



OF LAND, EARTH + SEA

A RE-MASTERED BEACH RESORT



SODAA

NORTH DAKOTA STATE UNIVERSITY

SCHOOL OF DESIGN, ARCHITECTURE, AND ART

DEPARTMENT OF LANDSCAPE ARCHITECTURE



OF LAND, EARTH + SEA

A Re-Mastered Beach Resort

A Design Thesis Submitted to the
Department of Landscape Architecture
of North Dakota State University

By
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In Partial Fulfillment of the Requirements for the
Degree of Master of Landscape Architecture

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The images presented in this booklet displays a variety of tropical paradises and resorts throughout the world that I admire and wish to travel to in the near future. These locations are part of my inspiration for this project and are visuals to convey what I imagine my proposal to look like. All the images exhibited are to capture the beauty of island paradises, tropical and ocean environments of earth. Beach's, islands and coastlines are something the human eye has always been drawn to as it is near large bodies of water. They are a perfect representation to how one can experience a landscape through a variety of ways.

*Soneva Jani
The Maldives*





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Paradise Cove Resort



Beach Villa Visualization



Versailles Gardens



Sandals Royal Bahamian



THESIS ABSTRACT

Beaches, resorts, and recreational activities serve as a main source of attraction for some cities across the world that reside next to large bodies of water. This often leads to cities becoming dependent on tourism for their source of income and identity. However, some resorts do not have the ability and accessibility to resources in order to become sustainable. Small towns with beach resorts often do not have facilities and equipment to progress towards a sustainable resort. The landscape surrounding a resort often can affect tourists' comfortability and experience around the resort.

A master plan emphasizing sustainability and a landscape would encourage resorts to become self-sustaining and provide the necessary resources to enable a sustainable environment. This landscape will not only provide sources for resort residents and faculty, but also serve new activities for the site. This will not only support the economy by providing jobs but will present new opportunities for programmed activities for a resort. Investigating successful sustainable resorts and programmed activities will focus on new strategies to promote green spaces for not only urban design, but resort design as well. Researching methods to accommodate mitigation within a resort will not only address safety for tropical storms, but also drainage for the site.

This thesis research will provide a layout for Paradise Cove, located in Freeport Bahamas, on how this resort will incorporate a landscape design that will address the micro-climate and mitigation while also implementing new programmed activities. Nevertheless, it will also emphasize expanding the resort site in order to shelter tourists and employees in order to achieve the goal of becoming a self-sustaining resort.



THESIS NARRATIVE

Since the early settlements of the Bahamas the country has always been seen as an economic opportunity. The cities of Nassau and Freeport have since then been devoted to tourism. Their economy heavily depends on tourism and international financial services in order for the country to operate. However following the events after COVID-19, tourist destinations have suffered a lack of visitations and revenue due to lock downs and limited air travel. For the Bahamas the country has devoted its resources to tourism in order to sustain a functioning economy. With the absence of tourists, the locals of the Bahamas and tourist sites have seen little action.

In May of 2021, the World Bank Boards of Executives approved over one hundred million dollars as a response to the economic crisis. Over the past year alone, the Bahamas has seen an economic contraction of 16.2% which has led to the increasing numbers of unemployed Bahamas citizens. Nonetheless, the Bahamas also face tropical storms affecting the landscape and resort alike. Over the past century, the Bahamas have seen countless storms and multiple hurricanes devastating the entire country. This does not only affect the land, but the economy and infrastructure as well. Mitigation and macro-climate has always been a challenge with the inevitable storm water. With the event of hurricane Dorian the state of disaster preparedness management and construction have been pursuing efforts to improve the country's mitigation process and plan.

This thesis project will attempt to create a sustainable resort that will account for micro climate while also incorporating a self-sustaining landscape that will provide the necessary resources for the resort. Nonetheless, this project will focus on answering questions related to how the resort will be able to generate revenue in order to sustain new programmed activities to promote interest. Proposed housing will also address mitigation and provide the necessary shelter to endure the wet season of the Bahamas.

MAJOR PROJECT ELEMENTS

1.0 EDIBLE LANDSCAPES



Vegetables



Fruits



Edible Gardens



Native



Non-Native Plants

2.0 PRODUCTIVITY



Vegetables



Fruits



Agriculture



Native



Non-Native Plants



Farmstead



Villa



Community Engagement



Participatory Garden

3.0 LAYOUT



Farmstead



Villa



Community Engagement



Participatory Garden



Edible Garden



Hydroponic Farm



Farm-To-Table dining



Programmed Activities



Agriculture



Preservation



Sustainability

CLIENT | USER | SITE

CLIENT LIST

The potential clients for this thesis would include:

- Paradise Cove Resort
- The city of Freeport
- National Emergency Management
- Agency Department
- Disaster Preparedness, Management and Reconstruction Department
- Tourism and Aviation Department
- Housing Department
- Financial Services Department

The project will be owned and run by the Paradise Cove Resort.

USER DESCRIPTION

This project will be designed for use by the tourist and resort staff members. Potential user groups would include: Snorkelers, Kayakers, Paddle boarders, Beach goers, Free divers, Fishermen, Kitchen staff members, and faculty members.

SITE INFORMATION

Location: Paradise Cove Beach resort, Freeport, Bahamas
Site Typology: Beach front
Climate: Subtropical
Ecosystem: Mangrove

PROJECT EMPHASIS

Micro-climate

Designing a landscape where it would be comfortable for users throughout the day

Recreational Activities

Research and determine what programmed activities should be added to the resort

Villa Housing

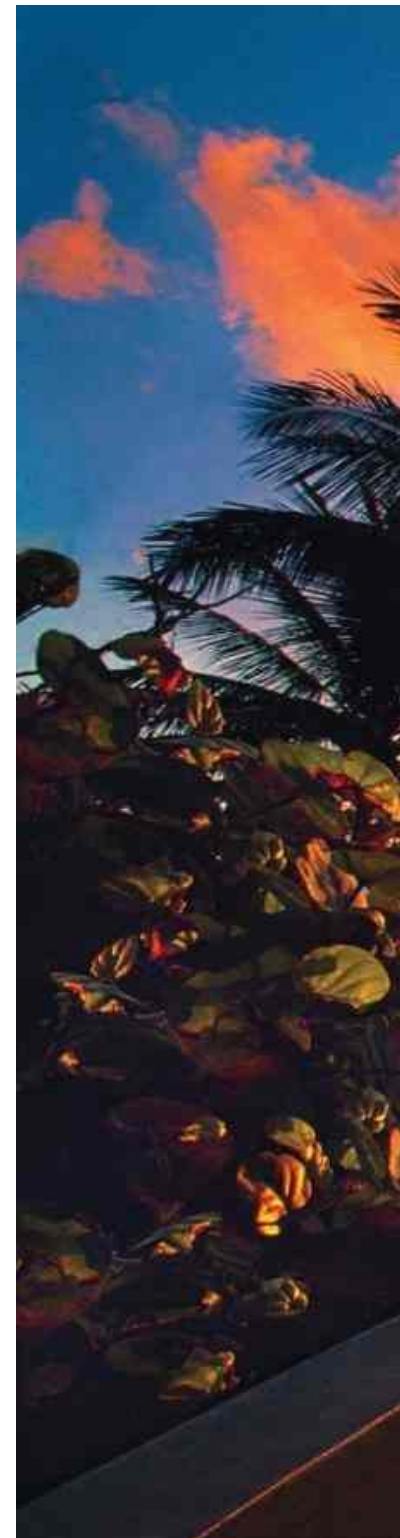
Implement housings for staff and tourist in order to accommodate inflow

Event Space + Resort Facility

Form an event space that will have programmed events throughout the week

Edible Landscapes + Urban Agriculture

Create a planting plan that will generate resources for the resort





PROJECT GOALS

1.0 EDIBLE LANDSCAPE

1.1 To develop spaces that will feature a variety of native and non-native plant species that are edible and are designed to be utilized for the proposed resort restaurant that will be in alignment with the idea of farm-to-table.

(E.g. Potato (Non-Native) | Sea Grape (Native))

2.0 PRODUCTIVITY

2.1 To generate produce in order to meet 25% of the daily recommend intake of fruits and vegetable for both adult men and women.

(Calories | Cups)

E.g. Recommended daily consumption

2 To 2 1/2 cups of fruit for men

1 1/2 To 2 cups of fruits for women

E.g. Resort to produce daily intake of 1/2 cup of fruit for men and women

2.2 To generate produce in order to accommodate 25% of the daily Recommended intake of fruits and vegetable for a maximum of 100 guest

E.g. 60 total seats for resort reservation restaurant

60 Resort guest

40 Daily non-resort guest (Smith, 2022)

3.0 LAYOUT

3.1 Provide an on-site community garden to allow locals from the community to gather and explore the opportunities of growing their own produce

3.2 Establish a restaurant within the main resort building that will utilize the surrounding edible landscape and hydroponic farm

3.3 Develop a main resort building that will be a central location for activities

3.4 Provide a participatory garden for guest in order to engage with research

3.5 Connect edible landscapes and east farm with resort guest

3.6 Program both leisure and active spaces throughout the site in order to enhance guest experience

3.7 Enable sustainable practices throughout the site such as rain harvesting LED motion sensor technology, utilizing solar energy and preserving the native mangrove swamps on site

RESEARCH PLAN

Research Methodology

1. Mixed Method
 - a. Case Studies
 - b. Qualitative Data
2. Comparative Analysis

Design Process

1. Research results
2. Data collection
3. Site analysis
4. Site Inventory
5. Conceptual Design
6. Schematic Design
7. Site Programming
8. Digital Design
9. 3D Modeling
10. Graphical presentation

PROJECT SCHEDULE

2021	AUG	SEP	OCT	NOV	DEC										
1	PROPOSAL														
2					PROGRAM										
3															
4															

PROJECT SCHEDULE

1

PROPOSAL

The proposal phase began back in April of 2021. The finalized typology of choice was concluded in early September. The submittal of this document will conclude my proposal.

2

PROGRAM

Programming my proposal started near the end of the proposal. The brain storming process started and stuck with me towards the end of September and continued into October. The finalization of programming my thesis will be concluded when mid-term reviews occur. This is due to the deadline of the thesis research which is completed by March 11.

3

DESIGN

The design process will begin early January after winter break and will include elements such as conceptual, preliminary, and schematic design. Other elements will include free hand sketching, 3D Modeling and the use of graphical rendering software.

4

PRESENT

Communication and presentation preparation will begin after spring break and will continue until the final submissions in May.



DATES AND DEADLINES

Fall Semester 2021

T	23 Aug.	First Full Day of Class
T	24 Aug.	1st meeting LA763
M	6 Sept.	Labor Day Holiday
R	23 Sept.	Draft of Thesis returned
R	14 Oct.	Thesis Proposal due
M-F	18-22 Oct.	Midterms
R	11 Nov.	Veterans' Day Holiday
W-F	24-26 Nov.	Thanksgiving Holiday
F	10 Dec.	Last day of classes
R	16 Dec.	Final document due
M-F	13-17 Dec.	Final Examinations

Spring Semester 2022

T	11 Jan.	First Full Day of Classes
M	17 Jan.	Martin Luther King Jr. Holiday
M	21 Feb.	President's Day Holiday
M-F	7-11 Mar.	Mid-Semester Thesis Reviews (ARCH)
M-F	14-18 Mar.	Spring Break
F-M	15-18 Apr.	Spring Recess
F	22 Apr.	Thesis Project Final Exhibits in digital form due to thesis advisors at 5:00pm
M	25 Apr.	All physical exhibits for the Thesis Project due at 9:00am on the 5th floor Renaissance Hall
T-R	26-28 Apr.	Annual Thesis Exhibit opens on the 5th Renaissance Hall
M-R	2-5 May	Final Thesis Reviews

PROJECT TYPOLOGY

Resorts & Hospitality

Sports & Recreational Design

Environmental Planning

Ecological Design & Restoration



**PLAYA VIVA RESORT
MEXICO**



TPOLOGY RESEARCH

**TRISARA
THAILAND**



**SIX SENSE
FIJI**



**OIL NUT BAY
BRITISH VIRIGIN ISLANDS**



PLAYA VIVA RESORT





PLAYA VIVA RESORT

Designer: Bill Reed | Regenesi Group

Typology: Environmental Planning | Sustainability | Eco Design

Location: Juluchuca, Zihuatanejo, Playa Icacos, Mexico

Size: 200

Summary

Playa Viva resort is a regenerative resort focused on using clean energy, water and waste streams. The resort, founded by Sandra Kahn and David Leventhal, promotes and creates biodiversity within the site while also creating transformational experiences for users. Along with its living legacy, Playa Viva inspires to promote a meaningful community environment for all its guests in order to create a positive environmental impact. Among its many features, the resort offers a turtle sanctuary along with a reforestation farm. This resort not only beneficially impacts the environment, but also the locals of Juluchuca.

History

Founded by Sandra Kahn and David Leventhal, the couple pursued to develop the land that is now Playa Viva. Intrigued by the beach's subtle environment and its appearance, they looked to expand the beach to accommodate for a turtle sanctuary. As part of the development process they reached out to the Green Build Conference, located in Atlanta, in order to search for experts in sustainable design. Bill Reed along with his company, Re-genesi Group, joined Sandra and David's goal of developing a sustainable resort. The design ultimately led to a master plan that showcased a regenerative resort that would be operational towards committing to an ecosystem.

Key Features

- Farm & Reforestation
- Turtle Sanctuary
- Regenerative Design
- Regenerative Trust
- Renewable energy

PLAYA VIVA RESORT



PLAYA VIVA RESORT



Takeaway

Sea Turtle Conservation

As part of Playa Vivas mission of achieving a sustainable resort, they took the approach of fostering sea turtles as part of their conservation efforts. From their 2020 study and report, it was documented that their team has released over 495,000 baby sea turtles since the year of 2010. This followed their core values of promoting biodiversity and their plans of environmental protection.

Conservation Data

Figure 1: Distribution of nest collection 2019

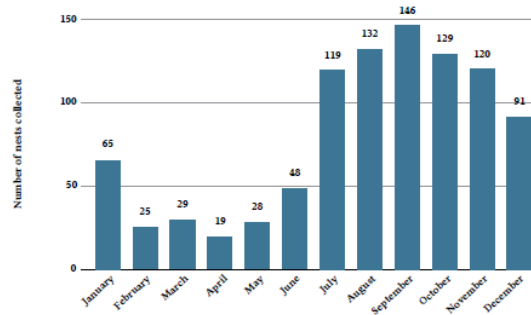
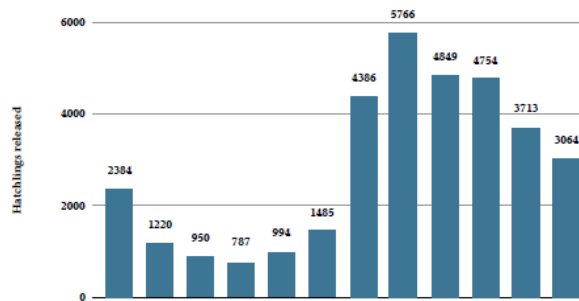


Figure 2: Distribution of hatchling releases 2019



TRISARA RESORT



TRISARA RESORT

Designer: N/A

Typology: Environmental Planning | Sustainability

Location: Thalang District, Phuket, Thailand

Size: 40 Acres

Summary

Trisara, located in Thailand, is a luxury beach resort that centers around being an environmental conservation. It emphasizes a low density development plan that allows the resort to be a balanced sustainable luxurious destination for its guest. It also aims to preserve natural habitats surrounding the site while also including a system plan of replacing plastic with recyclable materials. Among its landscape, Trisara has designed its master plan to reduce water usage through rain water filtration. Likewise, the landscape also features an on-site organic garden to support its restaurants.

Key Features

- Low density development
- Environmental preservation
- Rain water filtration
- Organic Garden



TRISARA RESORT

Trisara Resort Master Plan



Residential Villas

Hotel Villas

Arrival Lounge
Jara Spa
Gym

Beach
Main Pool
Activities

Restaurants
Trisara Kids

TRISARA RESORT

Takeaway

Environment

As part of Trisara's mission to reducing their impact to their local environment, they include features in their resorts such as rain-water collecting, composting biodegradable waste, and chemical free detergents. All roof tops for their buildings feature a rain water collection method which would then be integrated with their waste-system in order to irrigate the gardens. The lightings in their facilities are LED bulbs and they do not use plastic materials such as bottles.

