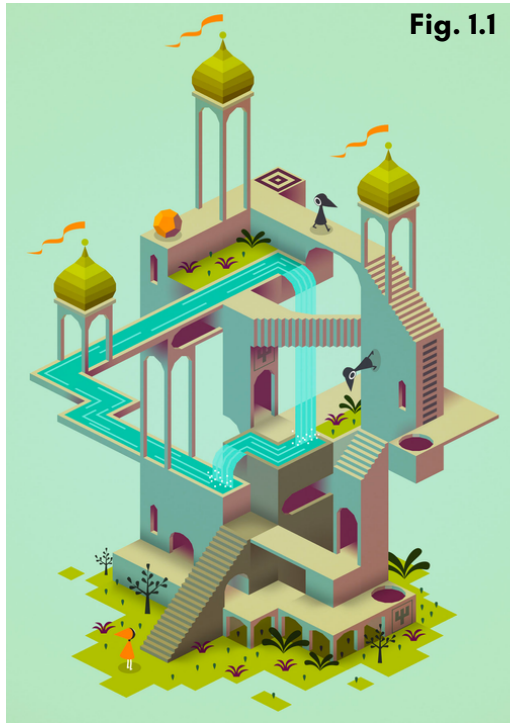
Fig. 1.2-1.3
Pages from my sketchbook showing the design process of the in-game buildings

Fig. 1.1

Fig. 1.2
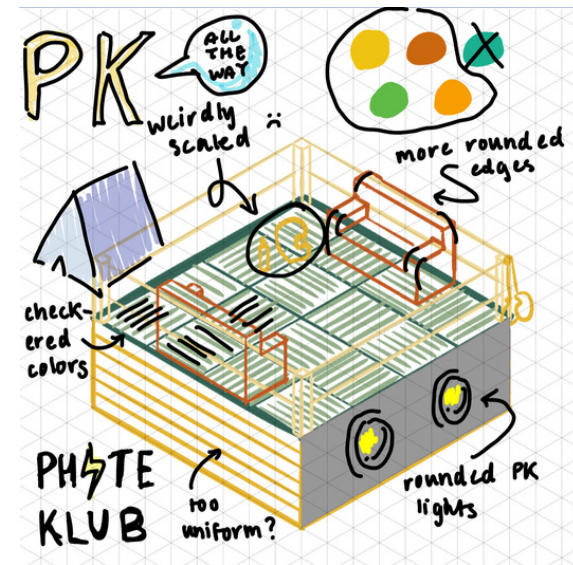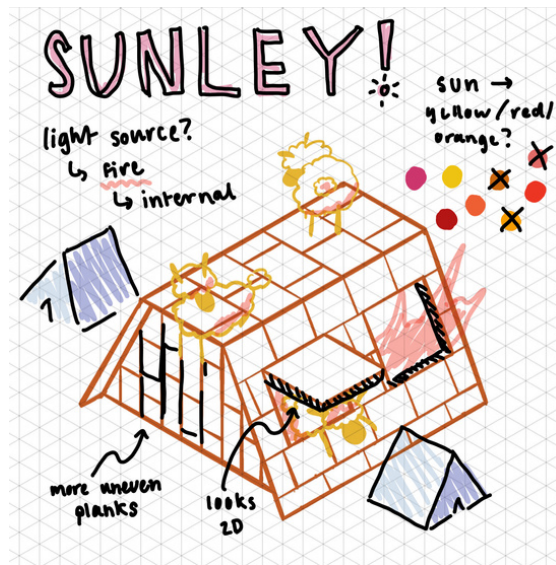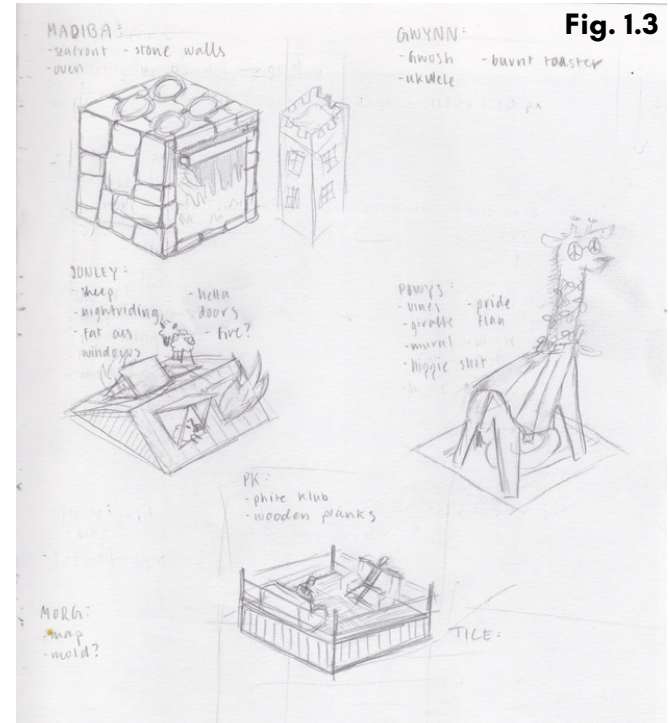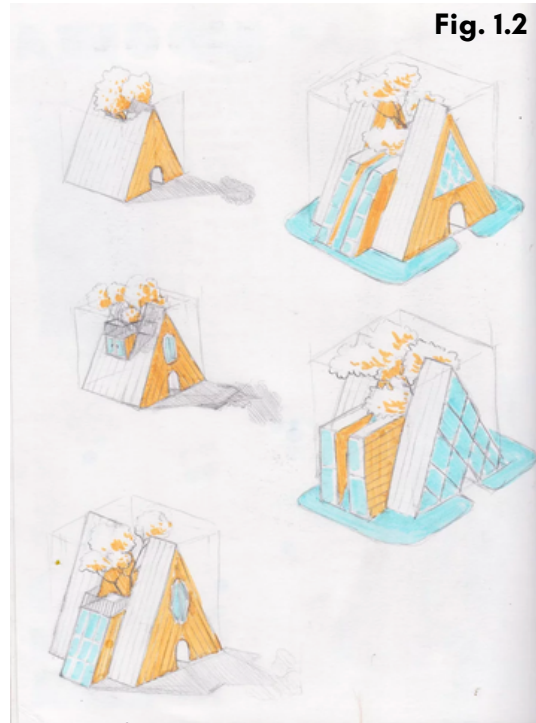
Fig. 1.3

