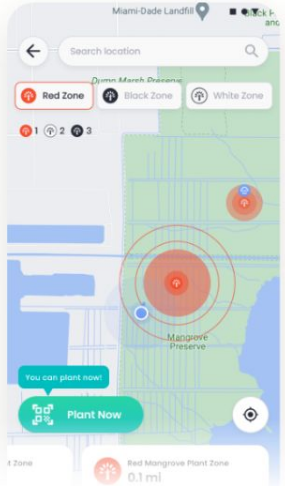
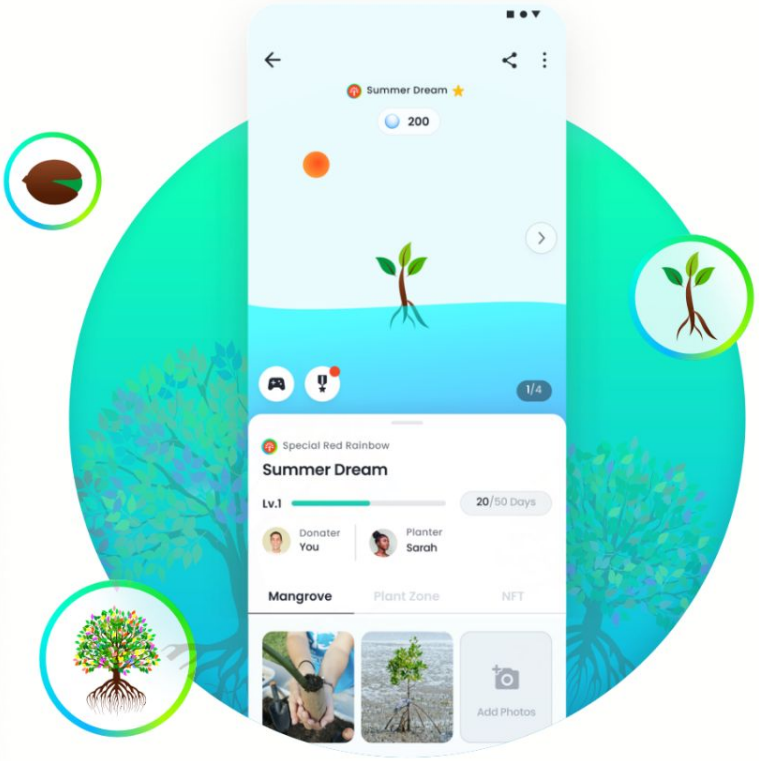
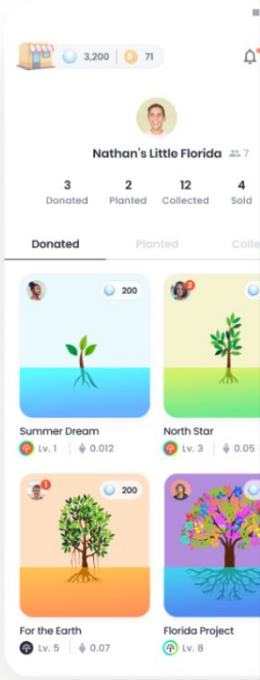
MANGROVERSE

Plant to Play, Play to Earn.







Link to GitHub

Link to Figma

Table of Contents

Overview

Mangroves are a wildcard to solve...

Challenge 1
Climate Change & Florida Ecosystem

Challenge 2
The Condition of Florida's Waterways

Challenge 3
Sustainable Fisheries

Is there a way to **create a rewarding experience and sustainable rewards** to mangrove preservation?

How can we get the **young generation, as well as people outside of Florida,** involved in mangrove restoration?

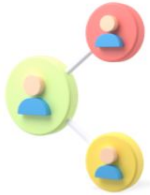
The Challenge

Restoring Mangrove Forests in Florida Better

Mangrove forests are key driving factors for improving Florida's ecosystem, water quality, fisheries, and climate change. Many have attempted to save mangrove forests. However, they are mostly temporary solutions, superficial, and requires a large sum of investment.

Another challenge was expanding the target users. We wanted to reach and engage people who live outside of Florida for a larger impact. By taking advantage of all of our team member being in our early 20s, we found a creative and meaningful way to attract the young generation to invest in the Earth's future.

Overview



Donator & Planter

Match them 1:1 for more efficient and responsible planting

Accessibility

Design all the process and data to make planting easy and simple

Metaverse

Expand the planting experience to a virtual world

Commercialization

Provide financial incentives and other rewards to contributors

Our Solution

Immerse into Florida's mangrove forests whenever & wherever you are!

With our mobile app **Mangroverse**, anyone anywhere can contribute to saving Florida's mangroves in 2 ways: **Donating** & **Planting**. The app provides step-by-step process and easy access to each contribution, matching them 1:1 for a more efficient and responsible planting experience.

Done planting? In the Mangroverse, the experience does not end there! You will recieve a virtual mangrove sapling that grows like a real tree with a real-time coastal info on where it's planted. What's more, they can mint it into a NFT by engaging and interacting with the tree.

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1. Background

Why Mangroves are important?

Home of Coastal Life

Mangrove forests provide habitat and refuge to a wide array of wildlife such as birds, fish, invertebrates, mammals and plants.

Natural Seawall

Mangrove roots stabilize coastal soils, reducing erosion and flood levels during storms, and buffer shorelines from the full impact of waves.

Blue Carbon

Mangrove forests capture massive amounts of carbon dioxide emissions and other greenhouse gases from the atmosphere and then trap them underwater.

For Human

Mangrove forests provide the nature experience for people. They also provide economic benefits to communities as a boost for commercial fish stocks.

Mangroves of Florida

Mangroves are one of Florida's true natives. 500,000 acres of Florida wetlands are made up of mangrove forest. They contribute to the overall health of the state's southern coastal zone. Florida's important recreational and commercial fisheries would drastically decline without healthy mangrove forests.

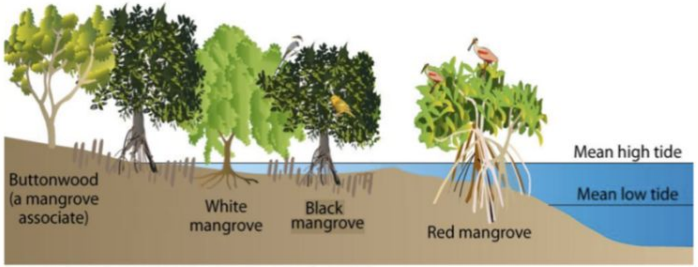
Red Mangrove Propagule

White Mangrove Seed

Black Mangrove Seed

A Home of Red, Black, and White Mangroves

Florida is home to three types of native mangrove species: red (Rhizophora mangle), black (Avicennia germinans), and white (Laguncularia racemosa). Each type of mangroves grows in salty waters in groups along Florida shorelines.



Threats

Despite the numerous benefits that mangroves provide, human impact such as dredging, filling, and water pollution from herbicides and developments, can lead to mangrove erosion and habitat destruction. When mangrove forests are cleared and destroyed, they release massive amounts of carbon dioxide into the atmosphere, contributing to climate change.

Efforts to Save

There are ongoing initiatives to save worldwide mangrove forests that inspired us.
They mostly take forms of volunteering, tourist activities, and remote donation.

However, we found rooms for improvement.

Current Limits & Problems

Where is my donated money going? How many mangroves did I plant? Wait, did they... even plant?

I have no idea where to start. Where can I get the mangrove saplings? Where do I plant?

Right after planting, I leave Florida. My experience ends there. I'll likely forget about my trees.

I wish there were more rewards aside from "feeling good."

How Might We...

How might we...

Encourage people outside of Florida to contribute by donating money and keep them tracked?

How might we...

Make the planting process super easy and provide step-by-step infrastructure and support?

How might we...

Extend the experience of physically planting mangroves to the next level and continue the interaction with the trees?

How might we...

Financially and emotionally reward the contributor's time & effort?

Target &
Value Proposition

Young Generation

We especially targeted users between 10s-30s.
They're the digital-natives who are going to lead the future of Florida's environment.
They seek fun, immersive, and interactive experiences in the metaverse.

#FUN **#Sustainable** **#Immersive** **#Gamification** **#Share**

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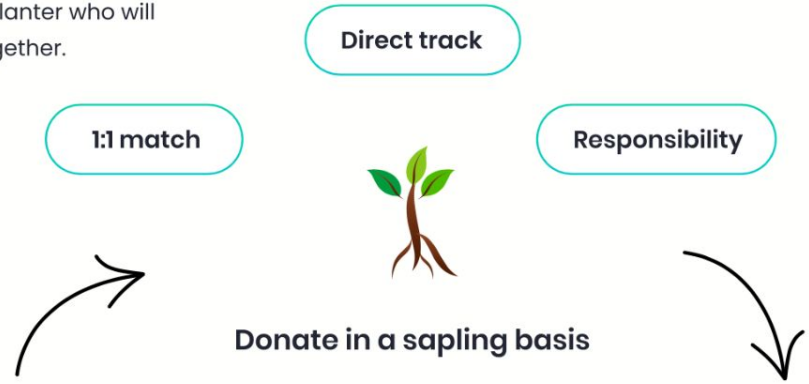
2. Our Solution

Creating a new form of 1:1 contributor relationships

Wherever you are, join the Mangroverse by donating saplings.
You're not donating cash, you're donating a sapling.
Each sapling will then be assigned to a planter who will physically plant it and keep track of it together.