Sustainability

One method how Trisara achieves sustainability is their ability to buy sea food from a sustainable resource. For instance, they received their vegetables from local organic farmers around the area.

Energy Conservation

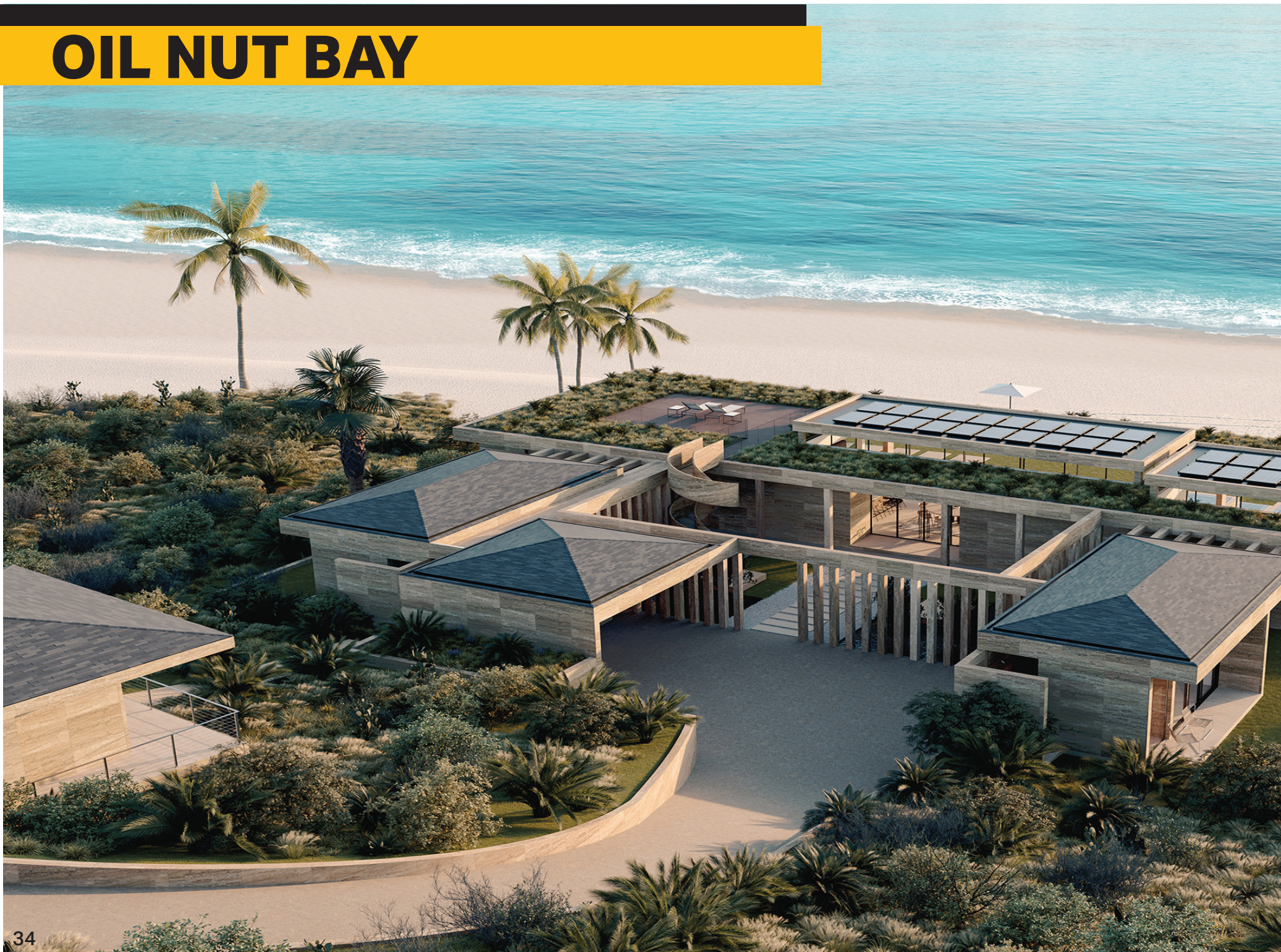
The implementation of energy saving sensors and timers on all their doors are a method they have used in order to conserve their energy and reduce the amount of energy used for their resort.

Other

Another takeaway would be how they do not use chlorine in any of their pools they have in the resort.



OIL NUT BAY





OIL NUT BAY

Designer: David V. Johnson | Victor International Corporation

Typology: Environmental Planning | Sustainability |

Location: Virgin Gorda, Oil Nut Bay, British Virgin Islands

Size: 400+ Acres

Summary

David V. Johnson, developer and chairman of Victor International Corporation, is the founder of Oil Nut Bay. He envisioned the resort to showcase a luxurious lifestyle while incorporating sustainable components. Among investment, he dream of creating a inviting and friendly environment that feels like home. He and his team focused on maintaining the landscape on the island while creating a sustainable luxury community. The site integrates Eco-friendly design features such as their low density site planning, conservation, solar panels and rain water collection. Nevertheless, the resort pursues follow Green energy guidelines and LEED Energy.

History

Virgin Gorda, one of four islands named by Christopher Columbus, is famous for its white sand beaches and volcanic boulders. Currently famous for its old copper mine national park, residents of the island seek to restore ruins of the early mine shafts as part of their restoration efforts.

Key Features

- Low density planning
- Conservation of natural resources
- Green energy guideline maintenance
- Solar Panels
- Desalination water management
- Rain water collection
- LEED Energy

OIL NUT BAY





OIL NUT BAY

Takeaway

Eco-Friendly

The mission for Oil Nut Bay is to become an eco-friendly tourist destination. One feature they include for their resort is that they focus on extreme low density planning. Although they only have 117 villas, it is spread out across over 400 acres on their property. Another feature is that they follow closely to Green energy guidelines in order to maintain their conservation towards natural resources. Furthermore, in order to generate electricity for their resort, they utilize solar power in order to generate power towards desalination of water. The use of desalination provides enough water for their plants and for the community of Oil Nut Bay.

Land Use

Half of the total land for Oil Nut Bay is designated towards open space; Through the use of thoughtful consideration towards the landscape, the celebration of the topography can be something tourists can experience.

“Thoughtful architectural guidelines include the use of natural building materials and colors to protect the beauty, coherence, and value of all properties”

Oil Nut Bay

SIX SENSES





SIX SENSES

Designer: Bill Reed | Regenesi Group

Typology: Environmental Planning | Sustainability | Eco Design

Location: Malolo Island, Fiji

Size: 120

Summary

Opened in 2017, Six Senses is a tropical resort aiming to pursue a greener future. The site includes water sports, surfing, snorkeling and diving. As part of their efforts to create a sustainable resort, the site includes its own beehives and hen houses in order to produce their own resources for its guests. Nevertheless, it also focuses on active management of energy, water, waste and biodiversity. Their electrical usage is primarily based off of their own solar panels that feature Tesla batteries. In order to sustain their own energy, they also have implemented LED lights to ensure efficiency.

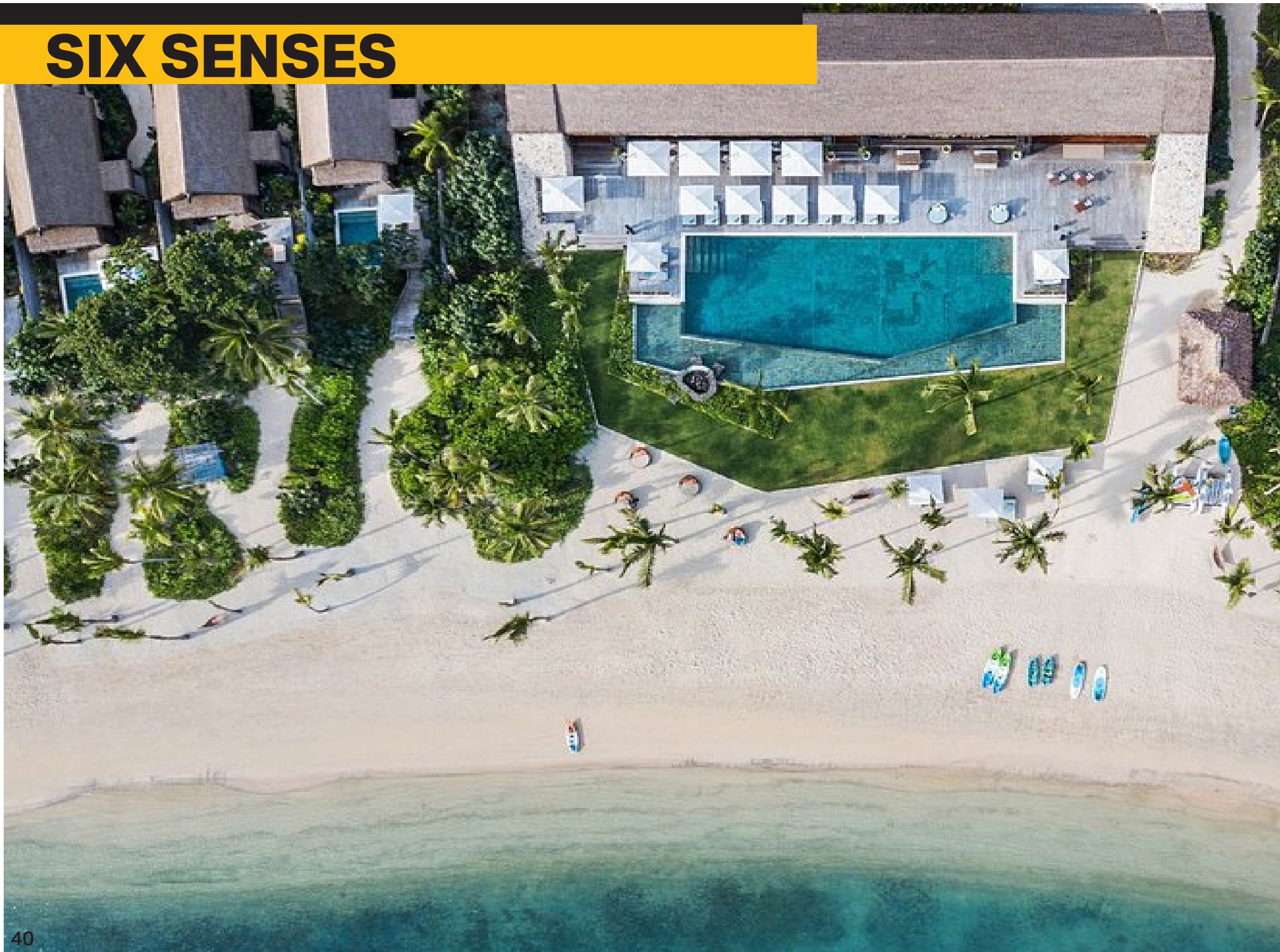
History

Founded in 1995, the mission from Six Senses is to promote a top-tier hospitality that would focus on responsible practices. As part of development, the site would include luxurious private clubs, residential spaces and sustainable locations. Among sustainable features, the resort includes Iguana Conservation while also pursuing to conserve water and energy. To ensure a completed vision, the developers of Six Senses composed a team of skilled architects, designers, and construction managers in order to construct this ambitious resort.

Key Features

- Iguana Conservation
- Community Development
- Water and Energy Conservation
- Off-grid Solar installations
- On-site Beehives
- On-site hen house

SIX SENSES





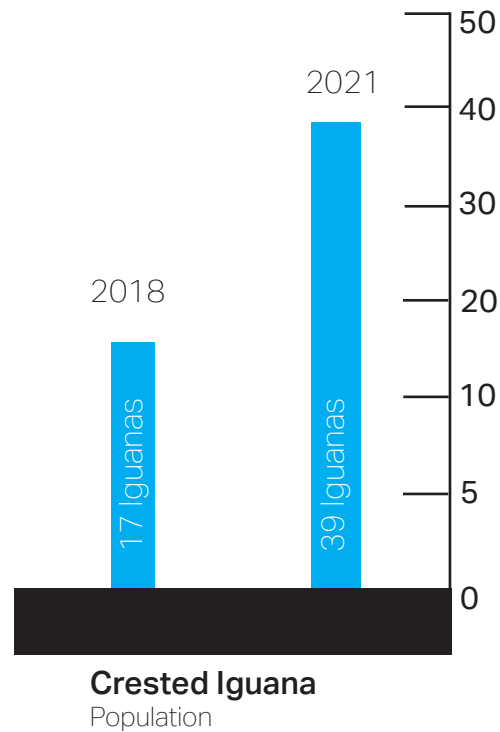
SIX SENSES

Takeaway

Iguana Conservation

One way Six Senses has contributed towards sustainability is through their preservation of an Iguana species. According to their website, there are only less than 5,000 Crested Iguanas remaining throughout the world. Since early 2018, they have successfully reproduced their natural environment and preserve this Iguana species with an increase in their population on site.

Conservation Data



RESEARCH



COMPARATIVE ANALYSIS

Techniques

Procedures

Benefits

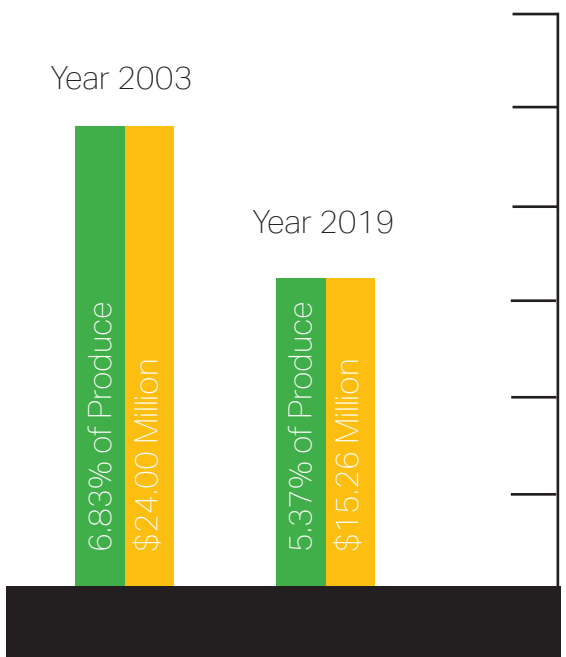
Restraints

	Techniques	Procedures	Benefits	Restraints
Amish	<ul style="list-style-type: none"> • Intense manual labor • Crop Rotation • Meadow Culture • Green Manure liquids • Natural fertilizers • Biological control of insects • Nutrient cycling • Diversity in crops 	<p>The Amish used natural and organic materials in order to fertilize their soils. In order to achieve such quality soil, they would dedicate over 12 hours a day to maintain their land. They valued their relationship between them and their farms. Nevertheless, they also had strong emphasis on strong cultural traditions.</p>	<ul style="list-style-type: none"> • Natural and organic materials • Higher yields of energy ratios compared to Non-Amish farms • Consumed less energy • Utilized old practice with new ideas 	<ul style="list-style-type: none"> • Lack of technology • Absence of electricity • Small scale • Reliance of manual labor • Commitment to lifestyle • Utilization of animals
Biosphere 2	<ul style="list-style-type: none"> • Intensive farming of diverse crops • Implementation of large volumes of soil beds • Animal system to minimize plant waste • Wastewater system • Lagoon wetland farming • Water management system • Air duct system 	<p>Biosphere 2 utilizes internal lighting, soil high in nutrition, climate control, aquaponics, water system management, and a diverse selection of crops in order to achieve the most optimal agricultural production.</p>	<ul style="list-style-type: none"> • Controlled environment • Increases in crop yield and production • Diverse selection of crops and cultivars • Aquaponics • Olla Irrigation system • Recycling material 	<ul style="list-style-type: none"> • Cost of production • High maintenance • Over 1 million to maintain • Limited staff members
Bahamas	<ul style="list-style-type: none"> • Utilization of compost and peat moss • Stagger of planting • Square or rectangular planting beds • Domestic plants, fruits and vegetation • Intensive plowing 	<p>The residents of the Bahamas do intensive plowing with the addition of nutrients and natural compost in order to increase the quality of the soil. They also utilize a very diverse plant pallet for their gardens while also using a calendar for their vegetation.</p>	<ul style="list-style-type: none"> • Natural and organic materials • Diverse plant list • Subtropical climate for citrus fruits • Optimal for native and non-native plantings 	<ul style="list-style-type: none"> • Limestone in nature • Intensive plowing • Pest • Vulnerable to tropical storms • Lack of access to freshwater
Takeaway	<p>One thing in common for all methods is that they all use traditional practices with innovative ideas that benefit their own community. However, the different the access of resources via fundings, land and personnel.</p>	<p>All societies emphasize natural and organic materials to ensure the highest quality for their soils. The key difference between them all is the location of their agricultural production.</p>	<p>Benefits for all societies include the diversification of compost, soil techniques and plant selection. IBD and the Amish however have seen higher production with their methods.</p>	<p>Each society face different challenges on different levels, however, they all face insects, pest and environmental issues. Access to resources and technology is a key restraints for all.</p>