Fig. 1.4-1.6
Digital sketches based off the sketchbook page from Fig. 1.3. Images were produced on Procreate, using the isometric perspective guide.

Transporting designs from sketchbooks to phone screens using Procreate, Unity, and Figma.

Fig. 2.1 Final designs of the in-game buildings developed from the sketches in Figs. 1.4-1.6. Images were drawn in grayscale on Procreate, then later coded with different color schemes on Unity. Each building was inspired by the characteristics of individual boarding houses at Atlantic College.

Fig. 2.2a
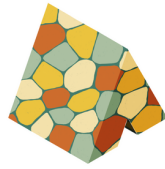
Fig. 2.3a

Fig. 2.4a

Fig. 2.2b

Fig. 2.3b

Fig. 2.4b

Fig. 2.2a-2.2b Discarded app icon concepts.

Fig. 2.3a-2.3b Final app icons.

Fig. 2.4a-2.4b Temporary app icons for special events.

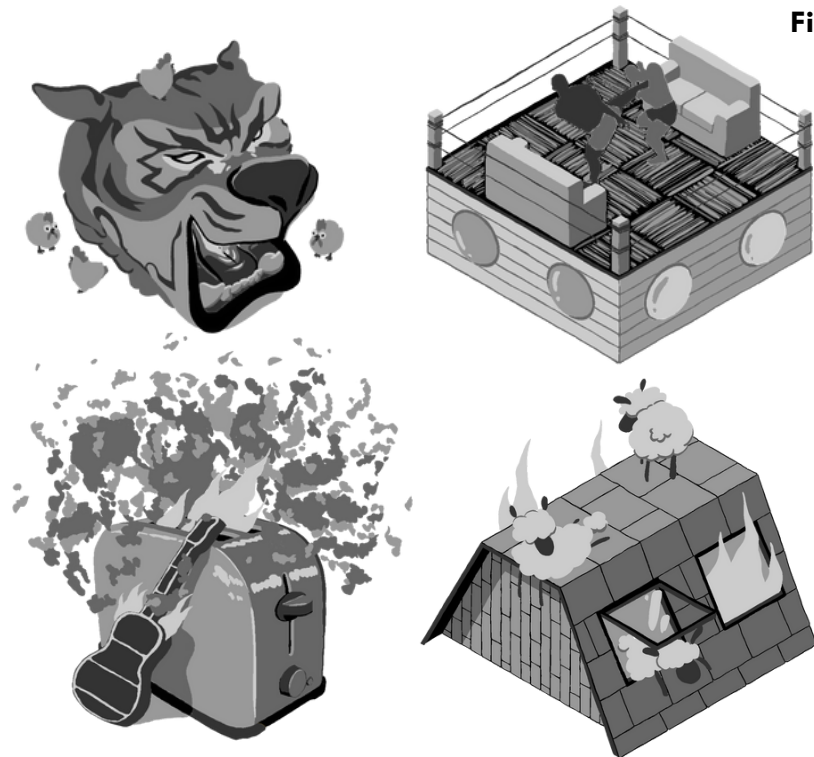All the icons were made with Adobe Illustrator and Procreate.