Marrie

Donator lives in Mexico

Even tho I live in Mexico, I can donate a sapling to Florida through Mangroverse. They'll match me with a planter who will plant it on behalf of me, so that I can get connected and track my tree directly.

John and his son Harrison

Travelling to Florida **Planter**

My 5-year old son wants to plant his own mangrove trees. Instead of buying the saplings and planitng tools, we can collect donated saplings for free.

Planting mangroves. Never been this easy.

You don't need an instructor or a guide. Each process for planting is made easy and simple, thanks to our strong algorithm and UX strategy.

©Worldview

Donate

Find a nursery

- Find nearby nursery
- Real-time sapling inventory

Order saplings

- Nursery Dashboard for order schedule management

Pick-up

- Match a Donator and a planter on a rolling basis

Find a plant zone

- Based on species
- Based on real-time weather
- Based on lack of mangroves

Learn how to plant

Plant

- Saves GPS location
- Saves sapling size

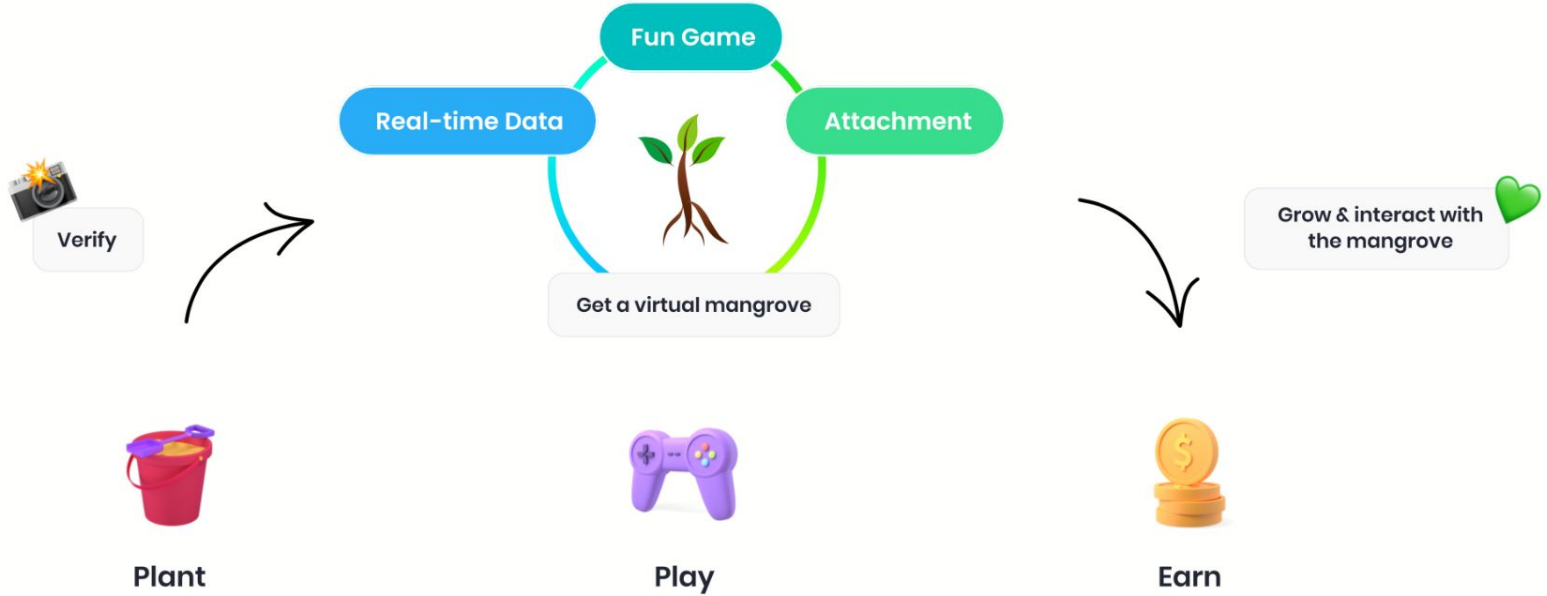
Welcome to Mangroverse

Earn a virtual NFT mangrove!

Expand the planting experience into the virtual METAVERSE

After planting, users will receive a virtual mangrove sapling that grows like a real tree. Even if they live Florida, they can keep track of it and interact with their tree in the Mangroverse...FOREVER!

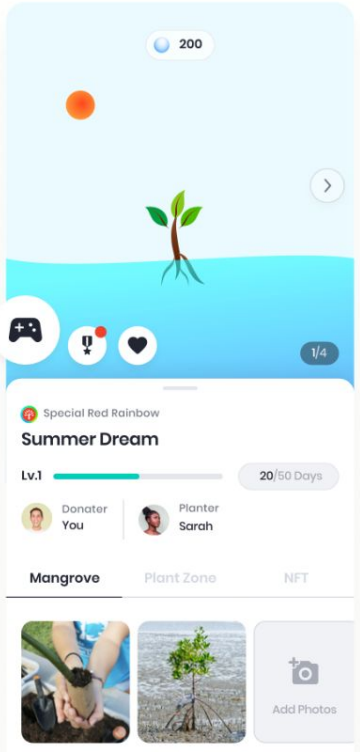
* Metaverse: A virtual extension of the physical world that still connects and interacts with reality. Users can create their own avatars that itself has a lucrative value and interact with others.

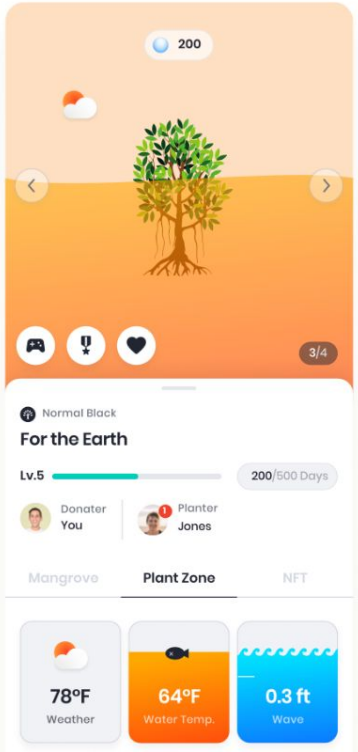


My Little Florida

Grow the saplings in the most real-like settings.
According to the climate data of the planted location, the dashboard interface changes intuitively. This way, the users can feel more engaged and immersed at the dashboard.

Real-time growth





Real-time weather

Real-time tide level

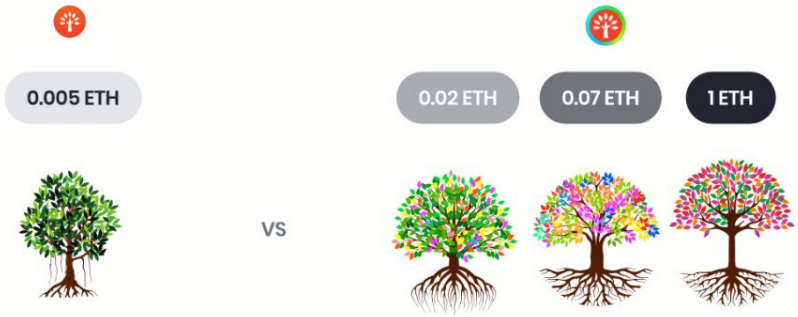
Real-time water temperature

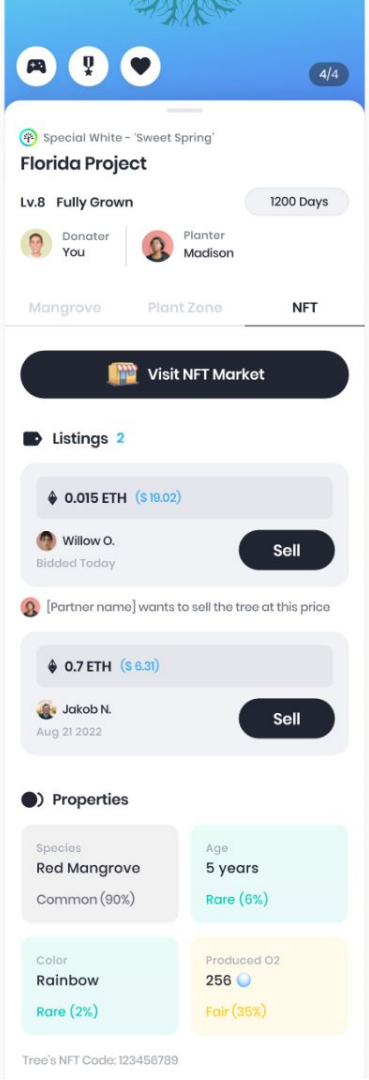
Before - after satellite images of the planted area

“Play to Earn” with NFT

When fully grown-up, each virtual mangrove can be minted to 2 unique NFTs, using blockchain technology. Both donator and planter will own 1 NFTs each. Sell it in the NFT marketplace to earn cash!