RESEARCH



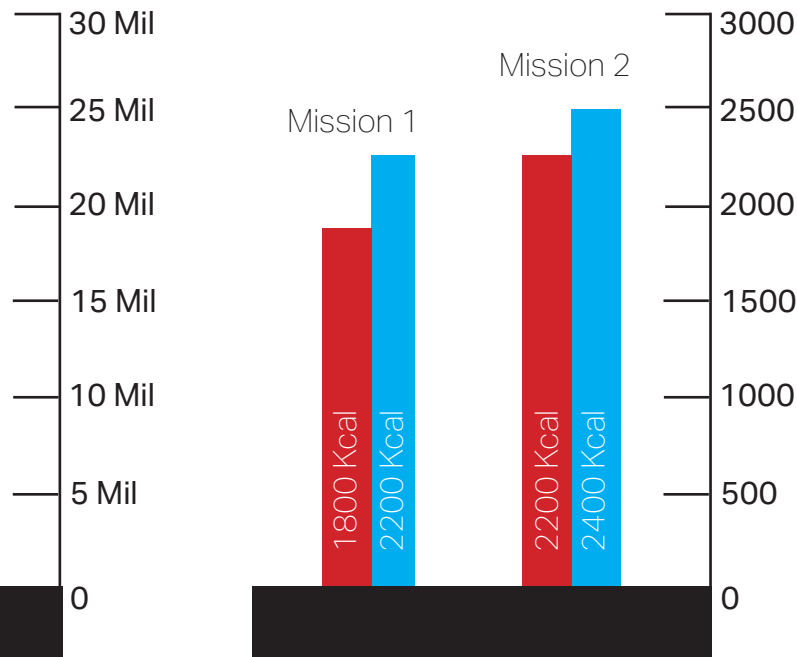
RESULTS



Value of Imported Vegetables & Fruits
In millions (USD)

Takeaway: Since 2003, the government of the Bahamas has expressed their interest in decreasing the importation of fruits and vegetables. Backyard Farming in the Bahamas, by Deborah Abang-Ntuen, states that in over \$24 million dollars worth of fruits and vegetables have been imported to the Bahamas. In this article, it is highly encouraged towards Bahamians that they should grow their own produce. The graph above shows the steady decrease in importation of fruits and vegetables from 2003 to 2019.

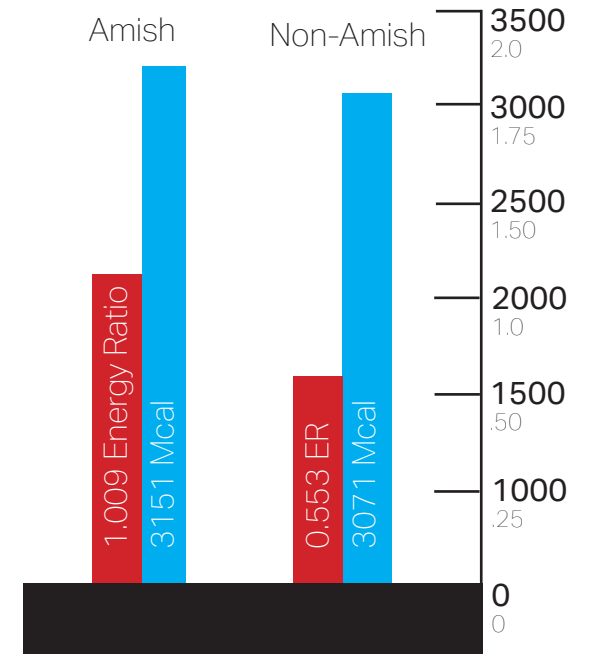
Bahamas



Crop yield
Kcal a day

Takeaway: Although Biosphere 2 failed its mission to achieve a sustainable bio-dome for the better future, the project showed promise with its methods of agriculture. By recycling waste, utilizing aquaponics, and an olla water system, they were able to demonstrate new innovative ways to program sustainability. The graph above shows how they improved the production of produce grown within the biosphere and displays the average consumed amount of calories for each person who participated in this experiment.

Biosphere 2



Crop yield & Energy Ratio
Mcal | Energy outputs to inputs (ER)

Takeaway: Based off on central Pennsylvania, Amish farms had an overall higher energy ratio compared to their non-Amish counterparts. This was primarily due to the fact that the Amish did not use electricity nor modern technology at the time. However, it is also shown that the crop yield is also at a slightly higher rate than non-Amish farmer in the area. Despite Amish farmers being 5 times smaller than other farms, they were able to generate slightly more crops in the region.

Amish

*"The COVID-19 Pandemic had a great effect on the resort. With the mandatory lock downs and border closures as well as beach closures it had a great impact. Financially it was devastating in that zero income for over 7 months but bills still coming in. Once finally allowed to open business is still operating at less than 80% of the normal capacity. I have had to cut back on a lot of activities which bring in income due to the fact that its **not sustainable** due to the low volume of guest."*

Barry Smith

Owner of Paradise Cove Beach Resort - The Red Bar





LITERATURE REVIEW

Title: What is Sustainable Landscaping?

Author: Elaine Kelly Applebaum

Literature Form: Journal Article

Page Count: 1

Abstract

In this short article, the author explains the concepts of what it means to be sustainable and defines what sustainability means. She goes into depth about how it relates to gardening and what it means for landscaping. For instance, she explains how there are multiple methods in order to achieve a sustainable garden/landscape. Methods that are mentioned in this article include topics such as planting pallet, water conservation, energy conservation, chemical inputs, design elements and the protection or creation of natural wildlife habitats. These methods are a guideline from the Placer County Master Gardeners and are efforts from the University of California Department of Agriculture to demonstrate and elaborate their ideologies on what sustainable landscaping means to their institution. Nevertheless, these definitions and ideas are emphasized goals from their department as part of the effort of making California landscapes become more sustainable.

Keywords

Sustainability, Sustainable Landscapes, Gardening, Food-scape, Agriculture

Views

The author in this article stresses the importance of the idea of sustainability through landscapes. For example, the author points out that sustainability is now not just a revolutionary idea, but now a true possibility. Furthermore, she points out how it may serve not as an economic viability, but a new source that may benefit the future due to the present limited resources. I agree with the author on these points. Like other literature reviews pertaining to sustainability, resources are becoming expensive due to its own limitations. The author expresses multiple methods that the University of California Department of Agriculture and Natural Resources follow in order to achieve sustainability. She mentions choosing the appropriate plants meaning to grow crops and vegetation only native to the surrounding area. This would decrease the amount of invasive species that may be harmful towards an edible landscape that seeks to become sustainable. Strategies mentioned in the article are graphically shown in Figure 1.0.

Plant Selection (Appropriate Plants)

In this guide, the author highlights how choosing the appropriate plant is a key factor into developing a sustainable landscape. Without a doubt, it is stressed how selecting native plants and vegetation is an important aspect of sustainable design. Without the correct planting selection for the site, it may not be as successful as planned. In this case planting invasive or non-native species may result in unwanted results or a potential hazard towards its current state. Furthermore, proposing local plants that require low maintenance or low amounts of water may result in a landscape that is much healthier since this could also potentially lead to a decrease of chemical inputs.

LITERATURE REVIEW

Soil Nurturing

Nurturing your soil is a big factor on how your landscape will perform. The addition of composting and nutrients will inevitably result in higher quality soil along with the result of higher crop yield when it comes to edible landscapes. However the author expresses how although it is important to implement nutrients, adding more does not supplement the loss of previous cycles. By soil testing and it indicating that there is a deficiency, it is not recommended to add more nutrients. Other methods the author suggest is to not compact the soil as it may result in reducing the effectiveness of the nutrients. Another detail that is mentioned is to prevent erosion for the soil.

Water Conservation

There are multiple ways to conserve water within a landscape. For sustainable landscapes, the element of water conservation will serve as a method to minimize the overabundance of irrigation. By monitoring, regulating and maintaining irrigation systems the landscape will have a much more productive response. It is also suggested to collect rain water to help combat the cost of using water to irrigate your landscape.

Pest Management | Chemical Inputs

It is inevitable that landscapes will draw attention to its natural ecosystem. However, there are ways to combat and minimize the damage caused by local pest. The author mentions how the use of insect and weed control, with minimum toxins, will help improve the quality of the vegetation while also controlling the population of pest. Nevertheless, not only it will help protect the landscape, but for its users as well since some pesticides may affect the health of humans and wildlife.

Wild life Habitat

Prior to developing a sustainable landscape, one must take account into the ecosystem of their existing landscape without harming the current wild life habitat. For instance, using native plantings and providing diversity with the planting pallet will result in creating a familiar habitat for wildlife to settle in. Conservation efforts introduced pertain towards restore endangered species or preserving the existing species.

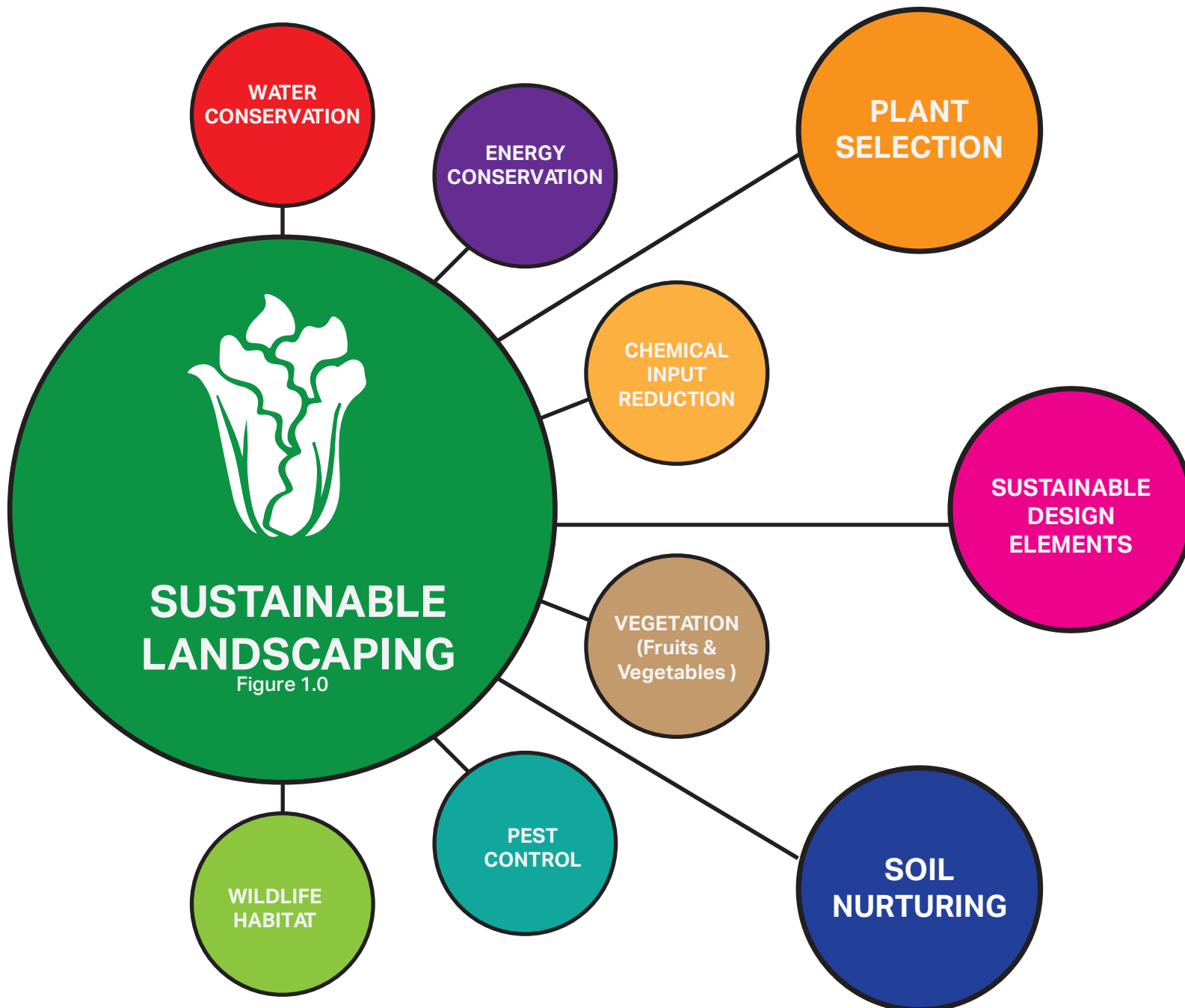
Design Elements

The author provides several methods in the reading to demonstrate how the use of design can make a landscape sustainable. In particular, the idea of "Slow the flow" (Applebaum, 2008) illustrates how rain gardens can be used to support the soils by a slow process of irrigation and self-sustaining water retention.

Energy Conservation

Energy conservation can be integrated with the idea of micro climate. The example used by the author is best displayed when being described how the use of directional planting can be a form of shade provided towards a structure or building designed to become cooler in temperature. By also designing a landscape that features low maintenance this would also qualify towards energy conservation since it will require less electricity or oil to mow or prune proposed vegetation.

LITERATURE REVIEW



LITERATURE REVIEW

Title: Backyard Farming in the Bahamas (2008)

Author: Deborah Abang-Ntuen

Literature Form: Document

Page Count: 30

Abstract

Through the decades, the Bahamas has seen an increase in import value. Over the past few years the Bahamas has imported over \$1 Billion dollars worth of produce such as vegetables, fruits, nuts and other foods. The value of importation is at a high rate due to the fact that the soil in the Bahamas is limited towards productivity and the islands are limited in arable land. Although the islands are over 339,000 acres in total size, there is only less than 20,000 acres in arable land that can be dedicated towards agriculture and self sustainability. However in this document provided by the government of the Bahamas, they propose and argue that the key to reducing the cost of imported good is through backyard farming. In this document they provide various ideas on each island on how to initiate an edible landscape such as a garden and the different methods that can be approached that can make a backyard garden successful. Furthermore, the author even provides a list of plants, fruits and vegetation that can be grown through the year.

Keywords

Agriculture, Farming, Gardening, Plant selection, Native vegetation, economics

Views

In this article provided by the government of the Bahamas, documented in 2008, they propose the idea of farming in your own backyard. Although it is known that the foundation of the islands are built on coral reefs and limestone, there are still solutions that can make agriculture productive. For example, they argue that composting, irrigation and heavy plowing can be the best method to increase crop yield and productivity (e.g. peat moss and animal waste). Nevertheless, it is also noted that there are more than enough diversity in crop selection that can be provided towards the community. They list native produce such as avocado, coconut, guava, guinep, hog plum, key lime ect. All of this is a collective effort to argue that the benefit include the following: Economic use of space, recreation, relaxation, exercise, health and promoting the love for plants. While I agree that these are the best methods towards sustainable agriculture, I believe that these preliminary methods will not entirely work for several reasons. The largest challenge they face in the Bahamas are the tropical storms. When heavy storms occur on the islands, most agriculture is destroyed. This creates the issue of always replanting your garden or farm.