Fig. 2.1

Fig. 2.5-2.6 Final user interface design, with graphics from Fig. 2.1. The UI layout was designed on Figma by me and coded on Unity by Enoch K. and Tenzin D.

Fig. 2.5

Fig. 2.6

student ranking
1

points
40/1240
unused/total

house ranking
1

ECOCITY

The impact of *EcoCity* on the community. How a digital app incited physical change by reusing and recycling plastic.

Fig. 3.1
EcoCity merchandise, designed by me using Procreate.

Initial sketch   Work in progress   Final design

Fig. 3.2
My design screen printed by Enoch K. & me onto second-hand clothing items.

Fig. 3.3-3.4
Digital renders of the *EcoCity* bench on SketchUp. The design process was collaborative between members of the *EcoCity* team. The SketchUp model was constructed by me.
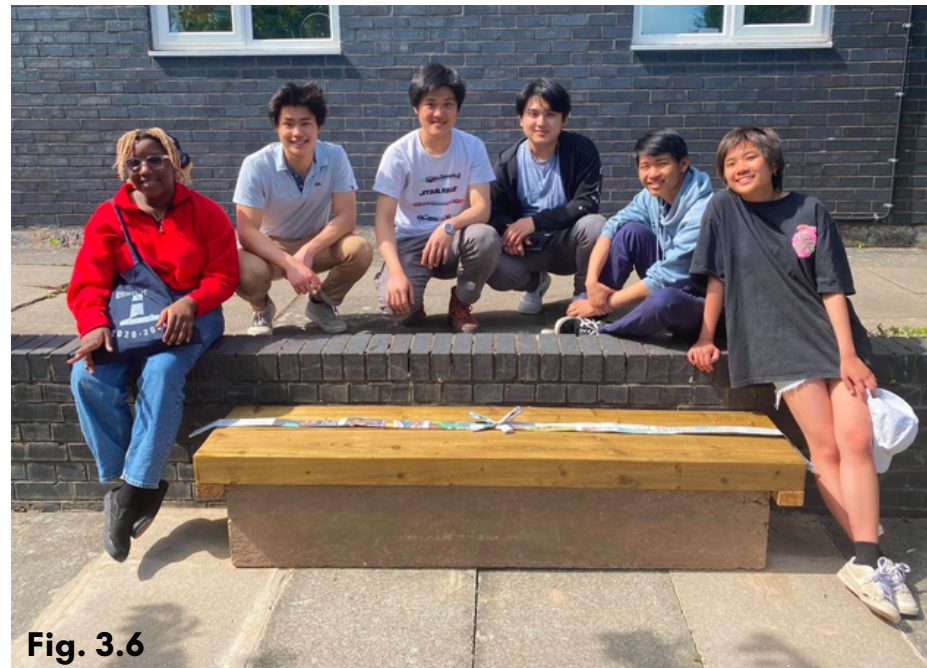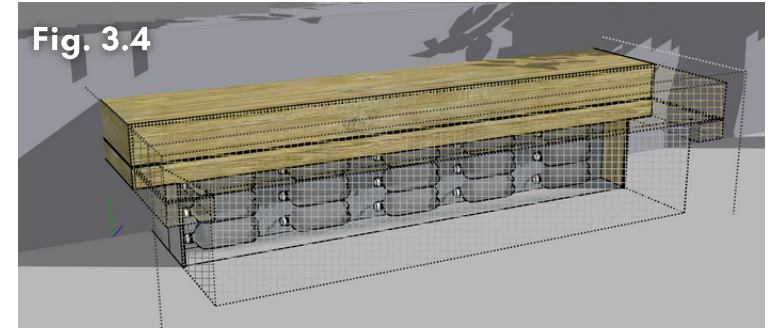
Fig. 3.5
Progress of the bench being built with concrete-reinforced Eco-bricks.