* NFT: A non-interchangeable digital assets exists on a blockchain currency and give the buyer digital owndership rights.





ethereum

Grow it into a unique appearance and sell it for a higher price!

Why is our solution unique?

1:1 Match makes planting more responsible, creating a new form of online community between users.

Having virtual mangrove not only adds fun to the planting activity, but also forms attatchment to their tree.

Collecting diverse trees itself is an appealing incentive to young generations according to the huge success of Animal Crossing and Pokemon Go!

Our algorithm finds the best plant zone for each of the 3 mangrove species, reducing the chance of planted saplings dying in a wrong habitat.

Provides lucrative incentives with fast-growing NFT technology so that the users can create their own reward ecosystem and interact within it.

The Metaverse and NFT concept will attract many investors and companies with infinite business models.

O2 points usable in Florida's local environmental-friendly business encourages tourists, who are the main user groups, to come (back) to Florida to claim the benefits. It offers mutual benefits to both users and Florida's economy.

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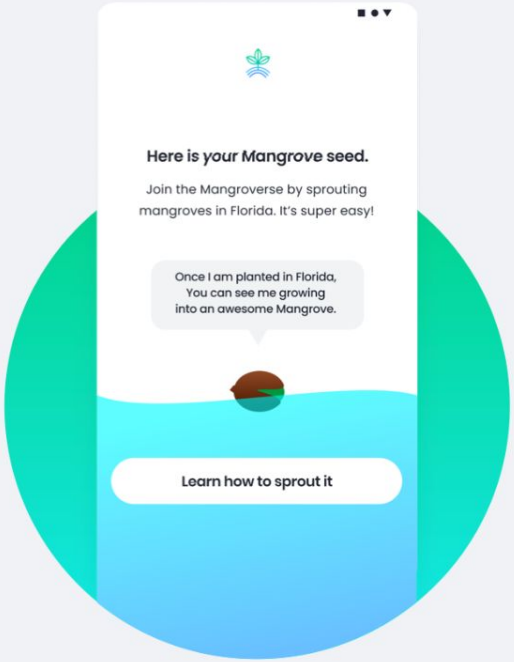
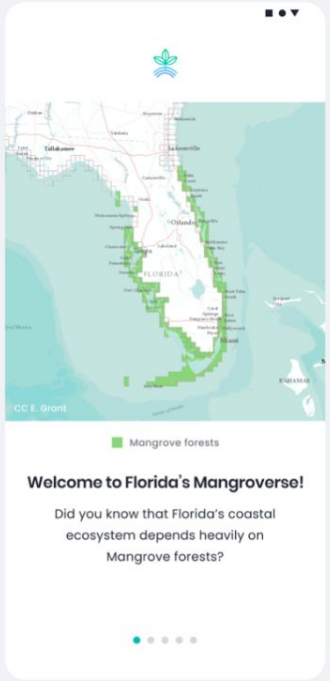
3. Prototype

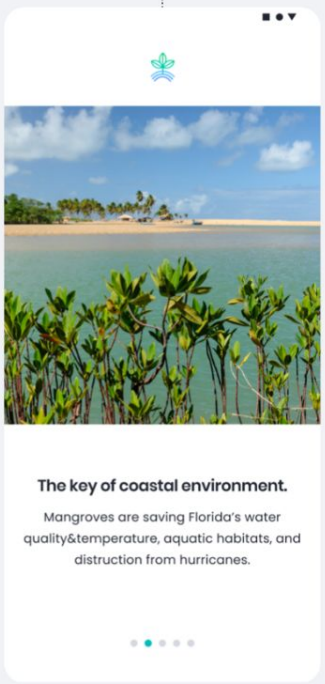
Onboarding

Introducing to the new way of planting mangroves - the Mangroverse!
Easily onboard to the app with fun facts about the mangrove's benefits to Florida environment. Also, a step-by-step guide will help you learn how our app works.