All Bahamas Availability chart

PRODUCE	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
AVOCADO												
BANANA												
CANTALOUPE												
COCONUT (DRY)												
GRAPEFRUIT												
LIME (PERSIAN)												
LEMON (MEYER)												
MANGO												
ORANGE (JUICE)												
PAPAYA												
PINEAPPLE												
PLANTAIN												
SOUR ORANGE												
TANGERINE												
WATERMELON												
BROCCOLI												
CABBAGE												
CARULFLOWER												
CUCUMBER												
EGGPLANT												
LETTUCE (HEBB)												
LETTUCE (ICEBERG)												
LETTUCE (ROMAINE)												
ONION												
OKRA												
PARSLEY												
PEAS, PIGEON (DRY)												
PEAS, PIGEON (GREEN)												
PEPPER (SWEET)												
PEPPER (HOT)												
PEPPER (HOT)												
POTATO (IRISH)												
POTATO (SWEET)												
PULPIN												
SQUASH (YELLOW)												
THYME												
TOMATO												
TOMATO (CHERRY)												
ZUCCHINI												
EXOTICS:												
ALLSPICE (DRY)												
BREADFRUIT												
GUINEP												
GUAVA												
JUJUB												
PLUM (COCO)												
PLUM (HOG)												

LITERATURE REVIEW

Title: Sustainability: Science, Practice and Policy Vol.2 *What do we mean by sustainable landscape?*

Author: Paul Selman

Literature Form: Book

Page Count: 45

Abstract

Spatial spaces and landscape forms has become a large issue in both the public and private sectors. The terms sustainability can vary from profession to its correlated disciplines. One may deviate sustainability and think of a natural aesthetic that will not deteriorate; Others may view sustainability as a continuous inflow of users for the designed space. In this book, the author explores and defines what *sustainability* may mean and how it is interpreted in the world of landscape architecture. The author separates the different dimensions of the definition through its social, political, economic, aesthetic, and governance aspects. In each section the author defines what it means to have a sustainable landscape and interprets how it is viewed through other professions, the government and the members of society. The importance of sustainability is also noted in each section and is explained how it may or may not be valued. Nevertheless, the author concludes with a statement disclosing that the reproduction of sustainable landscapes will not be possible without the mechanisms of its political and economic potential.

Keywords

Sustainable Landscapes, Landscape architecture practice, Landscape Architecture theory, economics

Views

The author expresses his view on what is sustainable landscape means through his ideas of dimensioning the term sustainability. He argues that *sustainable landscape* has not been yet defined to where one can truly understand what it means to have a sustainable landscapes. This is due to each profession and how it is theorizes versus how it is practiced. Nevertheless, it can be interpreted through how one views it through his or her knowledge of the environment, economics, society, governance and aesthetics. The author defines the following terms:

"Environmental sustainability of landscapes has been strongly influenced by landscape ecology which is concerned with spatial patterns and processes (e.g., Farina, 2006). In the ecological perspective, a sustainable landscape would be one in which the green infrastructure—i.e., biodiverse net-work of habitat patches and corridors." (Selman, 2008)

LITERATURE REVIEW

Views & Definitions (Continued)

"Economic sustainability of landscapes has often been expressed as the maintenance of attractive scenery to support tourism and recreation. However, this superficial view, though not without immediate practical merit, fails to query the desirability or possibility of retaining nostalgic spaces."(Selman, 2008).

"Social sustainability in landscapes is often addressed in terms of participation and inclusive in decision making and access." (Moore-Colyer & Scott, 2005).(Selman, 2008).

"Political sustainability of landscape requires effective governance structures, including "commons," for both the private and public domains." (Selman, 2008).

"Aesthetic sustainability is that aesthetic tastes are socially dynamic and, while some perceptions of beauty may be cross cultural (Strang, 2005)."

Conclusion

Overall there are multiple views I agree with the author on what is means a sustainable landscape means for landscape architects. Without a doubt the inclusion of desirability should always be factored into the economical elements of a sustainable landscape. Without the requirement of the desirability a landscape will not be desired for reproduction in the future. One may propose a great aesthetically pleasing landscape with high valued economic traits to attain a sustainable landscape, but without the desire to maintain its future it would simply not become sustainable. I also strongly agree with how the author defines political sustainability. Ultimately the government and our politicians will dictate the inputs of how a sustainable landscape should look like. (e.g., policies, land use codes, zoning plans). In order to define what it means to have a sustainable landscape, we first must find common ground with governance on the definition.

LITERATURE REVIEW

Title: The Agriculture biome of Biosphere 2

Authors: Bruno D.V. Marino, Tilak Mahato, John W. Druitt, Linda Leigh, Guanghui Lin, Robert M. Russel, Francesco Nicola Tebiello

Literature Form: Journal Article

Page Count: 37

Abstract

Biosphere 2 is known as the sequel to Biosphere 1 as a part of a scientific experiment regarding towards a intensive agricultural biome. The mission of this bio-dome was to provide produce, food and resources for its voluntary inhabitants in a controlled setting for a period of time which in this case was two years. This mission included a crew of 8 members as part of the operation was to implement mesocosm and display that there was a possibility to increase crop yield through a controlled and constructed environment for its vegetation. The results of this mission was a successful increase in crop production relative to its predecessor of Biosphere 1. This was proven through its low calorie production of averaging between a 1800 - 2200 Kcal daily consumption, in Biosphere 1, compared to its new result of 2200 - 2400 Kcal for Biosphere 2. This mission seek to establish an initiative towards becoming sustainable on another planet.

Keywords

Agriculture, Ecological engineering, Sustainability,

Lighting

Throughout this research, the crew members part of this process determined several factors that led to the result of a higher crop yield. The authors described how lighting was a large contribution towards the increase in crop production. In the research is it shown that the use of laminated glass panes and filtration of natural lighting influenced the conditions of each sector of vegetation due to its separation. The use of ultra light was not considered in this experiment since the lighting had to be in a completely controlled setting. The results of this trial was that the amount of light totaled and matched outside levels that were found in tropical lowlands and other environments such as rain and cloudy settings.

Minerals

The proposed minerals for the soil in this dome called for a measured amount of IAB type soil. For example the design of the soil led to a finalized result of Wilson pond, coarse peat, commercial and weakly composted mulch. This resulted in the total organic substance to be measured at 10% throughout the soil. It was described in the article that the IAB soil was rather difficult to work with due to its hard texture nature.

Climate Control

The method that was approached for a controlled climate included various systems. A viable component to this was controlled air handlers to manage the air flow for their crops that continuously circulated air throughout the entire dome. These air handlers also featured water pipes help sustain the consistency of air quality. Condensation of water was a reason that the air handlers were considered as it was a method that could capture the chilled water and be used for irrigation. This was an interesting method used to control the climate for their crops and landscape.

LITERATURE REVIEW

Cultivars

Biotin components were a part of the IAB and the cultivars that were selected for the Biosphere were a key factor into the successful of a self-sustaining system. These crop species generated a higher yield and the diversification of species led towards adaptability and the establishment of the planting plan. This result was directly measured through the USDA minimum daily requirements and the crew seek to achieve the recommended amount of calories consumed for an adult. What contributed to the successful of this system was also the selection of desirable produce that will be utilized in their design menu. The crop species a part of the selection process included cereal, grains, starch crops, legumes, fruits and vegetables.

Agriculture Production

Cultivation of crops that were being rotated on a regular schedule with pest control being addressed proved to be beneficial as the results of the experiment. It was proven that there was a higher crop yield per unit which led to the higher increase in food intake for each crew member and provided the necessary nutrients through its diverse selection of plants.

Results

Although the end result failed at attaining complete sustainability in a dome environment, they did successfully achieve an increase in crop yield production which is one takeaway that can be noted and used in the future as part of research towards developing a sustainable controlled environment.

Views

I agreed with certain methods that Biosphere2 followed and implemented such as the measured amount of nutrients to have a successful crop yield and the certain measures they took to ensure the correct plants were installed and utilized. The idea of developing the crops around the designated menu is a useful tip that I will consider using in my own design. I did not completely agree with the controlled environment due to the fact that the vegetation will not be sustainable in an outdoor setting, (e.g., trees falling over). The lack of wind resistance that should be developed for the trees was one mistake their methods did not address. There are benefits with a controlled environment, but having it being completely shut out from external contact will be a potential downfall for developing a sustainable environment. The result of the mission addressed sustainability in a controlled environment, but did not completely address external contact.

Conclusion

Biosphere2 was a revolutionary approach towards sustainability. While the mission was towards a scientific goal, there were methods pertaining to agriculture that can be used in the realm of edible landscapes. Methods such as measured amounts of nutrients, soils and irrigation can be useful towards developing a sustainable landscape. Furthermore, the use of aquaponics and the recycling of fish waste can serve as a impactful material used to help nurture vegetation. The biggest takeaways of this project was the use of new innovative ideas at the time that the mission took place (1994).

LITERATURE REVIEW

Title: The Importance of Edible Landscape in the Cities

Author: Feliz Celik

Literature Form: Journal Article

Page Count: 8

Abstract

In today's society and during the 21st century, people are disconnected from their sources of food. Members of society today have become reliant and dependent on industrial manufactures and commercialized farms in order to receive their produce and food. The challenge today is that people are not connected nor have direct access to their food. With a growing population and an ever demand for continuous expansion of cities, we as a society grow farther and farther away from what we consume. The strategy to re-invent edible landscapes and integrate it in our cities will be a future solution to solving how we can become connected with our produce. This would be a key factor into contributing towards a much healthier society that is not dependent on processed food. Although edible landscaping can be aesthetically pleasing, it can also be scaled towards something that is achievable such as a garden. Nevertheless, this article focuses on how edible landscapes can be implemented and become the future of urbanization.

Keywords

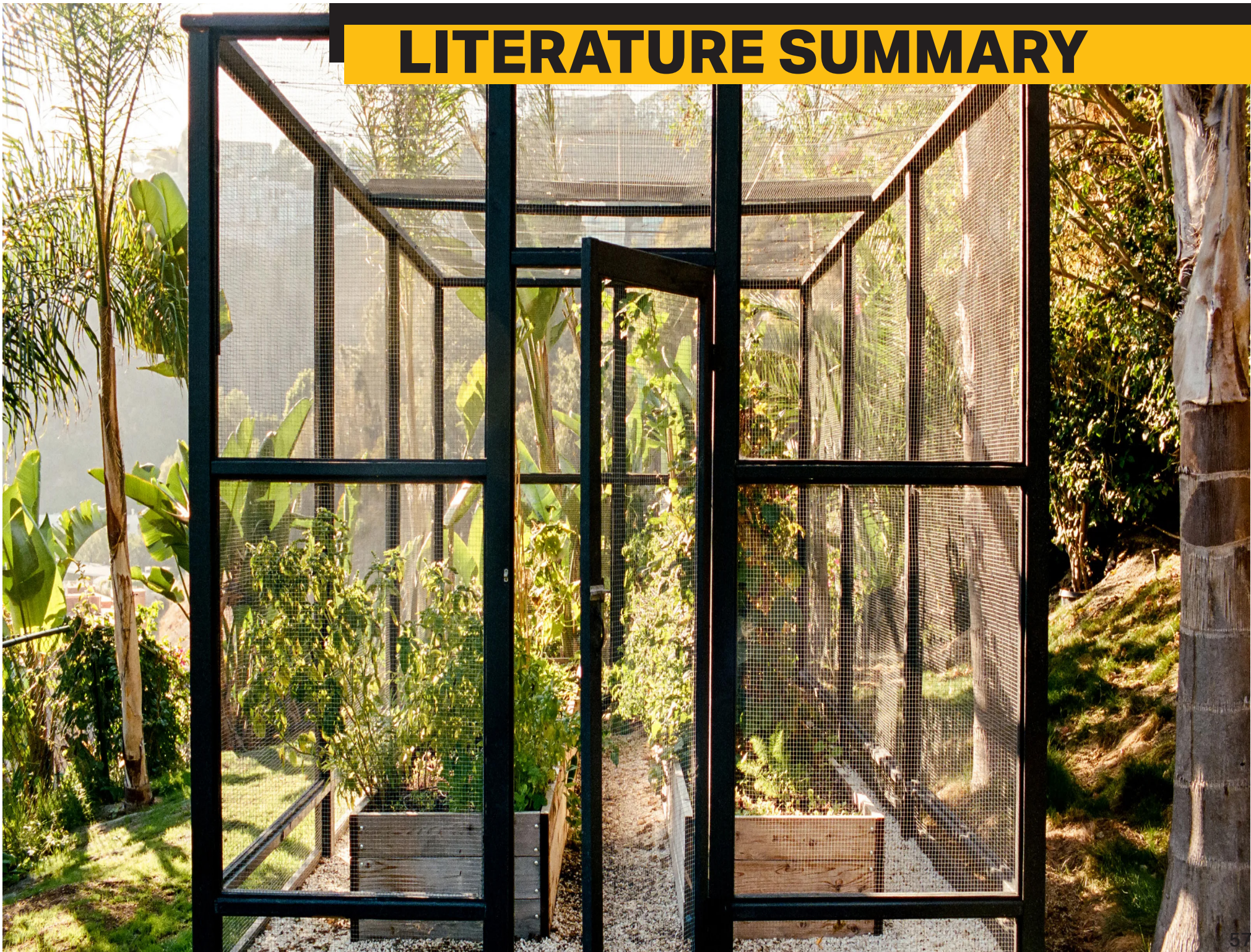
Edible Landscape, Sustainability, Productivity, Food scape, Urban Agriculture

Views

The author argues that by promoting edible landscapes inside cities, there could be multiple benefits such as an increase in health benefits, savings energy, reduce the cost of produce, promote food safety and encourage residents to become self-sustaining. The author states that this is incredibly important since people are moving back into the cities and with the every growing size of cities, edible landscapes can provide that produce society needs. Although at a micro scale, gardens and residential landscapes can be utilized as ornamental landscaping and providing the necessary produce (e.g., vegetables and fruits). The author also argues that edible landscapes can be designed in a way where it will be a combination of beauty and utility.

I completely agree with the author on all of her points made in this article. The author is correct on how there has been a continual shift in society where people are moving back into the cities which would ultimately lead into an increase in population. This will make it much more difficult to sustain the population on a macro scale since food production may be limited due to location, accessibility and finances. By promoting families to grow their own crops in their backyard, this will greatly improve not only the economy, but the health of the community as a whole. Although, not every person live in single family homes, the possibility of community gardens is not entirely out of the picture. Furthermore, I also agree how edible landscapes can be ornamental and utility like. For instance, Green Acre Park in New York City, New York is an example on how vegetables can be used through design to create a beautiful landscape while also being accessible to be used for consumption.

LITERATURE SUMMARY



RESEARCH SUMMARY

Summary

The research that was conducted which featured multiple literature reviews provided useful insight towards the different approaches of sustainability and edible landscapes. Narratives regarding information mentioning the different methodologies and how society can take an approach towards sustainability will be valuable components on how I will approach my design.

Edible Landscapes

There are many factors that dictate a landscape to be edible. Through the use of native vegetation with desired and consumable plant species a landscape can become edible. Articles whose topic include the idea of edible landscapes present key points such as edible landscapes will provide enough resources for its users while also being a aesthetically pleasing component of design. The authors emphasize the ideas of conserving space through the use of what space is available and that can be utilized for a potential garden. Topics that were included with edible landscapes were ideas such as composting, soil nurturing, availability, crop rotation and plant pallets. All of this information is useful to acknowledge since it will help guide my own design and will navigate how I should utilize spaces for edible landscapes.

Sustainability: Social, Economic, Political, Environmental & Aesthetic

The author expresses his definitions of what it means to have social, economic, political, environmental and aesthetic sustainability. These differ from profession to profession and the author seeks to help define on what sustainability can mean for everyone. He gives examples on how each topic interprets each what sustainability means to them and show what their core values are. I found this guide to be helpful towards explaining the different perspectives and showing how they may view sustainability. It also is very useful to help me understand how I can work with different professions and translate their perceptions.

What is Sustainable Landscaping

The article for what is sustainable landscaping provides detailed techniques for users in order to better understand the ideas on what makes sustainable landscaping possible. The author highlights key details and uses examples on what to do in order to improve the quality of the landscape. It is also demonstrated in the article on how these methods can be used to sustain a landscape through various ways. Topics in this article talked about broad ideas such as water conservation and soil nurturing. This article was a very organized and conveyed the ideas clearly for me to understand what makes a landscape sustainable. The methods were presented well in order for me to understand how I can improve the landscape and to ensure its desired results.

RESEARCH SUMMARY

The Bahamas

This document provided by the government of the Bahamas not only serves as a guide for locals to understand how you can promote a sustaining garden on your own property, but also provide ways to ensure that you will be successful at agriculture. The author showcases many ideas, examples and figures to illustrate how diverse the native vegetations are and how someone can utilize this information to initiate their own Gardens. It was strongly encouraged to sustain ones self through backyard farming due to the impact that it will have on the entire country as a whole. They stress how the country is strictly reliant on imports and by using this guide it will have a great benefit towards their economy. This article was very clear on how to prepare, structure, navigate and plant crops in order to become sustainable. I found this to be very informative since I was not educated on the climate and environment of the Bahamas. This document will serve as a guideline to how I can propose edible landscapes to encourage sustainable landscaping. Furthermore, the document also provides all the necessary tools in order to achieve this idea.