Fig. 3.6
Image showing the *EcoCity* team and the finished bench, constructed from 30 eco-bricks submitted by *EcoCity* users.

Fig. 3.3

Fig. 3.4

Fig. 3.6

Fig. 3.5

INTRODUCTION TO THE FUTURE OF AMPAWA

While *EcoCity* aims to mitigate the effects of climate change, *The Future of Ampawa* imagines a future where we have crossed the point of no return and are forced to live with the consequences of irreversible climate change. Inspired by the location of Ampawa, a long-standing floating market situated in Bangkok's municipal area, this familiar sight to many Thais was transformed into a futuristic underwater compound that has adapted to flooding of river delta areas caused by rising sea levels.

Though this solution is undeniably fantastical and not entirely within the realm of possibility of a developing country such as Thailand, the problem it aims to solve is very much an inevitable reality for many poorer regions of the world. Dense human settlements tend to congregate around rivers and other bodies of water due to their proximity to trade routes allowing for easier transportation of goods by boat. However, these areas are also lower in elevation causing them to be more prone to flooding. Combined with inadequate waterways caused by a lack of funding for proper infrastructure in developing countries forces the danger of imminent flooding due to rising sea levels onto many of these nations. This phenomenon is illustrated in the map in Fig. 4 by ResearchGate:
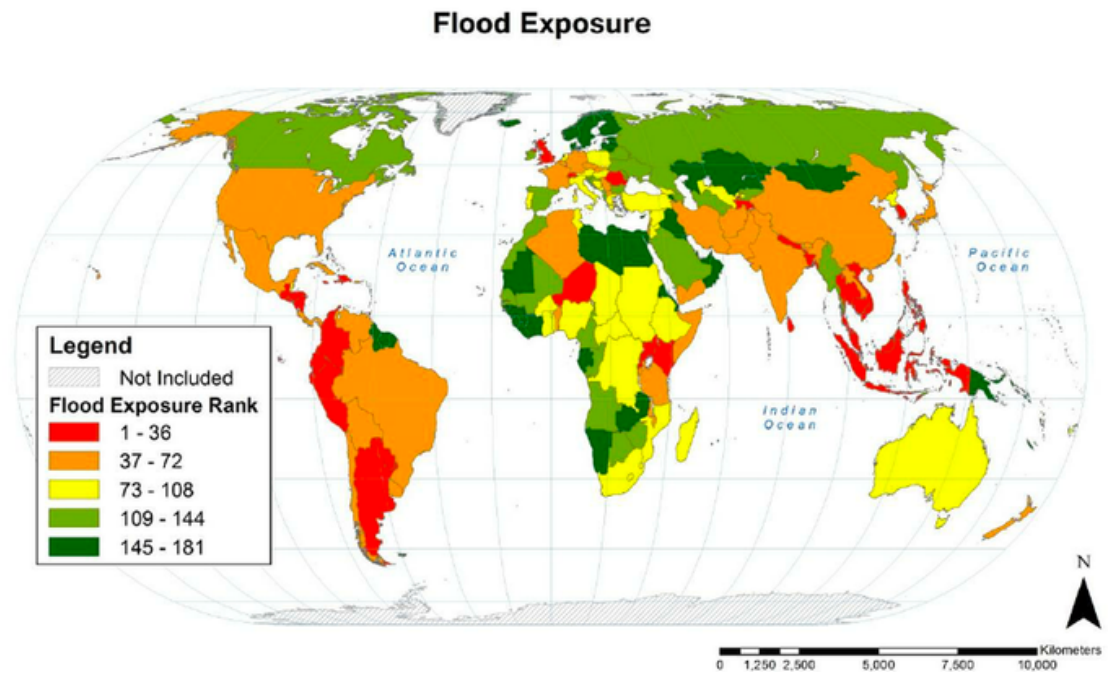
Fig. 4

By imagining a possible solution of relocating underwater, homeless crises that would otherwise be caused by the eradication of possible housing within these flood-prone areas can be avoided.

THE FUTURE OF AMPAWA

A response to the Hong Kong University Faculty of Architecture's 2021 Aptitude Exercise.