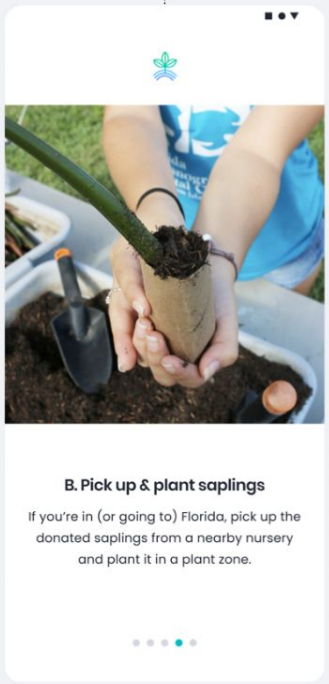




Benefits



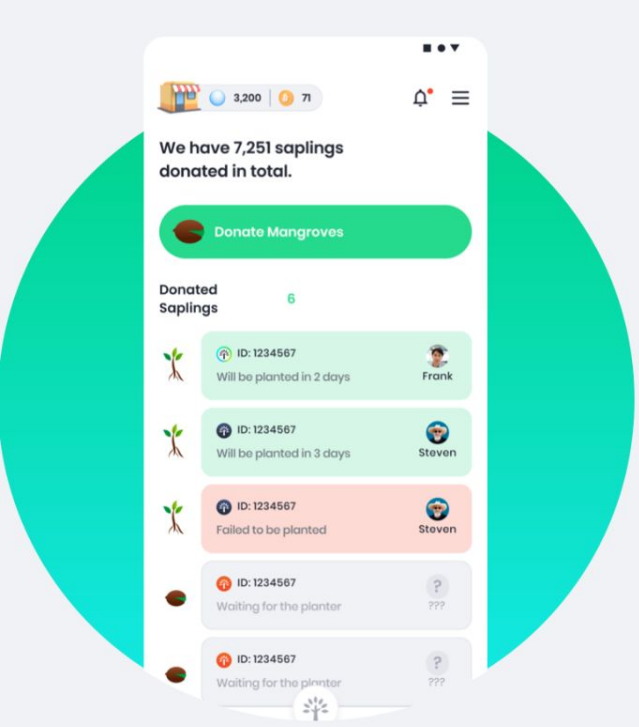
Brief Explanation

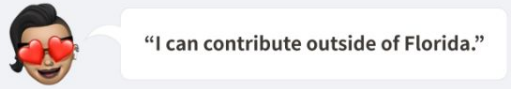


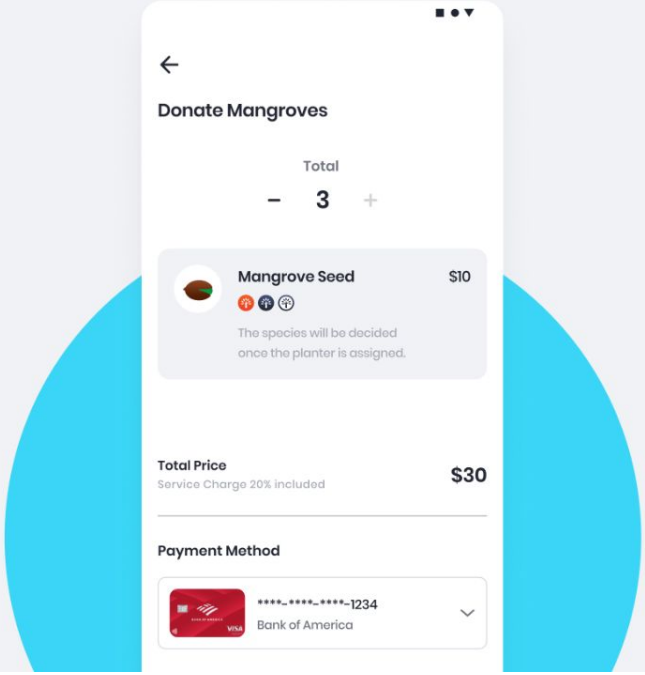
Donate

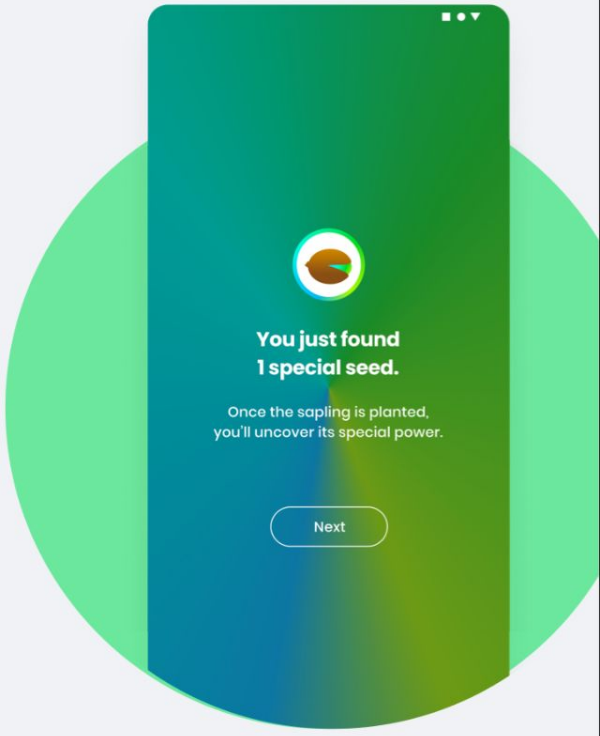
In Mangroverse, the donation process takes just a few clicks. As the saplings are equal in price, all the donator has to do is decide the number of mangroves and make a payment.

Once the donation is completed, the donator will be given mangrove seeds. If lucky, they'll get a special seed that will grow into a unique appearance later. Then, our system will match a planter to the seed on a rolling basis.





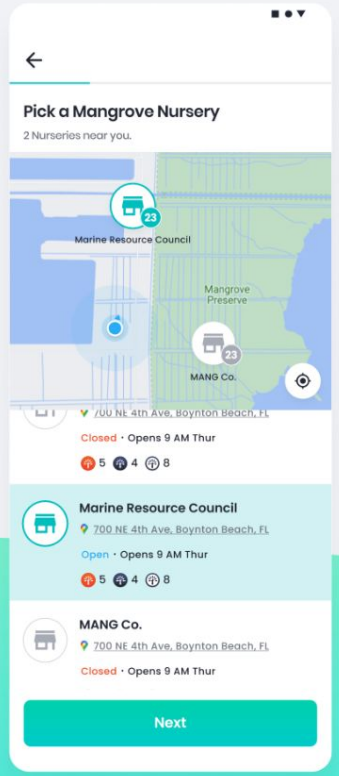


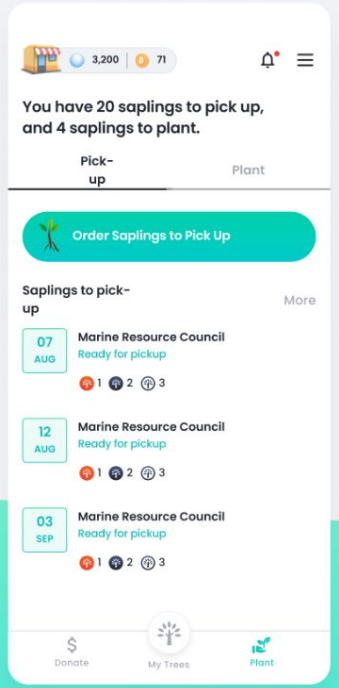


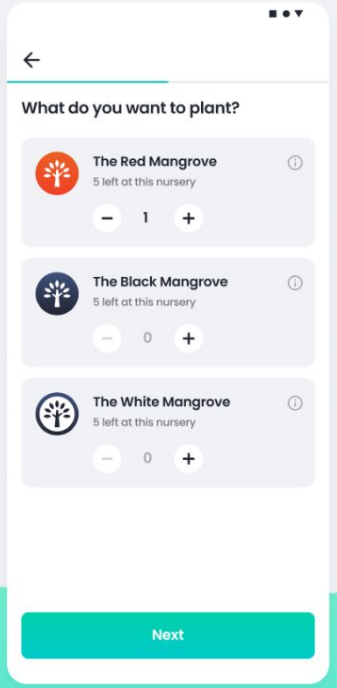
Order saplings to pick-up

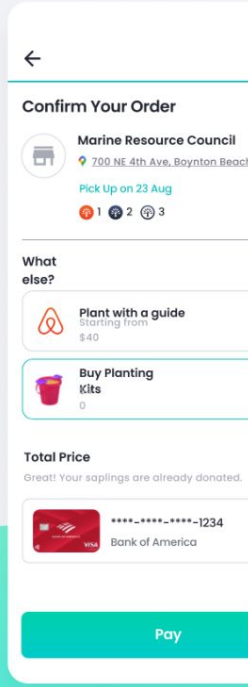
As a planter, the very first thing to do is to order saplings to pick up from nurseries. Mangroverse will show you the nearest nurseries with their sapling stock amounts.

"It's super easy to pick-up and plant!"





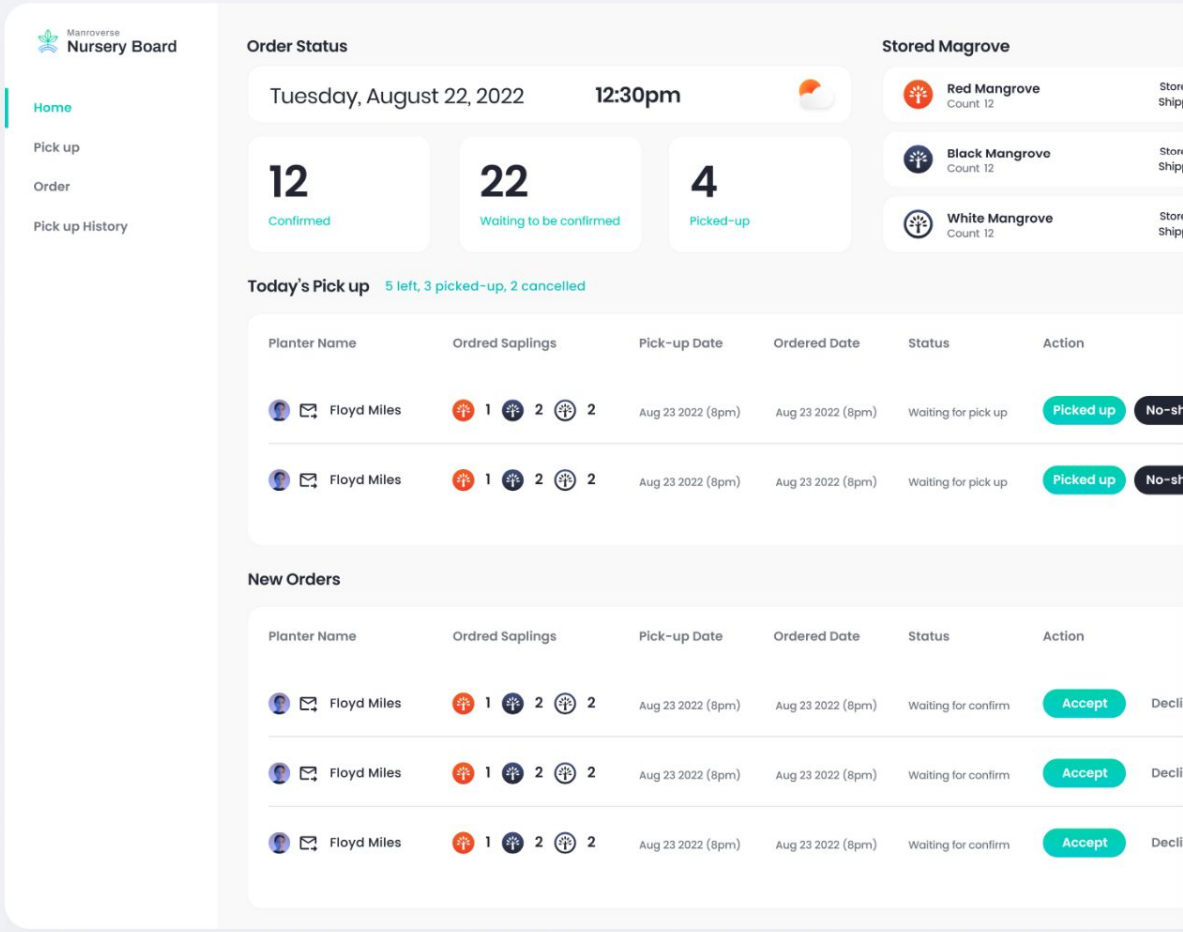




Managing Orders at the Nurseries

Nurseries will receive a tremendous amount of orders each day. With our nursery dashboard, they can easily confirm orders, send ready-status, confirm pick-ups or deliveries, or cancel orders.