Biosphere2

The biosphere2 will be ultimately known as a experiment that did not full achieve its goal. However, the largest take away from this research is how their structure towards sustainable agriculture was proven to be successful. Throughout the research resort, the authors elaborate and explain how these details affected the results from their methods. They utilized matrix, bar and graphic charts to illustrate and convey their numerical data for readers to understand. This journal challenged me to understand what other possible solutions there are to increase crop yield through a controlled environment. The missions that were conducted were truly revolutionary at the time that it occurred and helped serve as am education construct to how we as a society can strive for sustainable agriculture through controlled environments. By reading this research, I found it very intuitive to understand how modern and advanced technology can be utilized in order to increase food production while also considering its fundamentals to be self-sufficient.

Conclusion

These five pieces of literature served to be a valuable source of information that helped understand their source material and how it can be a new source of study. All individual source presented different ideologies and their views that will be considered in my thesis design.

PROJECT JUSTIFICATION

Economic Justification

Since the first establishment in the Bahamas, the country has relied heavily on tourism and financial services in order to fuel their economy. Predominately most of their resources and produce come through importations and trades from the United States and Canada. Over \$1 Billion dollars worth of food has been imported on an annual basis. With the pandemic of COVID-19, the nation has suffered from economic hardship due to the inevitable lock downs and limitations of aviation transportation. In 2019 alone, the country has imported over \$8 million dollars worth of frozen vegetables, \$3.5 million dollars worth of processed vegetables and over \$12 million dollars worth of fruit juice (oec.world). Since the early 2000's, the Bahamas has been promoting backyard farming as a solution towards reducing the cost of imported produce. Since then, there has been a slow decrease of importation value towards vegetables and fruits. Without a doubt, this has already been a slow result of promoting edible landscapes and gardening in the Bahamas. Furthermore, the government of the Bahamas has already provided a guideline for their locals that encourages growing their own produce. (Abang-Ntuen, D. (2008). Backyard Farming in the Bahamas. Published.)

According to section SDG2 of *The Bahamas: Voluntary National Review on Sustainable Development Goals to the High Level Political Forum of the United Nations Economic and Social Council*, the plan for the near future includes the ideas of promoting a sustainable agriculture. Although currently only 19,768 Acres of land in the Grand Bahama is arable land, the plan is to establish an 800 acre research farm in order to promote their diversification of plant production. The results from this research has already shown that they are currently able to grow crops such as bananas, papayas, coconuts, limes, avocados ect.

Site Justification

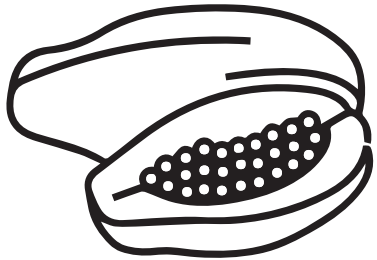
As part of the selection process for a site, I chose a site that I have personally visited in the past. Paradise Cove Beach Resort is a small yet beautiful resort that is surrounded by native vegetation. This site would be the best of interest to develop a nature conservation due to the location of near by mangrove which would provide a natural barrier for landscape resiliency. Nevertheless, the beach resort is located by a coral reef which would also act as a natural barrier for tropical storms. The resort itself however, was impacted by the events of COVID-19 due to the nature of social distancing which ultimately led to the decreased tourist attendance for their site. The limited amount of traveling tourist inevitably affected the economic cost of the resort. Furthermore, the resort is located in a remote location slightly far from the nearest city and access towards resources may be difficult due to limited infrastructure.

Personal Justification

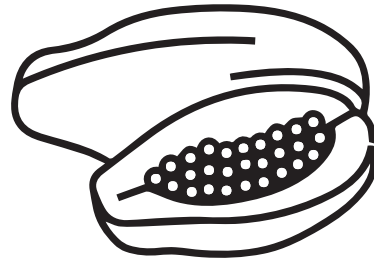
I have personally been to Paradise Cove Beach Resort in the Bahamas in 2016. One thing I noticed right away about the resort and the grand Bahama as a whole is their slow economic growth. I have always had an interest towards resorts and hospitality throughout my academic career and I thought this proposal would be the best opportunity to brainstorm ideas on how I can help improve resorts and local communities through landscape architecture.

PROJECT JUSTIFICATION

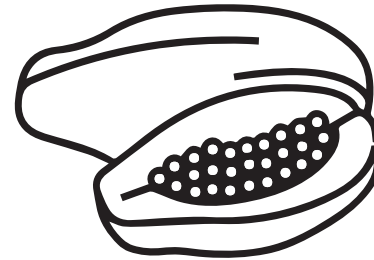
BAHAMAS IMPORTED FROZEN VEGETABLES (OEC.WORLD).



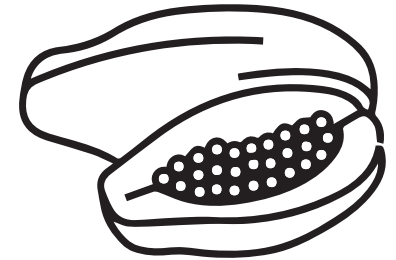
2019 | \$8.36 Million



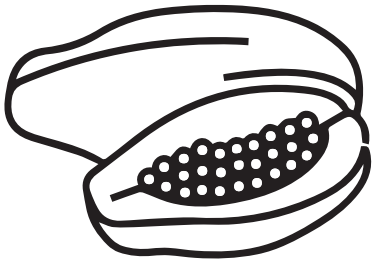
2018 | \$7.89 Million



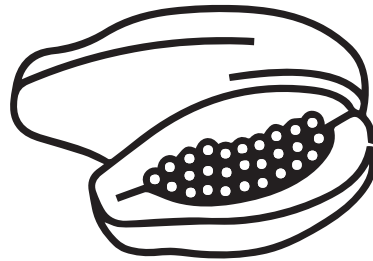
2017 | \$6.74 Million



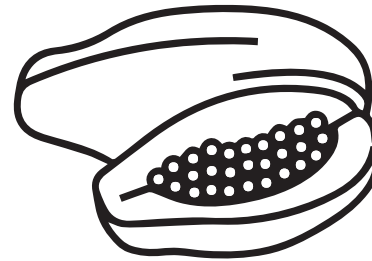
2016 | \$7.06 Million



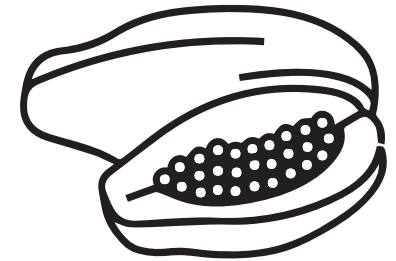
2015 | \$6.84 Million



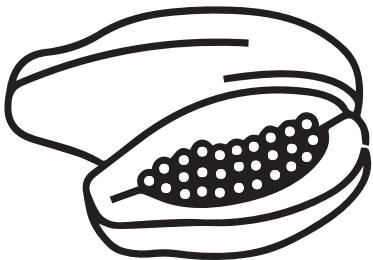
2014 | \$7.64 Million



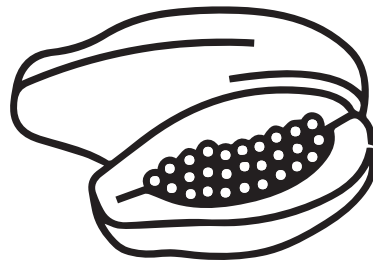
2013 | \$10.9 Million



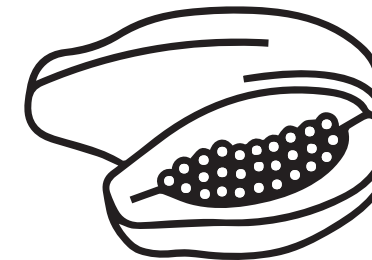
2012 | \$5.54 Million



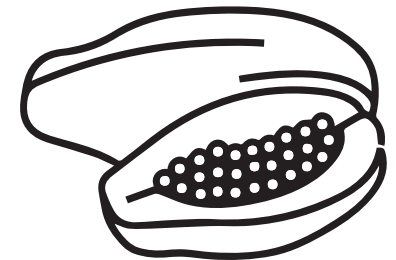
2011 | \$5.84 Million



2010 | \$5.53 Million



2009 | \$ 4.51 Million



2008 | \$4.54 Million

Backyard Farming in the Bahamas
document release year

HISTORICAL & SOCIAL CONTEXT

Historical Context

Originally the Grand Bahama island was settled by the Lacayan tribes near 7,000 years ago. This date was suggested through the remains that were left on the island. However, their disappearance was never clear and was only documented through Christopher Columbus and the Spanish empire. It was estimated by Christopher Columbus that there were roughly 40,000 native Lucayans spread throughout the Bahamas islands and about 4,000 on the Grand Bahama island. It was believed, prior to their extermination, that they had a high political structure and very organized cities throughout the islands. Although there is very little to know about the Lacayans, it is without a doubt that the cause for their extermination is the result of the Spanish arrival on the island.

The Grand Bahamas has always had a reputation of wrecking ships with the harsh coral reefs and the shallow land depth. In 1492, the Spanish enslaved the Lacayan tribes and were transported to other islands such as Cuba to work in their silver and gold mines. Evidently, the Spanish hardly returned to the Grand Bahamas due to the surround coral reefs. The collisions with the reefs were much too discouraging to establish settlements early on the island. Over the course of centuries, the Bahamas and its waters was home to pirates and privateers. The islands was a magnet for infamous pirates such as Blackbeard, Henry Morgan and Captain Kidd. However, in 1670 the islands of the Bahamas was claimed by Great Britain. They then were able to establish control over pirates and the caribeans to put an end to the golden age of piracy.

Social Context

The people of Grand Bahama are known to being extremely friendly, loving and easygoing. They all enjoy a good laugh, food and love. Tourist can expect the best service when entering a resort, restaurant and hotel due to the friendly nature of the environment.





CULTURAL CONTEXT

Cultural Context

The culture of the Bahamas can be described as incredibly vibrant. There are a lot of components that make up Bahamian culture. The Bahamas is known for their music, Junkanoo, art, language and the people. Although the country's history can be conflicted, the people have developed a unique culture that integrates the blend of traditions and beliefs into their society. One thing they are known for today is their entrepreneurship and their passion for the sea and its wonders. The outdoors is home to many locals to the islands.

A native sound from the Bahamas would be the music genre of Rake 'N' scrape. Their music can be described as the sound of pounding goombay goatskin drums and the sound of scarping saws which creates a melodious melody. As for its origin, it was first noted during the era where the slave of the Caribbeans came together to recreate instruments with what was available to them. This genre of music can be heard playing at festivals, events and venues across the islands.

An iconic festival of the Bahamas would be the Junkanoo festival. This festival features the islands culture and activities. The origin of this festival started during the era of slavery in which the slaves would be granted three days off. In those three days, the slaves would dance, come together and celebrate. This event in particular takes place during the 26th of December until January 1st.

Another example of Bahamian culture would be their art. The Bahamas has several art galleries across the islands such as Leo's Art Gallery, The Gallery, and the Grand Bahama Artist Association. These could be located at Port Lucaya Marketplace and the Garden of the Groves. These art pieces include glass sculpting, woodcarvings, and ceramics. Bahamian Tings is one of several other art installations famous for its native art gallery and carries authentic handcrafted art. Other locations such as Hoyte's Art & Nature and Island Galleria could be found at Port Lucaya Marketplace; However, most art can be generally found in Freeport on the island of the Grand Bahama.





THE BAHAMAS



THERA &
OUR ISLAND



SITE LOCATION



SITE ANALYSIS

Grand Bahamas

The Grand Bahamas is the third largest island in the Bahamas and has over 700 islands. The island is **339,000 acres** in size and has only 19,768 acres of arable land for agriculture which is only less than 1% of the total area. The largest city on the island is the city of Freeport which has a population of 43,078 (2019) and a total population of 51,765 (2010).

Site Location

The selected site for the re-mastered beach resort is Paradise Cove Beach Resort. The resort is located 30 minutes west from the city of Freeport and is near Dead Mans reef. The site is surrounded by native vegetation and is bounded by the edge of the beach. The resort is protected from natural elements from the thick mangrove east of the site while the reef acts as a barrier from the strong ocean tides. The resort is accessible via vehicle and through water.

Size

Currently the size of the resort is **6.0 acres** (261,360 Sq Ft)

Climate

Type: Subtropical

Annual Rainfall: Varies from 34" to 54"

Daily Temperature: Varies between 63F - 90F

Summer Months: May to October

(Wet Season)

Winter Months: November to April

(Dry Season)

Hurricane Season: June 1 - November 30

Hardiness Zone: Zone 11 (+10.0c to +4.5c)

Soil

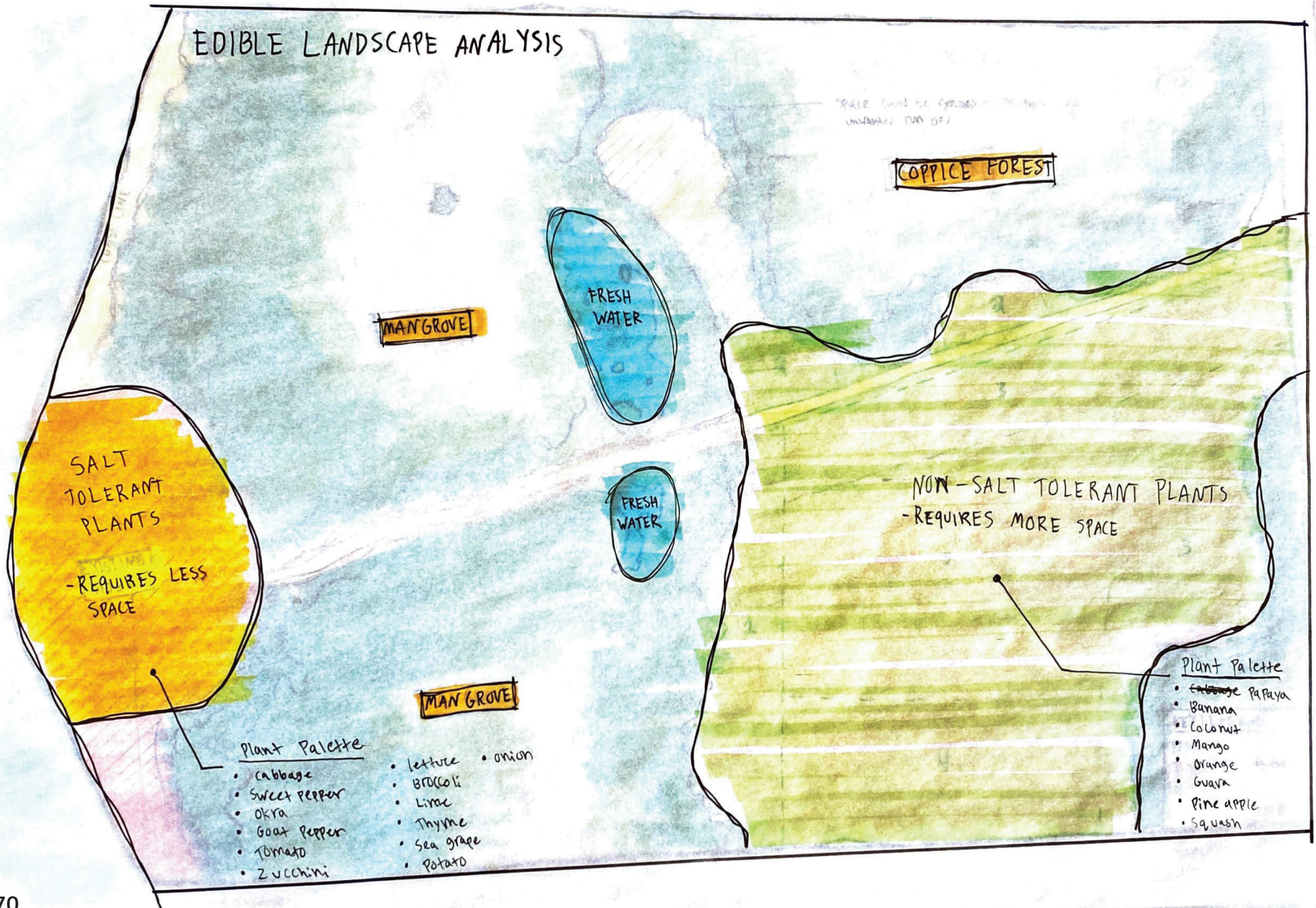
The soil for the Grand Bahama is primarily made up of limestone and is very alkaline.