The Future of Ampawa was made in response to the Hong Kong University Faculty of Architecture's 2021 Aptitude Exercise. The assignment was created for students to respond to a prompt with their own unique ideas, and it is the main component of the admissions process into the university's Undergraduate Architecture Major. The prompt I was given was:

"**1: A Room in the City
Identify and describe a room in your city. What are its qualities, when does it exist, and for whom does it exist?**

**2: A Room of Imagination
Following your thoughts on an existing room in your city, describe an imaginary room in the city. It can exist anywhere, at any time, and at any scale. Who is it for? What are its qualities?**"

I was given an admissions offer to the Architecture Major upon my submission of this project.

Fig. 5.1

Fig. 5.2

Figs. 5.1–5.2
The initial concept for *The Future of Ampawa* was mapped out using SketchUp. This was to establish a consistent perspective appearance for the composition of the images, as well as making it easier to move around components such as the individual boats and houses along the river.

Figs. 5.3–5.4
Screenshots of each SketchUp mockup were taken from a perspective that shows as much of the model as possible. Then, using Procreate, the images were traced over with a pencil brush and colored in with watercolor brushes to give the final illustrations a more hand-drawn and organic appearance compared to the initial model.
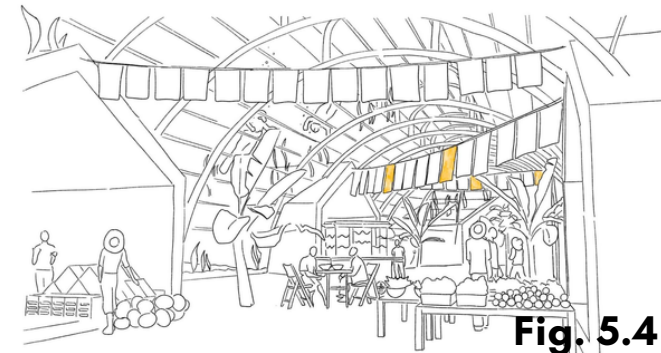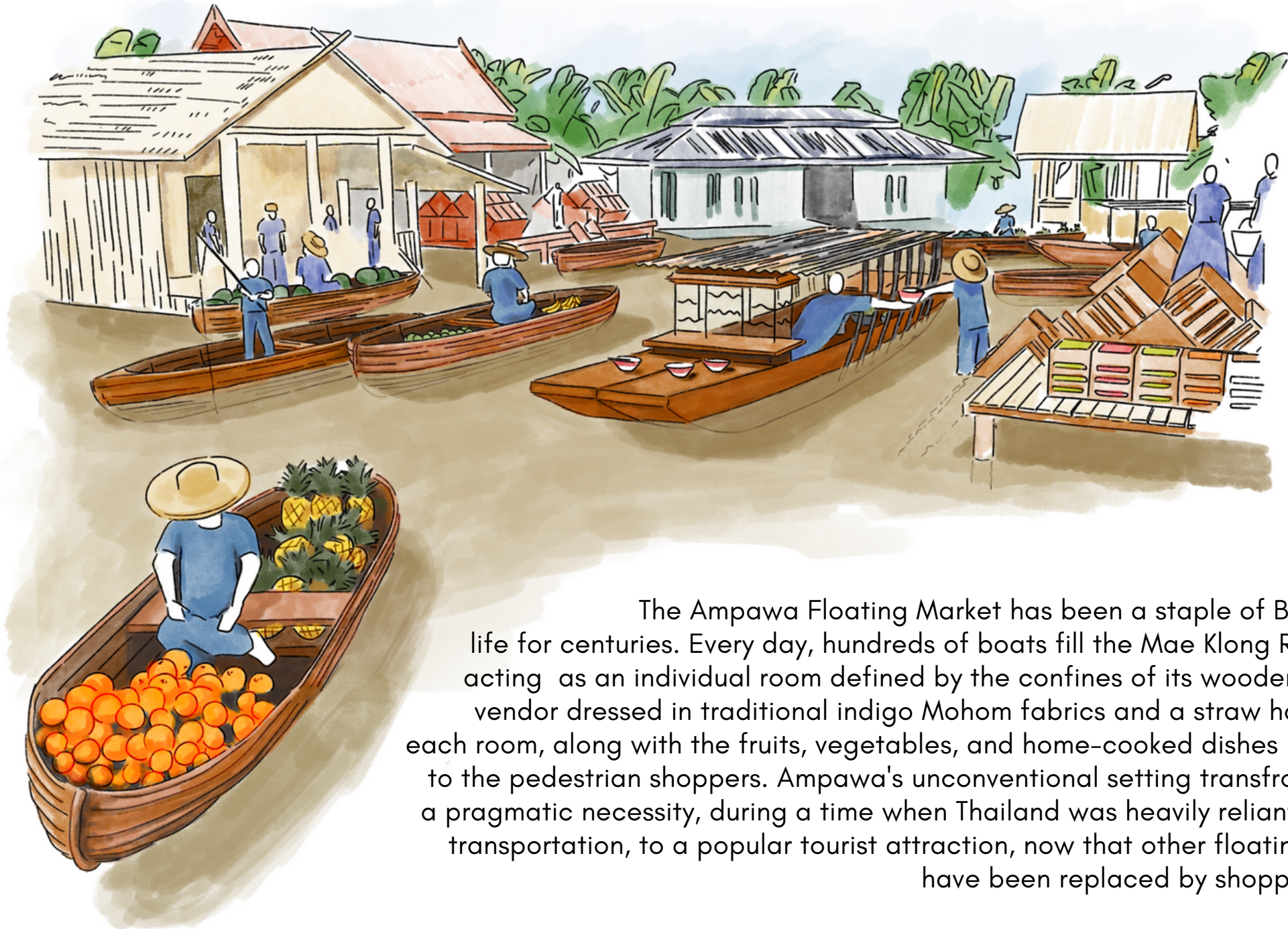