"This dashboard is saving my work to manage orders"



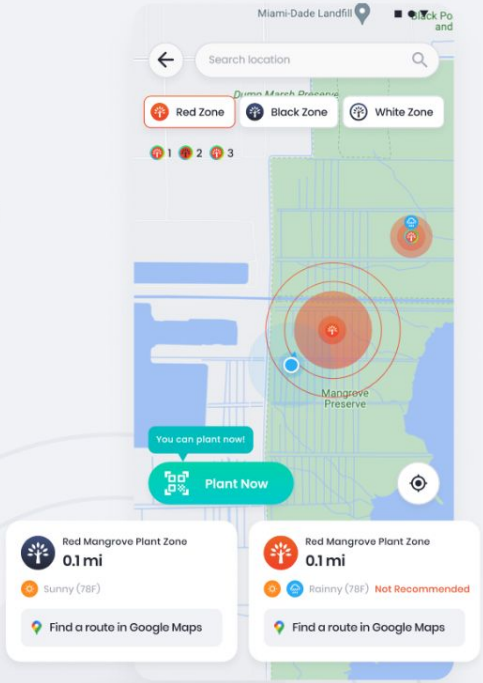
Plant saplings in the 'best' area

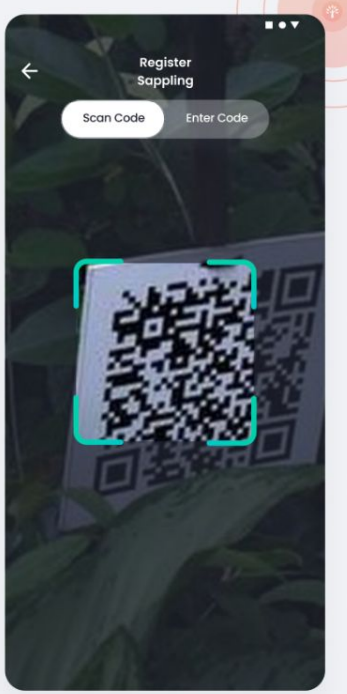
Each mangrove species grows in different habitats. For instance, the red mangroves inhabit the near coasts, and the white on near rivers. Our app shows the right planting zones for each species for the best planting result.

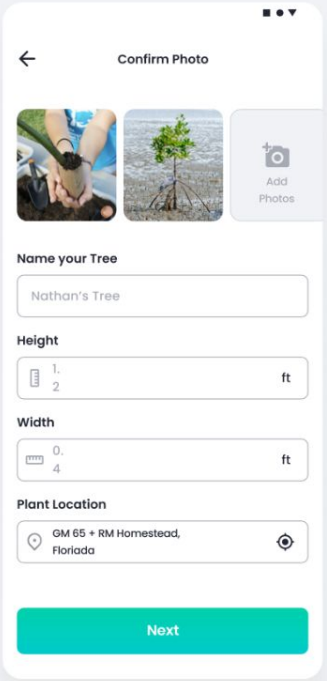
Typically, those areas are tidal which means it can sometimes be underwater when it rains or floods. Therefore, based on the climate data, our app excludes those areas that has a possibility of flooding.

One common reason why mangrove planting often fail is planting in a wrong area where mangroves can't tolerate.

- Sunanda Kodikara, Botanist University of Ruhuna

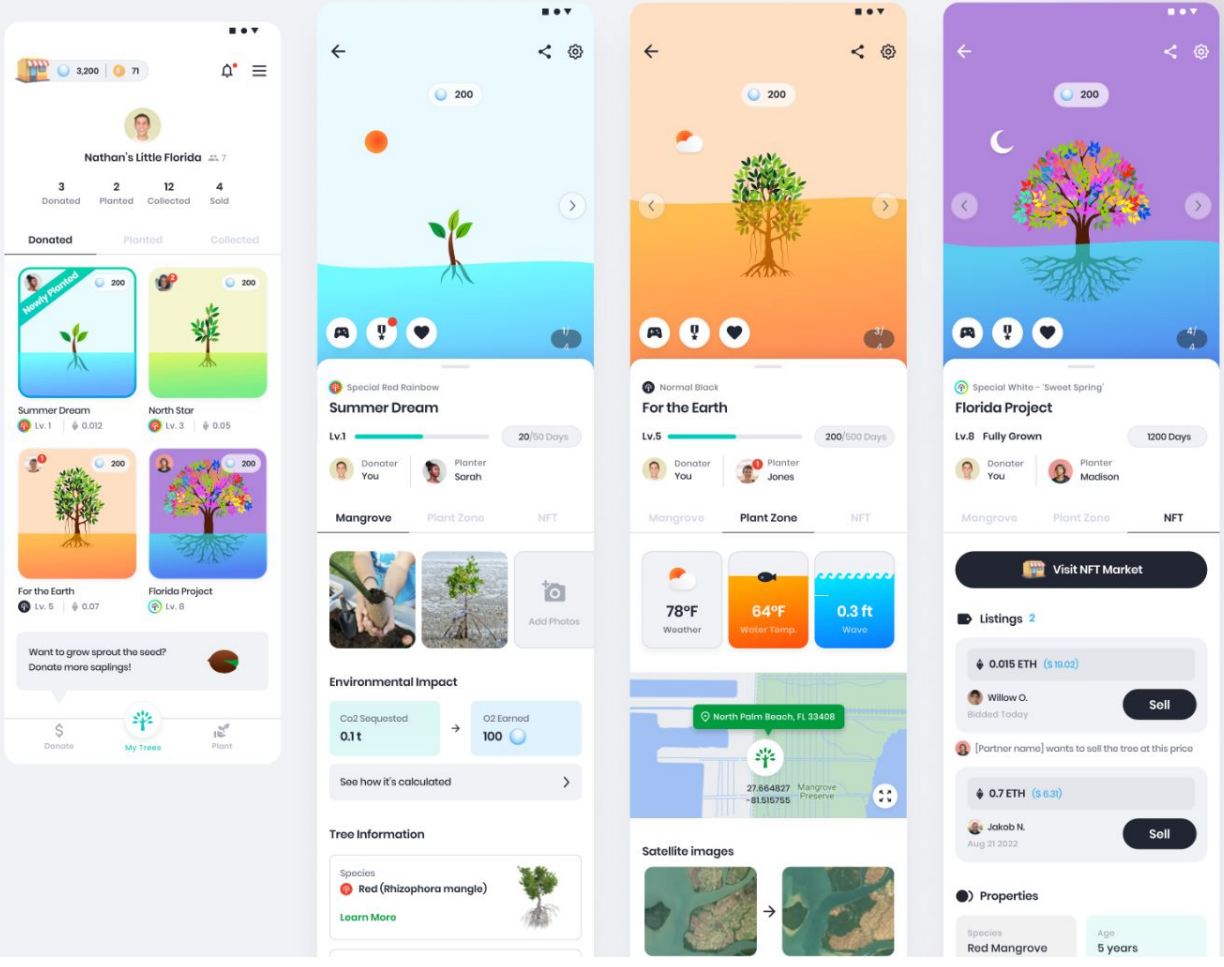






Earn a virtual mangrove in your Mangroverse

Done planting? In the Mangroverse, the experience doesn't end there! They'll will recieve a virtual mangrove sapling that grows like a real tree with a real-time coastal settings of where it's planted. What's more, they can upgrade it into a NFT by engaging and playing with the tree.



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4. Technology

Platform Architecture

Database

Deploy Database
IBM Cloudant

Object Storage
IBM Cloud Object Storage

Backend

Backend
Flask & Python

Mint the trees into an NFT
Ethereum

Populate database with nurseries
Google Maps API

Deploy our server
IBM Cloud Foundary

Http Requests

Apps

Nursery
Java Script & HTML5 & CSS 3

Android Application
Java & Android

Payment
Google Pay

QR Code Scanner
ZXing

Measure tree size
AR Core

Select & direct plant zones
Google Maps API

Authentication (Sign up, login)
Firebase Authentication

Database & Backend

Database

IBM Cloudant

In order to make the app as lightweight as possible, we are using **IBM Cloud Object Storage** to store images and assets that are too large to store in either the database or the app files, such as real images of the trees, profile pictures, and metaverse assets.

Cloud Object Storage

IBM Cloud Object Storage

To store our data about trees, nurseries, zones, and users, we constructed a NoSQL document schema and deployed it to **IBM Cloudant**. This database interacts with the backend API to handle requests to create, update, or delete data.

Backend

Flask & Python

The backend API is built on a **Flask server in Python.** This server processes and redirects the requests made from the mobile app and the nursery web app. It acts as a gateway for the user-facing apps to interact with the database and images in a controlled manner.