Vegetation

Plantings on the island are primarily made up of dry forest; White-land Coppice's, Black-land Coppice, Pine forest, Rocky Coppice, Mangrove Swamp, Sea Purslane, Sand-fly Bush, Bay Marigold, the Bay Lavender and the Bay Cedar.

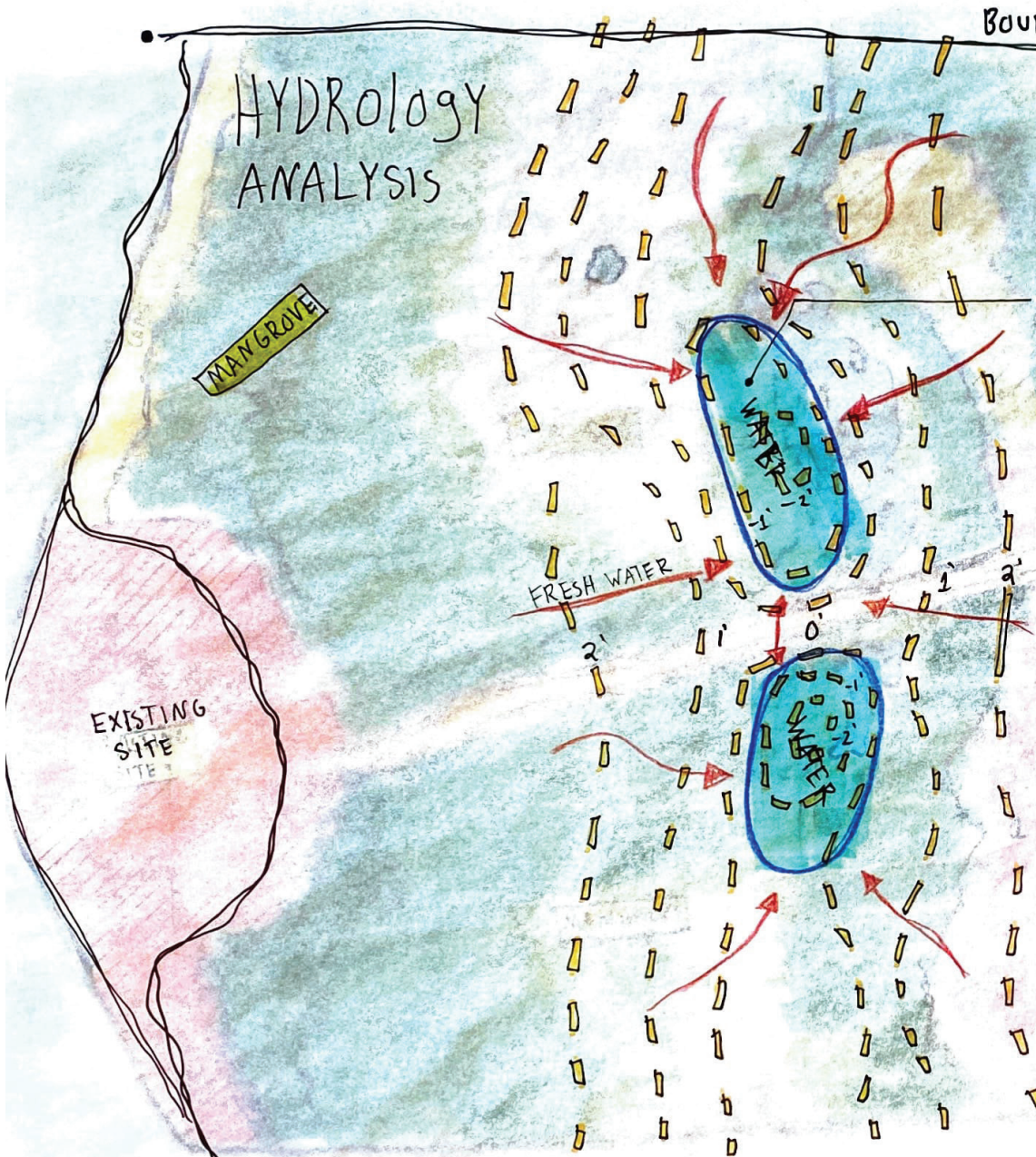
SITE ANALYSIS

EDIBLE LANDSCAPE ANALYSIS



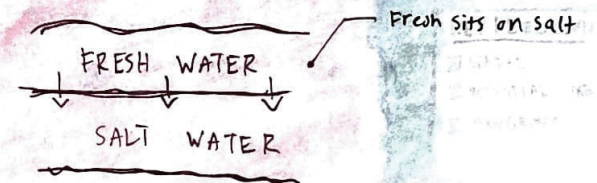
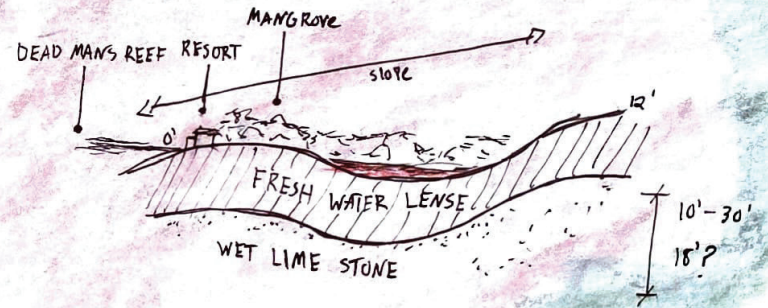
SITE ANALYSIS

HYDROLOGY ANALYSIS

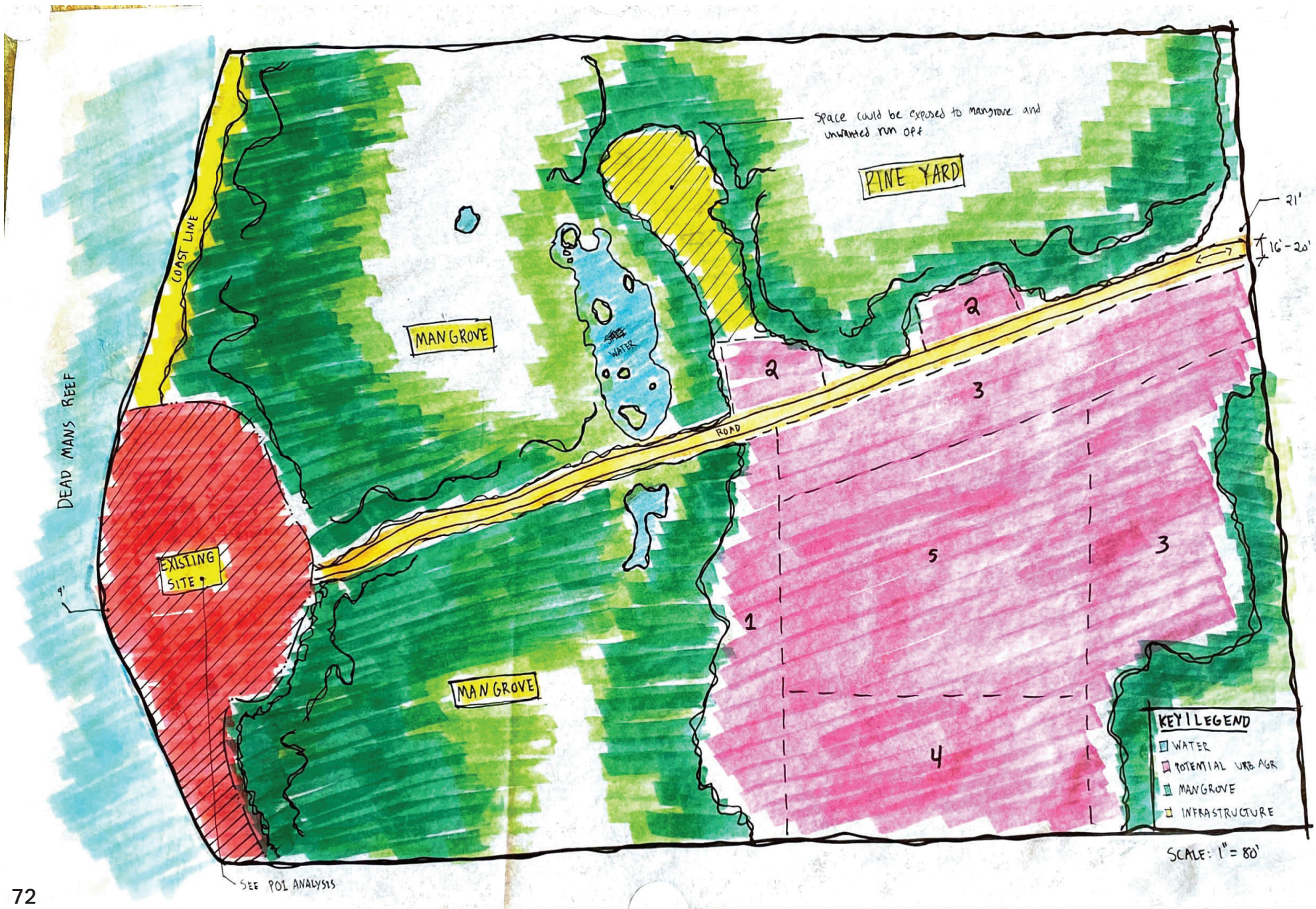


NOTES

- Mangrove absorbs ~~salt~~ fresh water from salt water to survive
- Mangrove is salt and freshwater tolerant
- Mangrove filters salt water

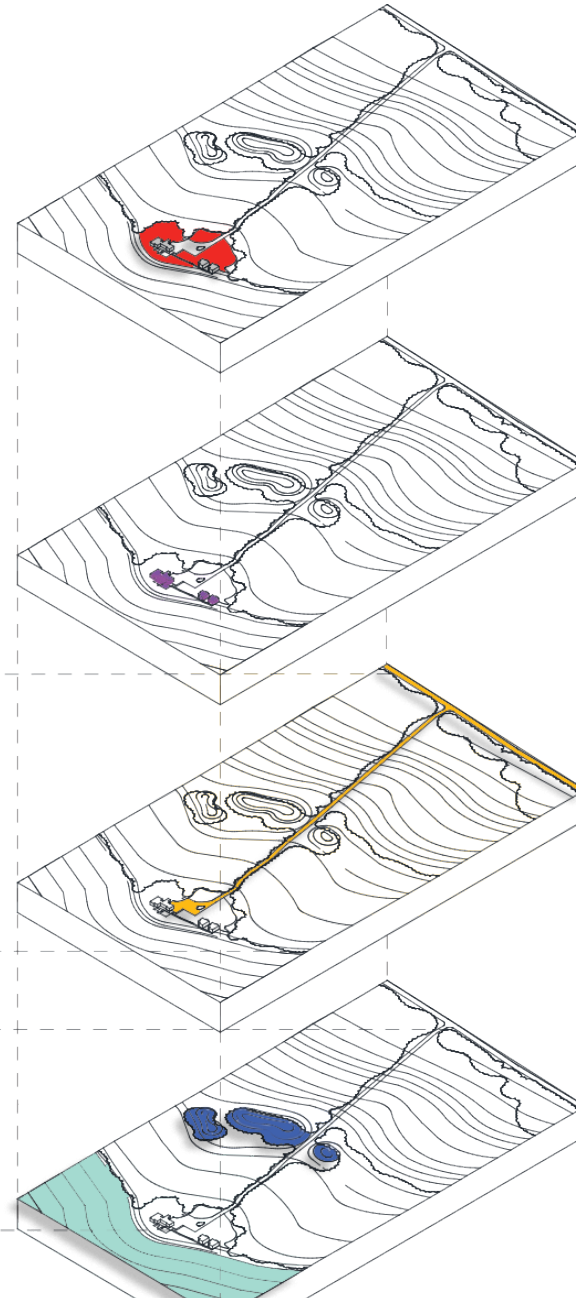
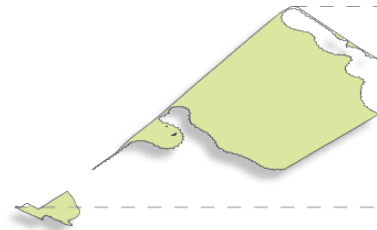
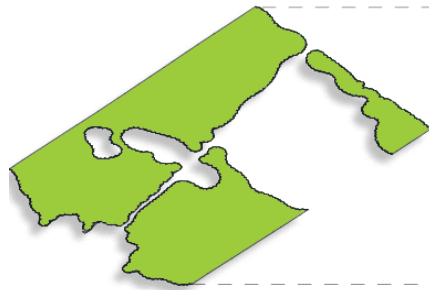


SITE ANALYSIS



SITE ANALYSIS

- Resort Site 
- Resort Facility 
- Infrastructure 
- Mangrove Forest 
- Potential Urban Agriculture Edible Landscape 
- Fresh Water Lens 
- Ocean 



THESIS DESIGN PREMISE

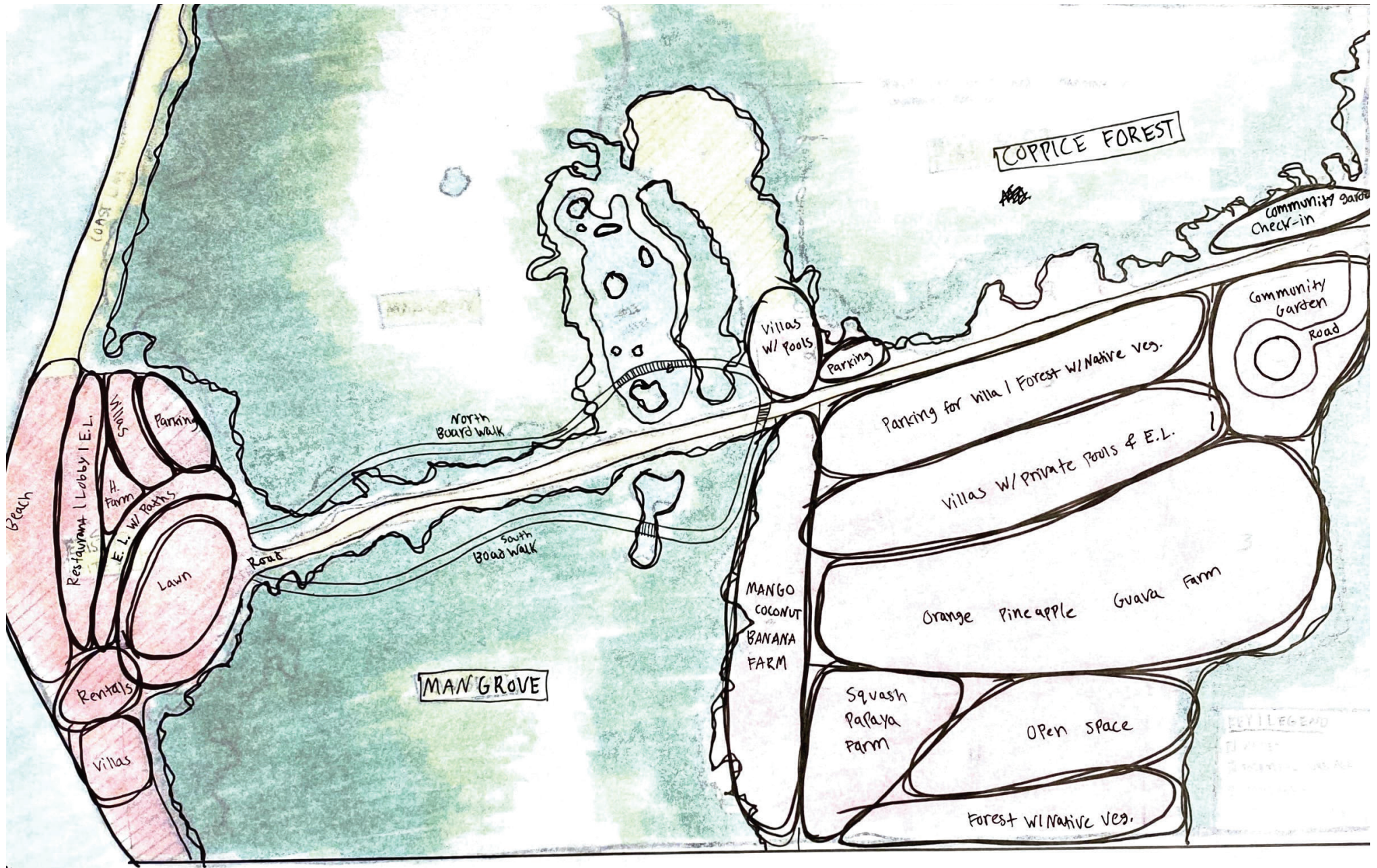
1. WILL THIS PROPOSED ECO-TOURIST RESORT BE SUSTAINABLE THROUGH URBAN AGRICULTURE AND EDIBLE LANDSCAPES?
2. IS THIS A VIABLE PROPOSAL TOWARDS EXPLORING SUSTAINABLE RESORTS IN ORDER TO ALLEVIATE THE COST OF PRODUCE IMPORTATION IN THE BAHAMAS?
3. WILL THIS PROPOSAL BE A START FOR THE BAHAMAS TO INVEST IN SUSTAINABLE RESORT DESIGN?
4. WILL THE METHODS OF EDIBLE LANDSCAPE, FOOD-SCAPE AND URBAN AGRICULTURE BECOME A VIABLE SOLUTION?
5. WILL URBAN AGRICULTURE AND EDIBLE LANDSCAPES PRODUCE ENOUGH RESOURCES TO MEET 25% OF THE DAILY RECOMMENDED CALORIES FOR THE AVERAGE ADULT