Fig. 5.3

Fig. 5.4

Fig. 6

The Ampawa Floating Market has been a staple of Bangkokian life for centuries. Every day, hundreds of boats fill the Mae Klong River, each acting as an individual room defined by the confines of its wooden vessel. A vendor dressed in traditional indigo Mohom fabrics and a straw hat inhabits each room, along with the fruits, vegetables, and home-cooked dishes being sold to the pedestrian shoppers. Ampawa's unconventional setting transfromed from a pragmatic necessity, during a time when Thailand was heavily reliant on water transportation, to a popular tourist attraction, now that other floating markets have been replaced by shopping malls.

THE FUTURE OF AMPAWA

Exploring a possibile way Ampawa's cultural heritage could be preserved for future generations despite the threat of rising sea levels.

Fig. 7
Despite its long-standing history, Ampawa is unlikely to last another century. Waste produced by Bangkok's rapid urbanization and subsequent inadequate disposal methods crowd the Mae Klong, exacerbating the harm caused by climate change-related floods that erode the wooden houses. In repsonse to this, a new Ampawa was imagined for the future where the community moves underwater. The cramped boats are replaced by a vast central common room, bound by glass walls and ceilings protecting the neighborhood from the water outside allowing residents of Ampawa can preserve their traditional way of living while adapting to the conditions of urbanization and climate change.

INTRODUCTION TO REFOOD

The world's current agricultural practices are putting much of the industry at risk of another "dust bowl" situation similar to one that happened a century ago in the United States during the period of the Great Depression. The need for fresh vegetables to be mass-produced at a large scale demands that the same crops are planted on the same plot of land season after season, slowly exhausting the soil of the nutrients needed for these fruits and vegetables to continue growing.

Much of the developing world is forced to depend on agricultural products as their main export due to the lack of resources available for them to transition their workforce to tertiary and quaternary sectors of the economy. In certain cases, such as the "Banana Republics" in Central America, the ability of a country's government to construct infrastructure can be solely reliant on foreign direct investments from privately owned companies located in richer nations. This opens up farmers in poorer regions to be exploited by these large-scale companies that benefit from their unsustainable farming practices. Once their land is inevitably rendered unusable because all the nutrients have been used up, the companies will leave to find usable farming plots elsewhere, depriving these farmers of their main source of income.

Conceptualized for the Atlantic College Lighthouse Hackathon event in 2021, ReFood is a mobile application that aims to eliminate the aforementioned problem by reducing the amount of food waste generated in developed countries. The app encourages its users to sell or trade their leftover food and produce before they go out of date in order to prevent the unnecessary creation of food waste. Furthermore, the app includes a feature that allows users to track the expiration date of their groceries and customizable reminders for when their food is about to go out of date. This incentivizes users to become more conscious of their food consumption and waste generation.

By lessening the amount of food wasted, the number of groceries purchased should consequently decrease as well. This will, in turn, reduce the demand for large-scale companies to supply stores with a surplus of fruits and vegetables that would not sell. Relieving the pressure on farmers to produce crops at such a rigorous rate allows them to practice horticulture or crop rotation methods that allow the soil to regain different nutrients over time.