Backend APIs

Ethereum & Google Maps & Cloud Foundry

This backend utilizes other services, such as **Ethereum API** to mint our assets into an NFT and **Google Maps Platform API**, to handle addresses and location-related tasks. This server application is then deployed to **IBM Cloud Foundry** to create a scalable, low latency, and central API with various endpoints.

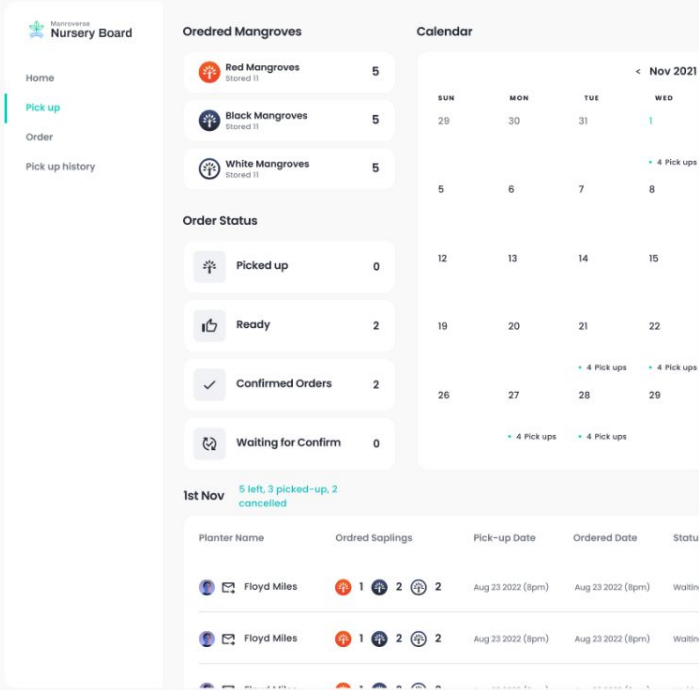
Mangroverse Nursery Software

Nursery

Java Script&HTML5&CSS3

The application for nurseries was built with vanilla **JavaScript, HTML5**, and **CSS3**. It consists of a simple UI that displays the orders made by users from the mobile apps.

It makes requests to the backend API, which can display the existing orders and update them on the database. This allows both the nursery and the planters to interact as seamlessly as possible by managing orders, pick ups, and deliveries.



Mangroverse App

Android

Java&Android

Along with the backend API, the Mangroverse application is the most comprehensive part of our platform. It handles all user input and make corresponding HTTP requests to the backend API. The initial prototype is built as an **Android application in Java**.

Payment&QR Code Scan&Location

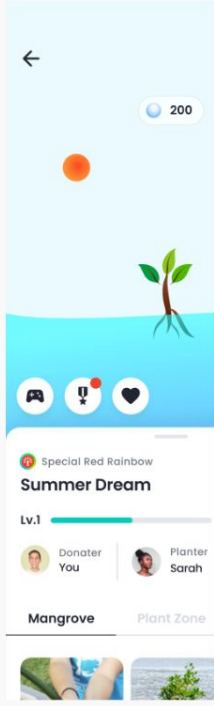
Google Pay&ZXing&Google Maps

To handle payment services for tree donations and trading, we are using the **Google Pay API.** For tree authentication with QR Code Scanning, we are using the **ZXing library support on Android SDK. The Google Maps Platform API** is used to handle location and plant zones-related services; finding nurseries, displaying plant zones, and providing directions.

Tree Size Scan & Authentication

AR Core & Firebase Authentication

The ARCore API is used to enable augmented reality and sensors built in Android phones to be able to measure the width and height of the tree without any measuring tools. For user authentication, we are using **Firebase Authentication**.



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5. Data

Mangrove Botanic Data

Avg. Mangrove growth by species

https://scholarworks.utrgv.edu/cgi/viewcontent.cgi?article=1056&context=bio_fac

https://daac.ornl.gov/CMS/guides/CMS_Global_Map_Mangrove_Canopy.html

Avg. Mangrove Co2 sequestered

Healthy mangrove forests are able to store the equivalent of 21 gigatons of carbon; restoring degraded mangroves could lead the sequestration of an additional 1.3 gigatons.

In Florida, mangroves have been keystones of disaster mitigation and climate adaptation; in 2019, TNC co-authored a report concluding that mangroves prevented $1.5 billion in direct flood damages and protected over half a million people during Hurricane Irma in 2017.

Implement

Virtual tree growth

Lv.1 — 20/50 Days

Estimated tree data

Species
Red (Rhizophora mangle)

Learn More

Width
5.5" (when planted) → 7.5" (now est.)

Height (when planted)
8" (when planted) → 11" (now est.)

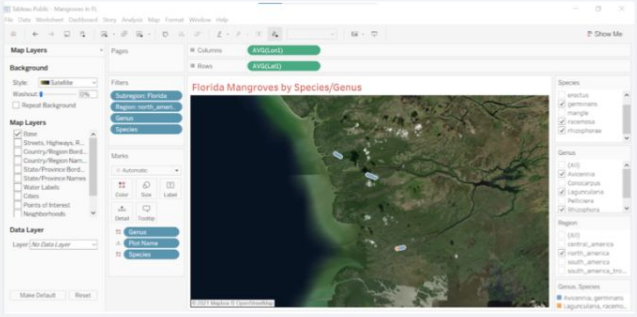
Converting O2 Points

Co2 Sequested
0.1 t

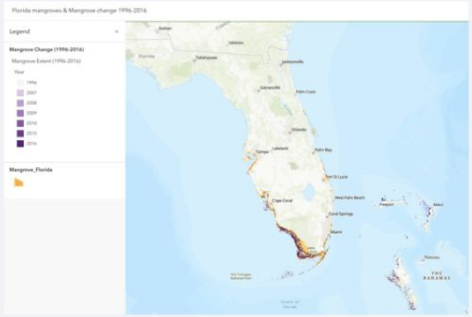
→

O2 Earned
10
0

Mangrove Habitat Data



NS America Tree Measurement dataset



© The Global Mangrove Watch

Current Florida mangroves & Mangrove change 1996-2016

Mangrove losses since 1996 represent some 0.082 gigatonnes (GT) of carbon in aboveground biomass carbon and 0.354 GT of soil carbon.

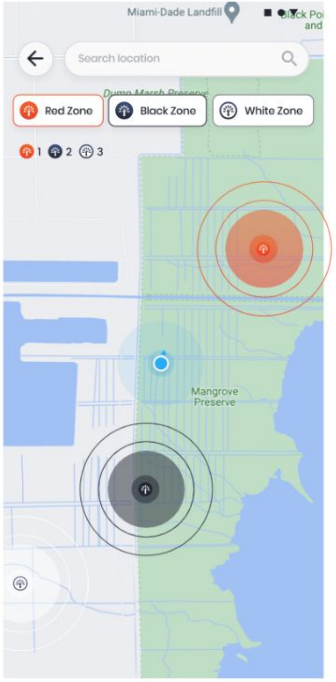
© 2021 Conservation Biology Institute

Florida Mangrove Map

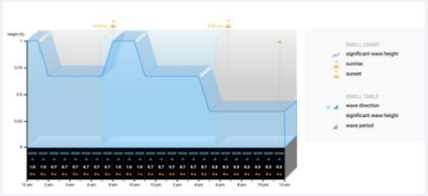
Locates mangrove habitate and where mangrove forest absent

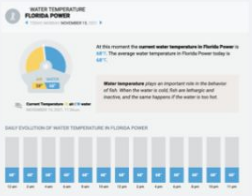
Implement

Real-time plant zone data



Climate Data & GPS





Florida ocean data

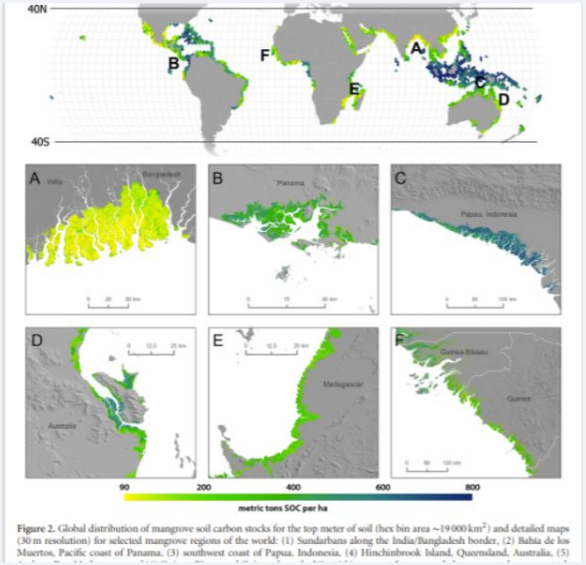


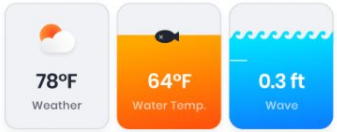
Figure 2. Global distribution of mangrove soil carbon stocks for the top meter of soil (hex bin area ~19 000 km²) and detailed maps (30 m resolution) for selected mangrove regions of the world: (1) Sundarbans along the India/Bangladesh border, (2) Bahia de los Muertos, Pacific coast of Panama, (3) southwest coast of Papua, Indonesia, (4) Hinchinbrook Island, Queensland, Australia, (5)

Satellite Images for Carbon Sequestration

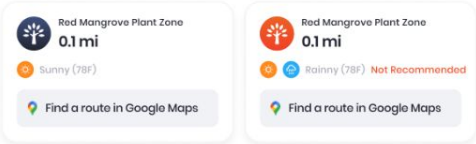
Coastal zones with major rivers have some of the highest rates of soil formation, so they also have high annual carbon sequestration rates.