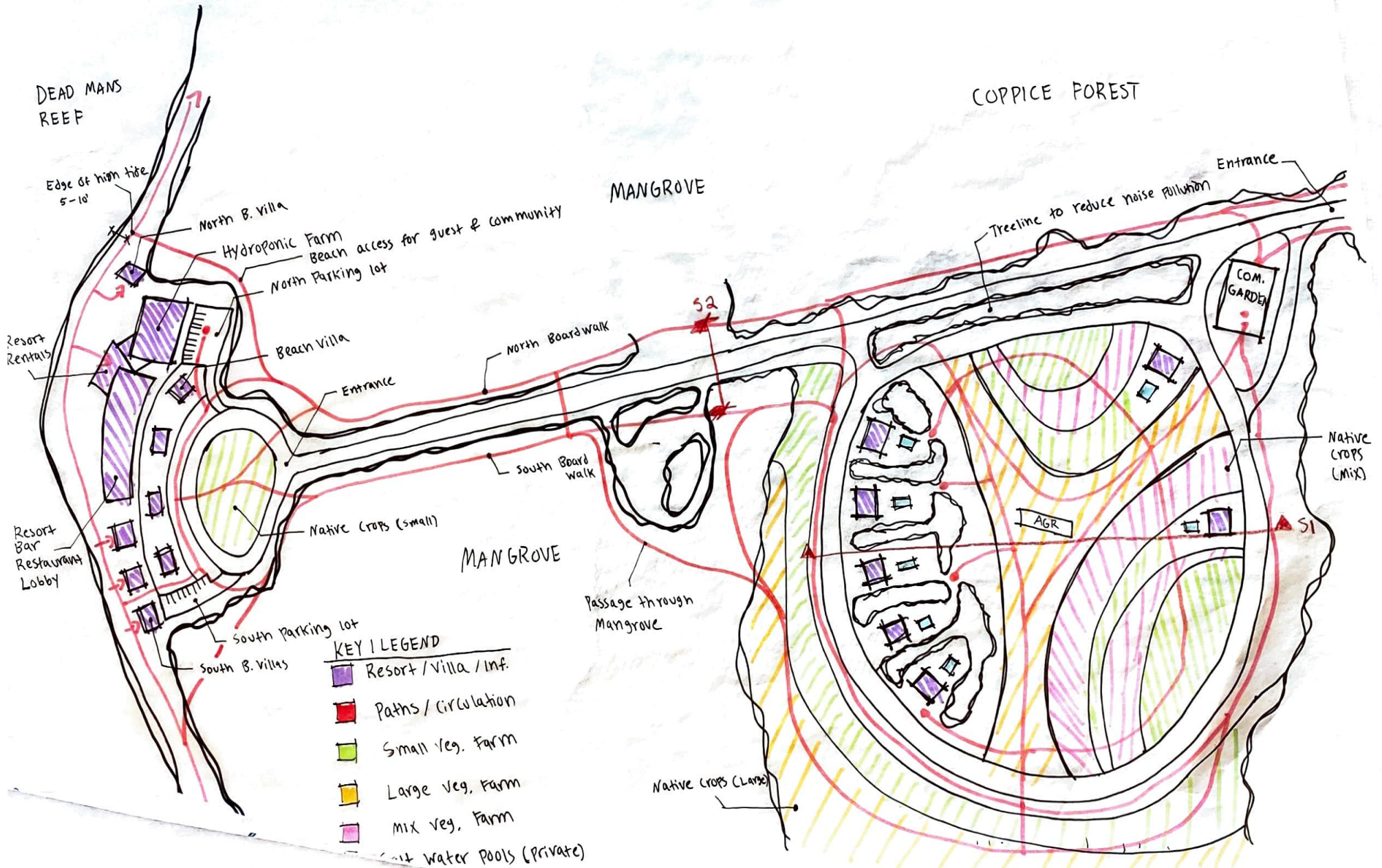
DESIGN CONCEPT STATEMENT

The overall concept of consist of free form and non-linear geometry across the site. This include overall composition, pathways, orientation and programmed spaces within the 60 acre site while also being environmentally conscious of the existing vegetation. Each designed spaces were designed either to accommodate urban agriculture, pedestrian circulation, edible landscapes, and programmed spaces and activities throughout the resort boundaries. Nevertheless, the design of the urban agriculture, Earth By Sea, was influenced by the idea of time. The design is shaped and works like a clock to reflect the timeline of not only the vegetation but also the Bahamian people showcasing their longevity and evolution of life and society. The entire design works to frame and connection guest through the sites visuals, sensory and the beauty of nature through and edible forest.

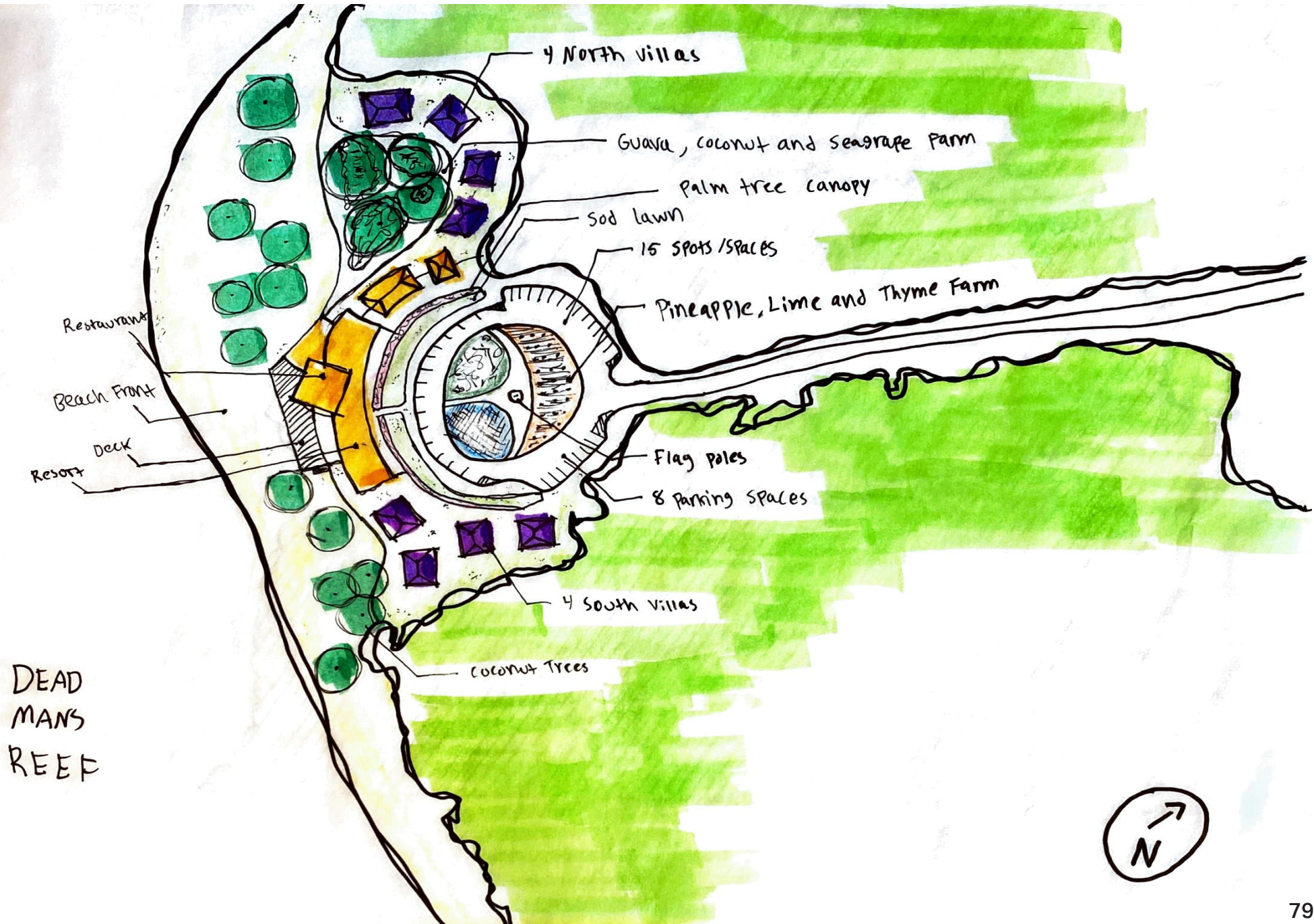
SCHEMATIC VISION



DESIGN DEVELOPMENT

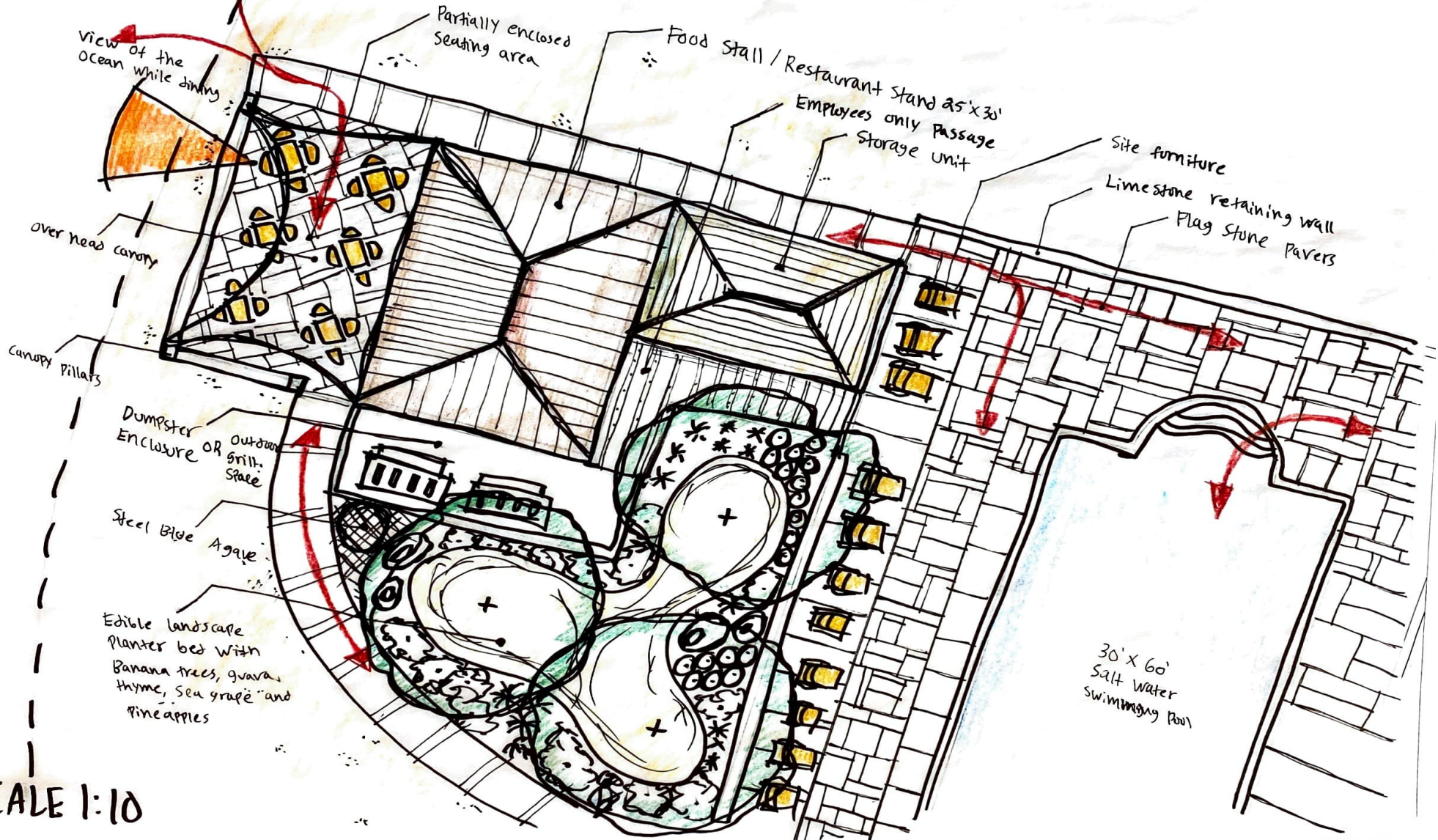
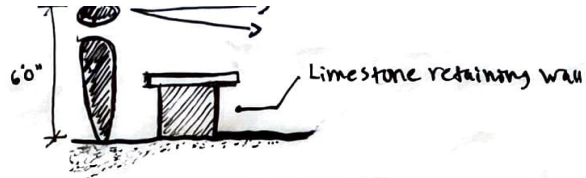