The main appeal of ReFood is the function for users to trade or sell cooked meals to each other at a cheaper price than regular restaurant options.
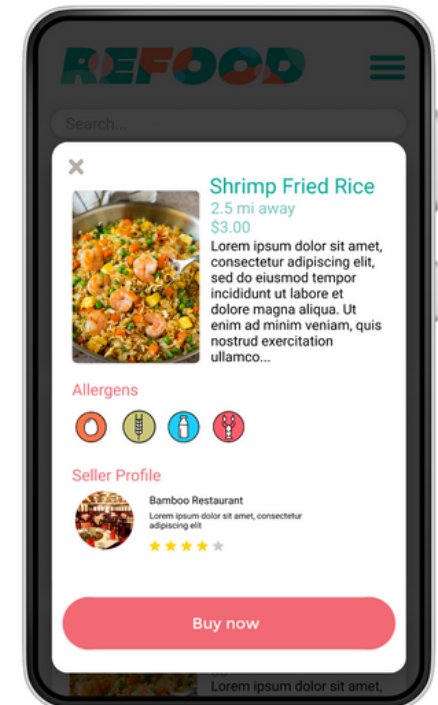

Fig. 8.1
The launch screen to the ReFood app utilizes an intuitive user interface that is familiar to many social media users, making the app easy to use by its target audience.

Fig. 8.2
The "Profile" page of the app allows users to manage the sale of their own cooked dishes. Multiple menus can be put on sale by one user, allowing both home-cooked meals as well as commercial dishes (Eg: baked goods from a bakery at the end of the day) to be sold.
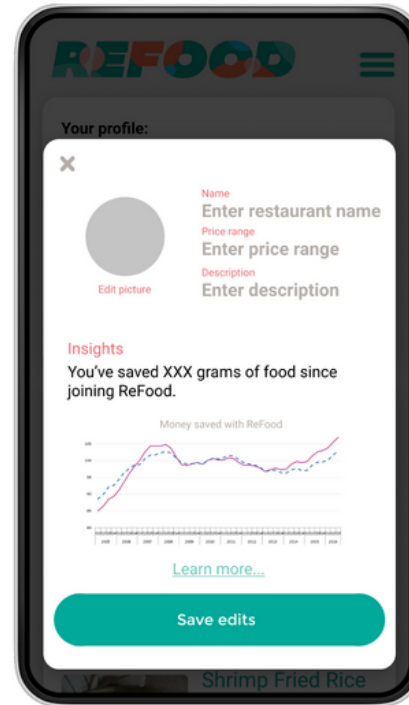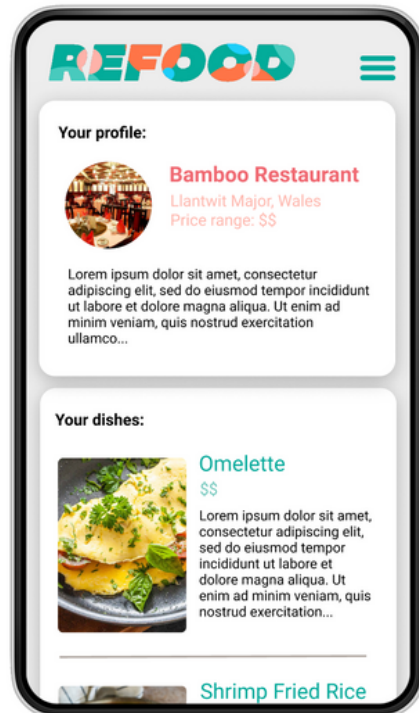
Fig. 8.3
ReFood will also calculate how much food waste is being reduced with each sale, allowing users to keep track of their progress while also reminding them of the environmental impact they would be making otherwise. If users choose to make their statistics public, then their numbers could contribute to community values, showing how much food waste each town or neighborhood is saving.