Implement

Real-time plant zone data



Real-time plant zone recommendation



Satellite images

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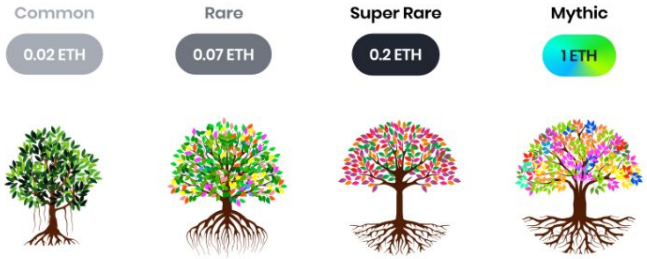
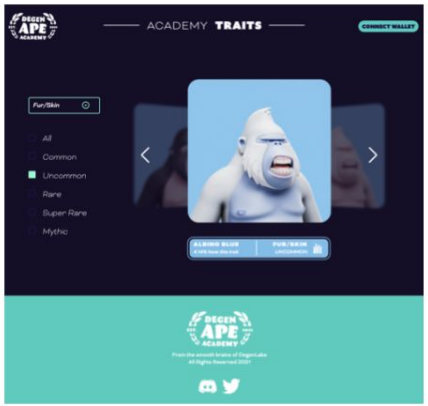
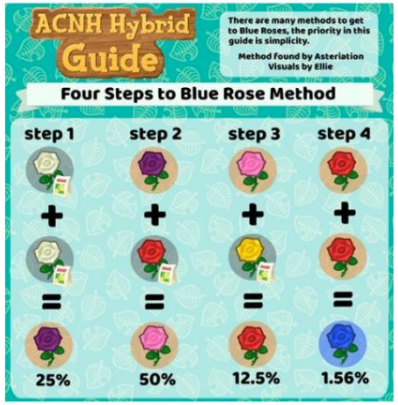
6. Business Model

NFT Properties





Degen Apes (https://www.degenape.academy/)



Animal Crossing (https://animal-crossing.com/)

The Gacha Model (Random Vending Machine)

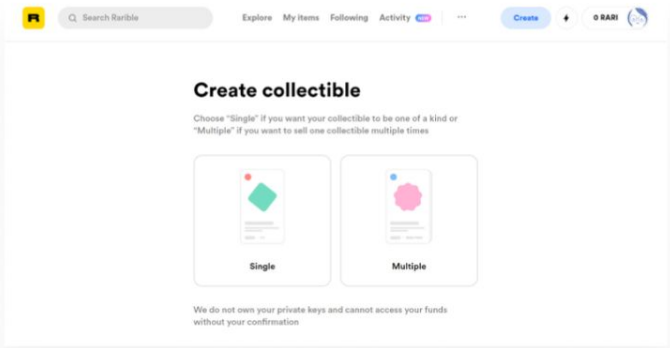
We are planning to create a collection of 1,000+ unique tree appearance in colors, shapes, and themes (eg. Halloween tree, Christmas tree) and randomly match properties with different rarity when a user donates or picks-up a sapling.

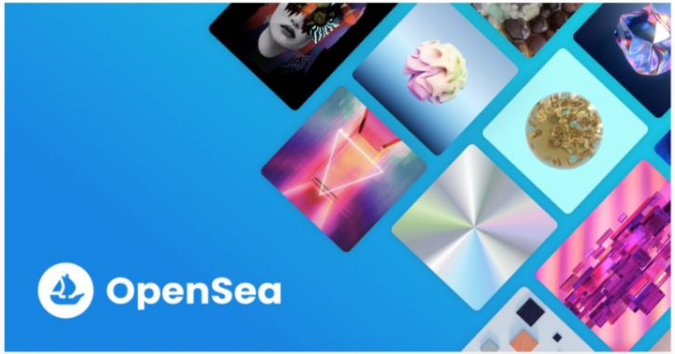
Gacha is a vefiried incentive to spend real-world money. **Users who want to gain more unique properties will donate or pick-up more saplings and enjoy gacha.**

Charge Hybridizing Mangroves

Another way to earn rare trees is making a hybrid by mating with other user's mangroves. This can create super unique variations as well as encourage interaction with other users.

NFT Mediator





Minting* & Service Fee

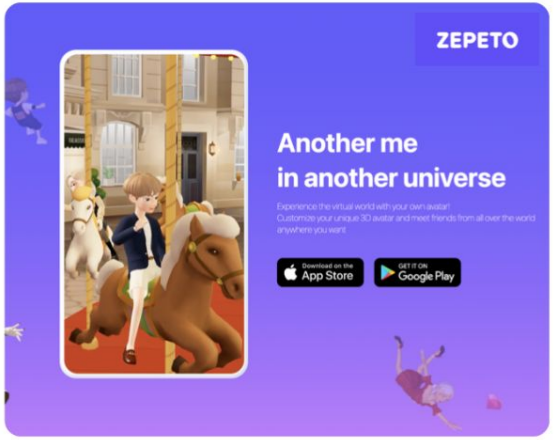
Once the virtual mangrove is fully grown up, users can earn it as an NFT by minting their mangroves. After minting, they can sell or bid their NFT in NFT marketplaces such as OpenSea and Rarible.

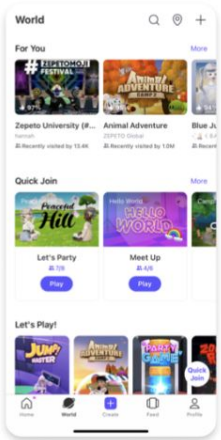
We earn 1% service charge for minting NFTs and mediating users with NFT marketplaces.

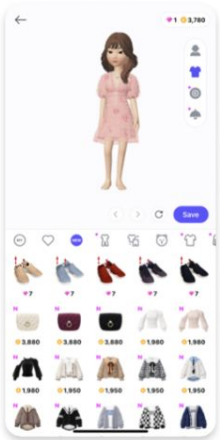
* Minting: Turning a digital file into a NFT on the Ethereum blockchain.

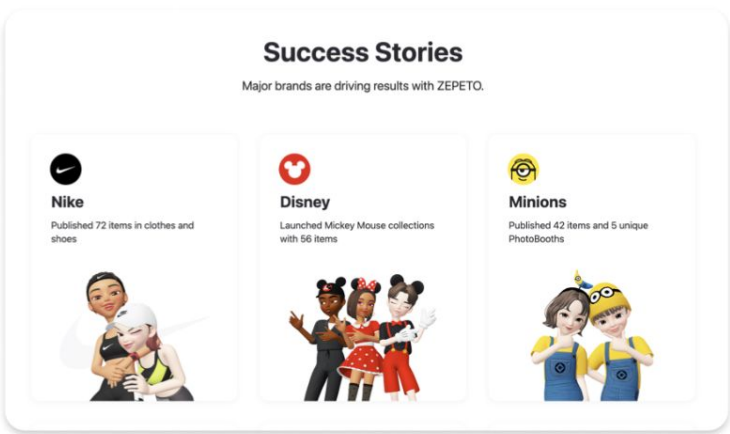
Infinite BM in the Mangroverse

Example: In Zepeto, you can create a 3D digital character and personalize your avatar with millions of items.
You can play multiple games with the character and adventure the virtual world.





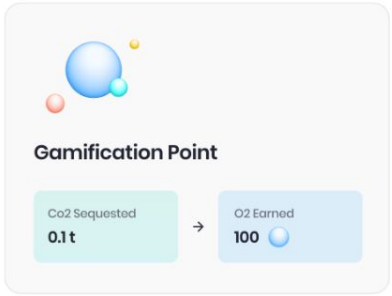




The value of metaverse avatars is that users can play game with it and interact with others. We can create (or affiliate with) games such as adventurous RPG game in Florida settings, fishing, sea animal farms that are related to mangrove's positive efftcts on nature.

Companies can publish branded limited editions of tree styles or decorations for marketing.

Gamification



O2 Points

Each virtual mangrove produces O2 points **based on estimated Co2 sequestered** regarding their age.