Fig. 8.4
The "Selling" page of ReFood displays information about possible allergens contained in the food as well as past reviews of the seller given by verified customers so users can determine the quality of the food they will be delivered before choosing to buy it. This also prevents the sale of spoiled food as these instances will be reported by the customers.
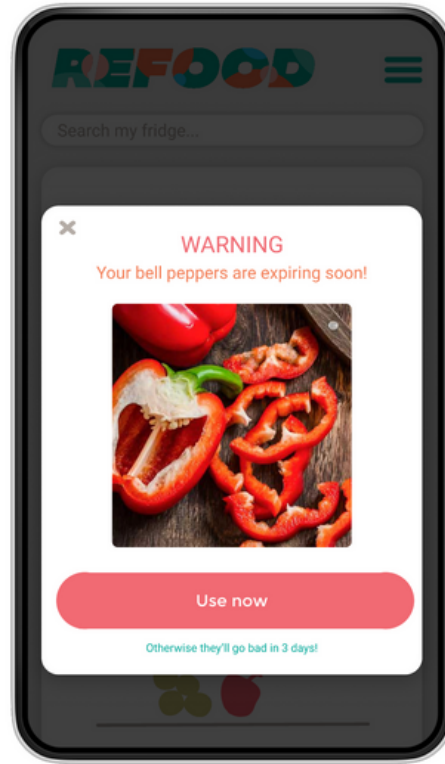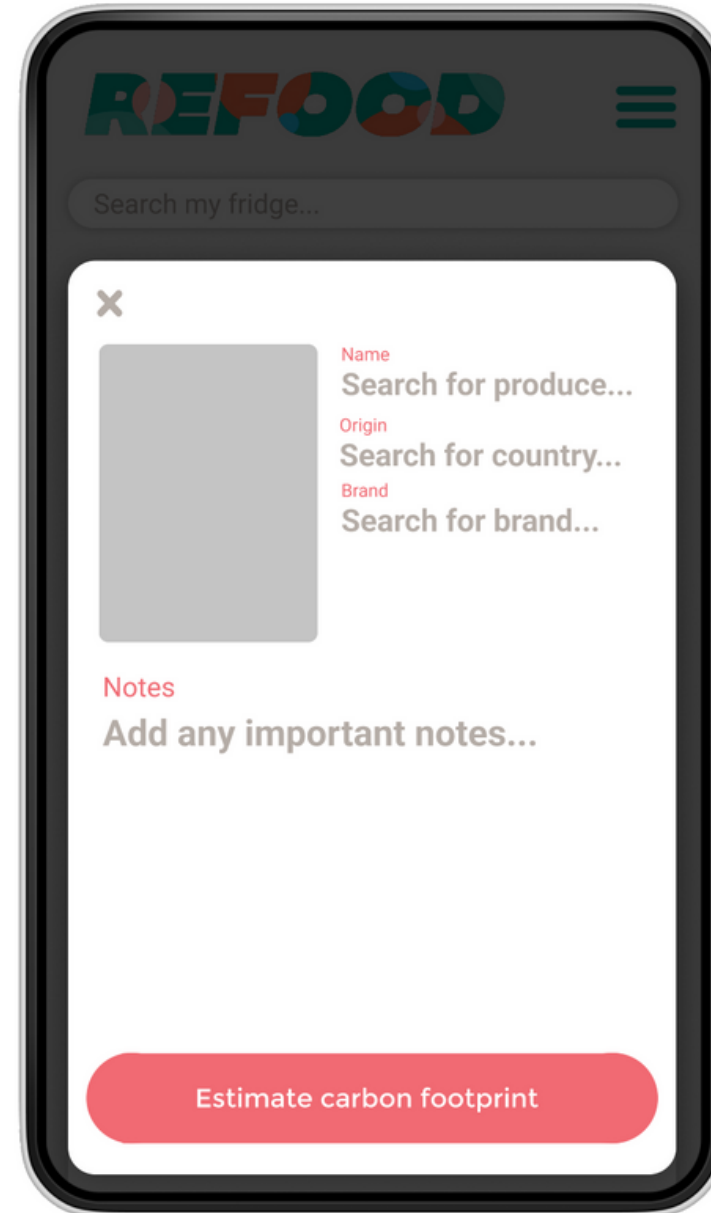
Fig. 9.1

Fig. 9.2

Figs. 9.1-9.2
ReFood also offers a "Fridge-tracker" option for users to keep record of the expiration dates of the produce in their fridge. Warning notifications will be sent within a customizable amount of time before the food expires to remind users to either eat the food or sell it.

Fig. 9.3
ReFood can also estimate the amount of carbon emissions generated from the purchase of each item in the users fridge. This number is calculated by using the data the customer has to input such as the type of produce, its origin country, and its brand. Combined with the address the user used to register for a ReFood account, the algorithm will estimate the carbon footprint by using information from its database regarding the export routes each company typically uses to outsource their production, the amount of time and resources typically taken to cultivate a certain produce, and more. As more users continue to input information into ReFood, this algorithm will keep refining itself to provide more accurate estimates using machine learning.

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