According to internationally accepted VCS methodology, each mature tree mitigates a minimum of 500 kg CO2 over 20 years, involves the related estimate that about 24% of this is captured by the tree and the rest in the soil.

Discount on Florida's local business

O2 points can be used in affiliated local stores in Florida such as a cafe or a aquatic nursery. This encourage users to visit Florida again, benefiting local businesses.

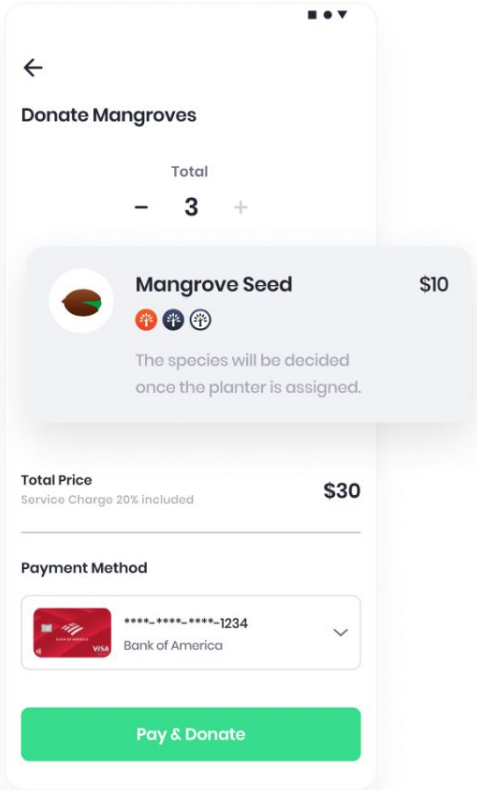
Buy Boosters

The virtual mangroves will dry if the user don't interact with them for a while. Boosters are sold to save those dying mangroves.

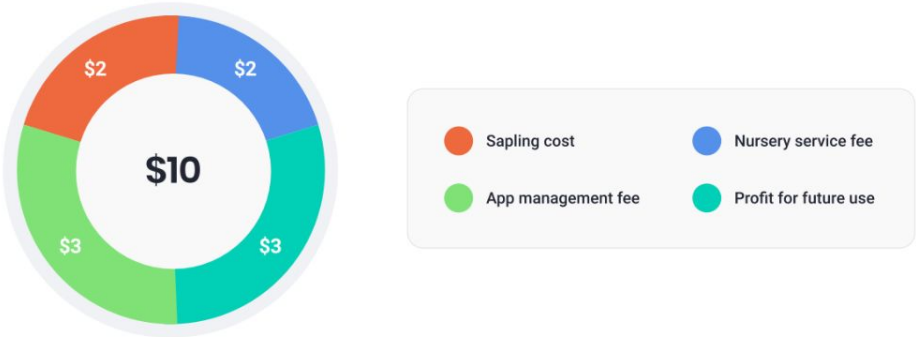
Get Free Saplings to Donate

Users can donate a sapling for free with O2 points. This encourages a virtuous cycle and let users without enough money to participate in donation.

How we spend your donation



Mangroverse seeks for a non-profit service, but still it needs to be sustainable. The set price to donate 1 sapling is $10 ($2 for the sapling itself.) We're planning to take 20% to support our nursery affiliates and their tree-planting.



The other 30% are for administration and app developers. The leftover profits will mostly be used to strengthen our app process, carry out promotional events, and support planting tools like baskets or shovels.

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7. Future Goals

In 6 months we will have...

10

Affiliates

who will guide us and collaborate with us to grow the impacts

100

Mangrove saplings

planted by ourselves and gain holistic insights for our service

1,000

Virtual saplings

planted by our MVP users through donating money to our affiliated organizations

10,000

MVP users

who interacts in our Mangroverse in any form on a regular basis

Building Alliances & Meeting Users

Our priority is making partnership with mangrove organizations, experts, communities, and funders ASAP to **seek feedback and collaboration**.

In addition, we'll conduct **surveys and interviews with stakeholders** including volunteers and nursery managers. We will validate our hypothesis and discover hidden needs of mangrove planting to improve our service.

Mangrove nursery owned by ©Worldview

WORLDVIEW INTERNATIONAL FOUNDATION

Worldview's goal is to plant 1,000,000,000 trees to achieve the level needed to make a global impact on climate change. We're contacting them to **collaborate with the nurseries they own.**

Mangrove Action Project

A US-based nonprofit which collaborates with stakeholders at all levels to preserve, conserve, and restore our world's mangrove forests.

GLOBAL MANGROVE ALLIANCE

The Global Mangrove Alliance (GMA) is a commitment from the international community to reverse the loss of critically important mangrove habitats worldwide. The GMA has the ambitious goal of expanding the global extent of mangrove habitat by 20 percent by 2030.

Engaging Organizations & Companies

To maximize the impact, we're planning to extend our users from individuals to bigger organizations like schools and companies.

Company donates 100-1,000 saplings

Here, companies serve as donors while students of schools take the role of planters.

Schools are assigned to planters

Donated saplings will be assigned to a matched school. The students will then be provided with an opportunity to trip to Florida and to plant real mangrove saplings with their hands.

Companies enhance brand image

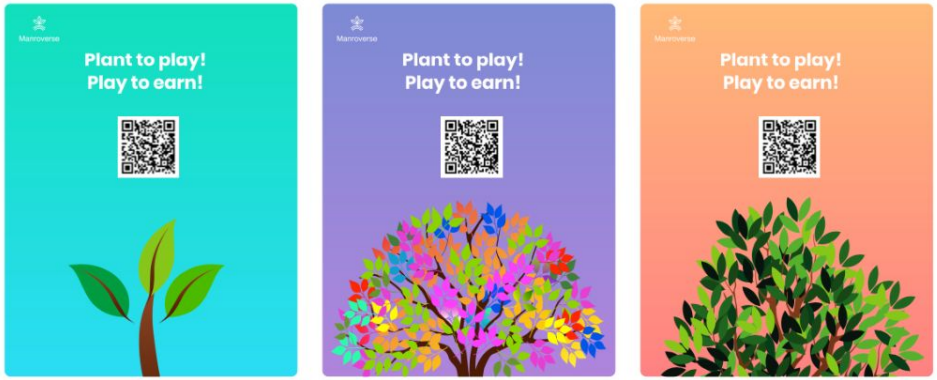
Companies can enhance their brand image by contributing to the environmental sustainability through Mangroverse.

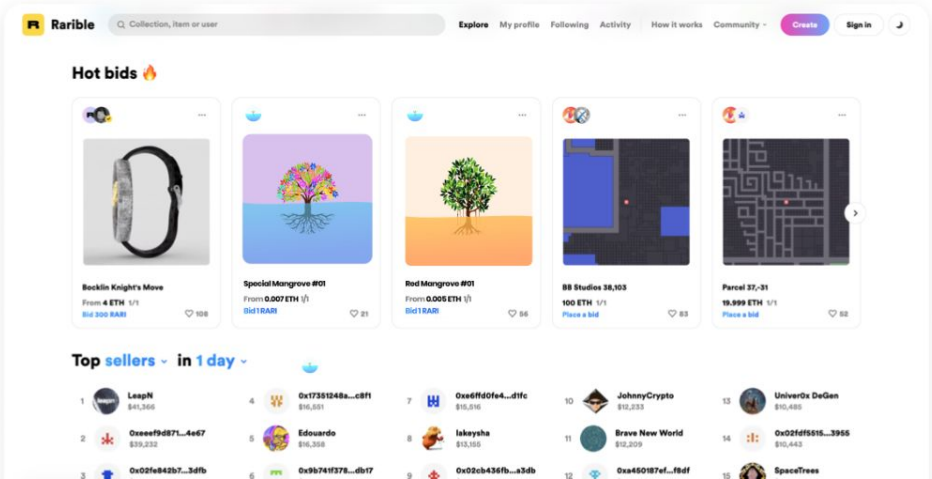
Students gain educational experiences

Students get an opportunity to learn about environmental challenges as well as to enjoy the planting activity in nature. Students will also gain volunteer hours for their contribution to the environment.

Each school can compete with each other on how many saplings they grow.

Marketing Plans





Free NFT Promotion

We will execute a promotion where we randomly **give out free NFTs immediately when the user donates money.** This will drag people's attention and make them interested in NFT.

Promotion on NFT Marketplaces

We will upload some of our mangrove NFTs on famous marketplaces (Opensea, Rarible) and expose them to the users. When the users click it, **they'll see our metaverse story and how to earn more NFTs by donating/planting mangroves.**

🎃 🎄

Limited-edition Tree Theme

Existing users will be rewarded with O2 points for inviting initial users. Initial users will have an opportunity to **earn special theme for thier mangroves**, for instance Chirstmas ornaments, when making their very first donation.

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