DESIGN DEVELOPMENT

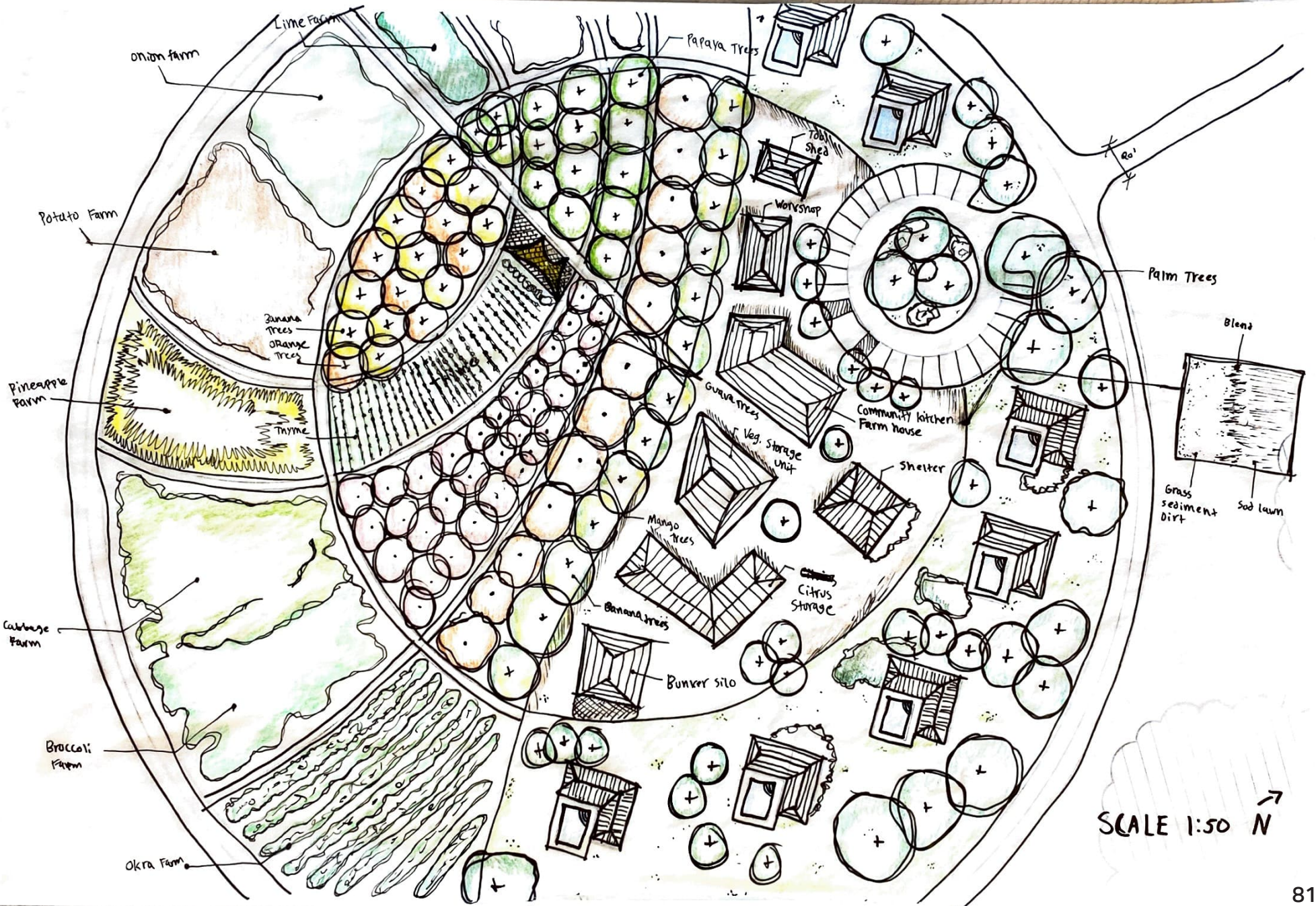


DESIGN DEVELOPMENT

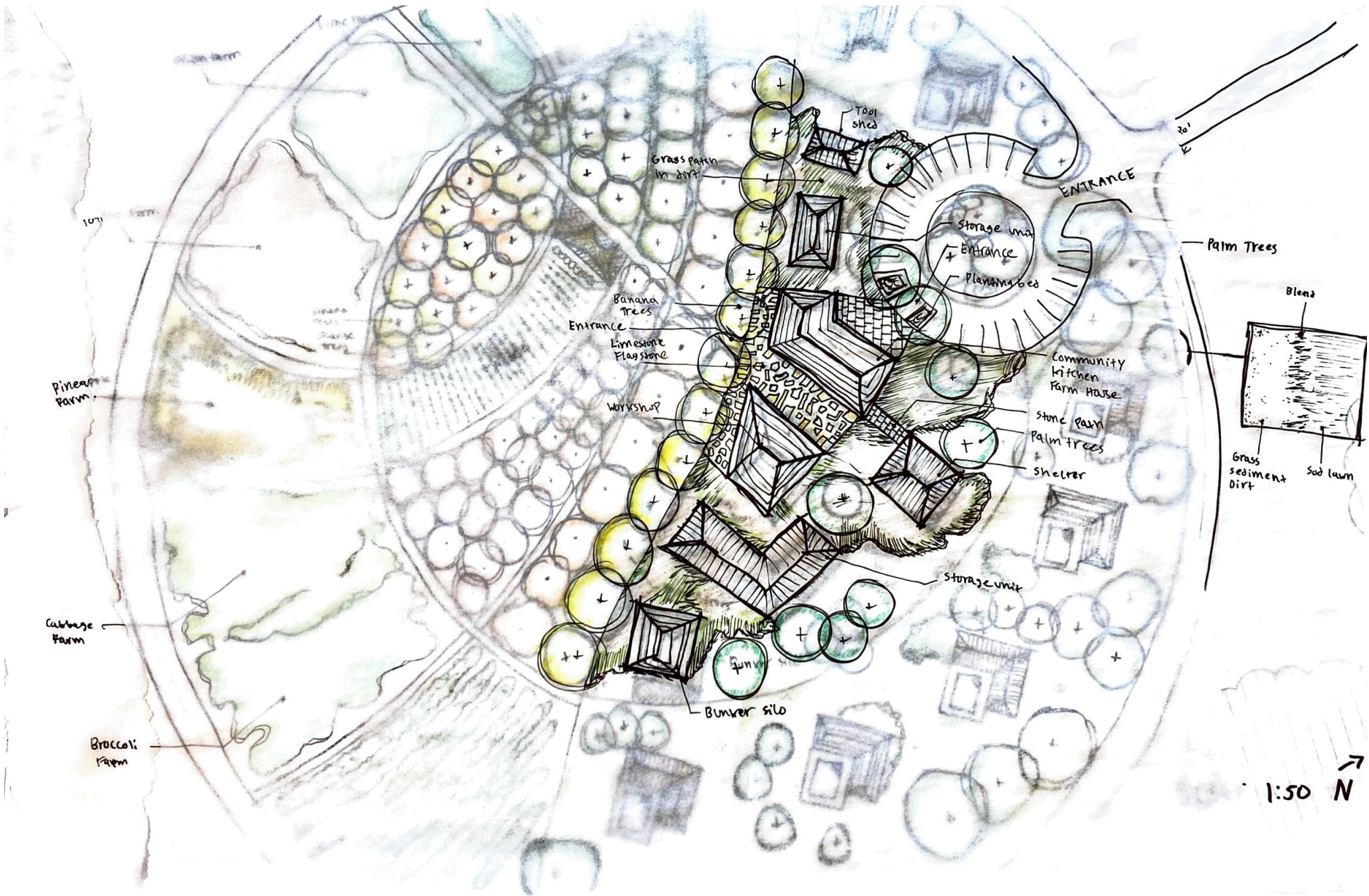
BEACH FRONT



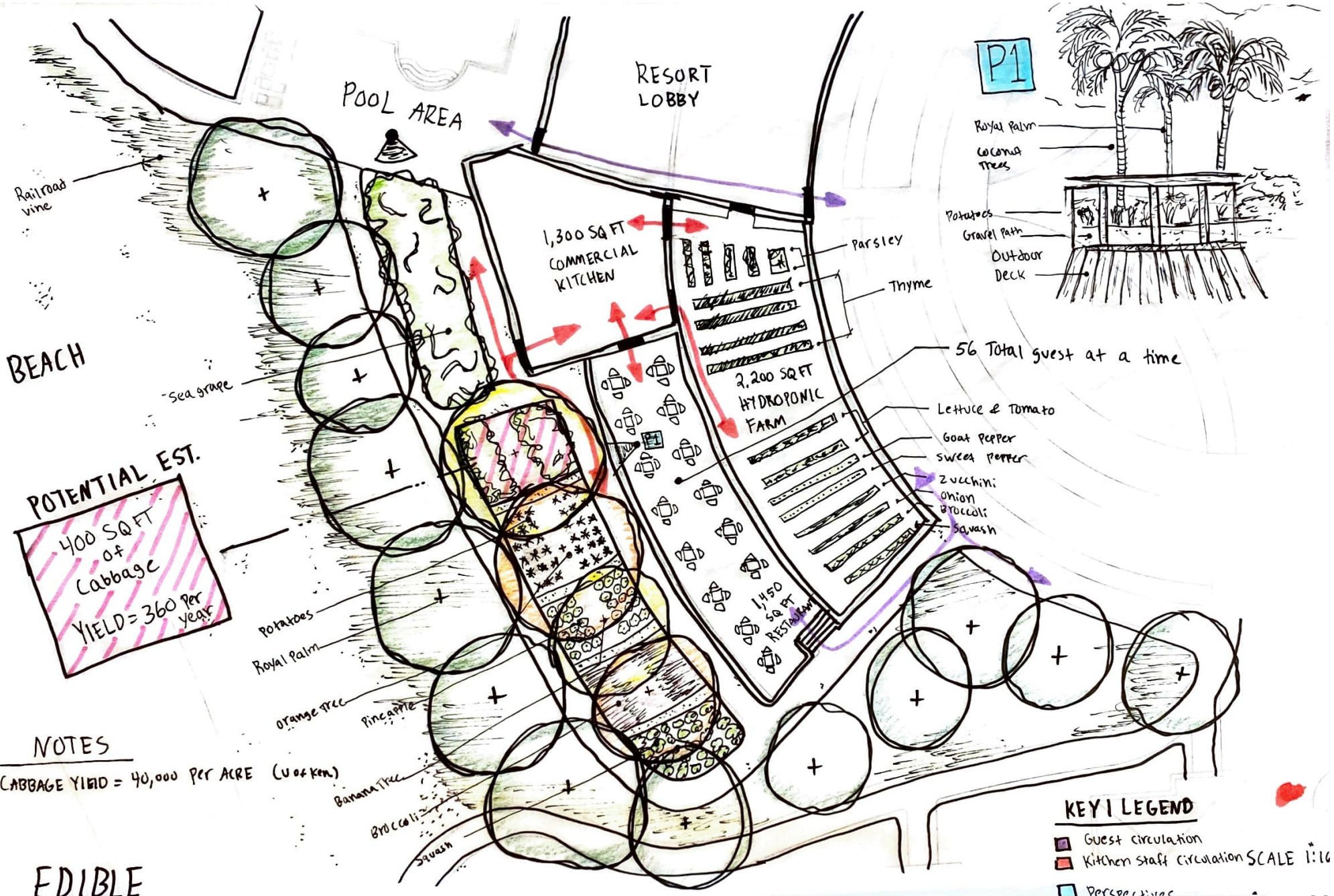
DESIGN DEVELOPMENT



DESIGN DEVELOPMENT



DESIGN DEVELOPMENT



POTENTIAL EST.
 400 SQ FT
 of
 Cabbage
 YIELD = 360 per
 year

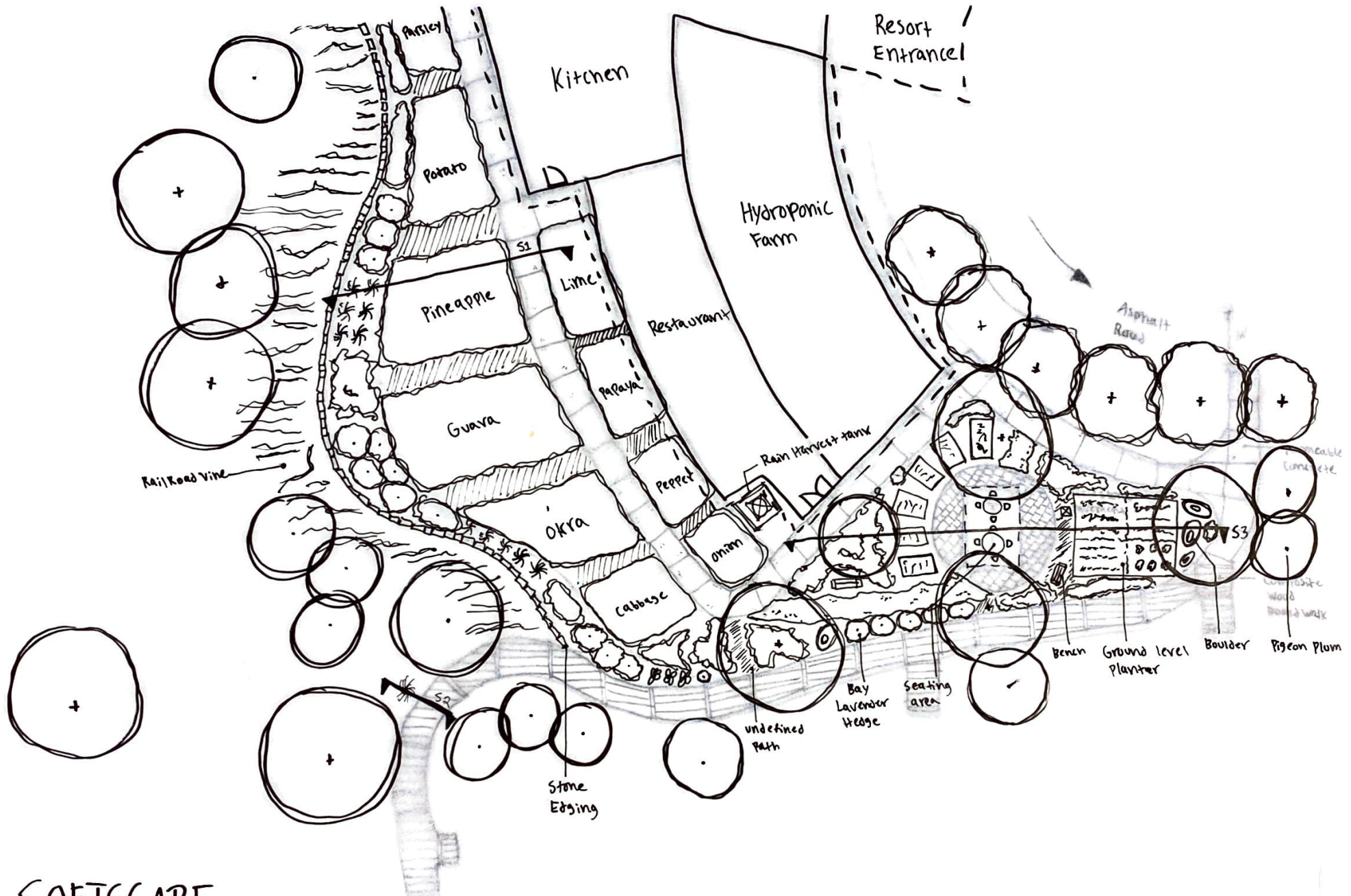
NOTES
 CABBAGE YIELD = 40,000 PER ACRE (U of Ken)

EDIBLE

KEY | LEGEND

- Guest circulation
- Kitchen staff circulation SCALE 1:16
- Perception

DESIGN DEVELOPMENT



DESIGN DEVELOPMENT

Edible Landscape Signage

1.

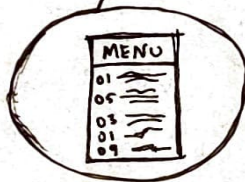


Notes
• Each planting bed will feature its own signage



Numerical Label
Graphic image of plant
Plant name
Scientific Name
List of dishes in restaurant that includes X plant

Map of planting across resort



Outdoor Seating

4.



Lounge chair

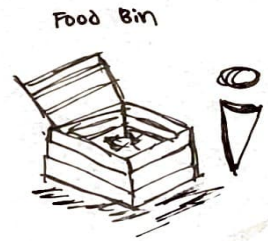


Abaco sofa

5. Storage units

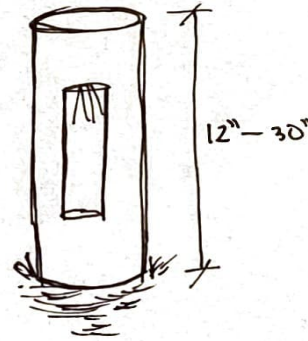


Tool shed



Food Bin

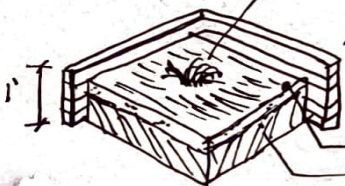
Hinkley Atlantis bollard lighting



Notes

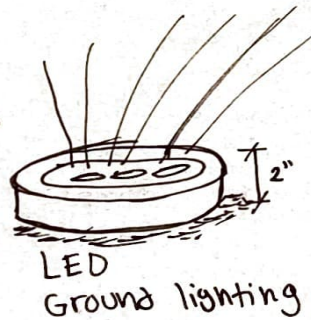
• Solar Panels on roof will power surrounding LED ground lighting

3. Planter Box



Proposed reg. Lumberwood frame

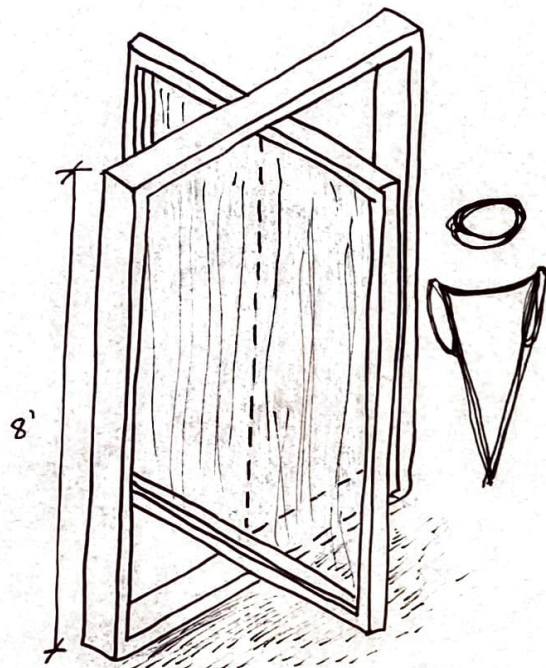
Compost / Manure Black Dirt



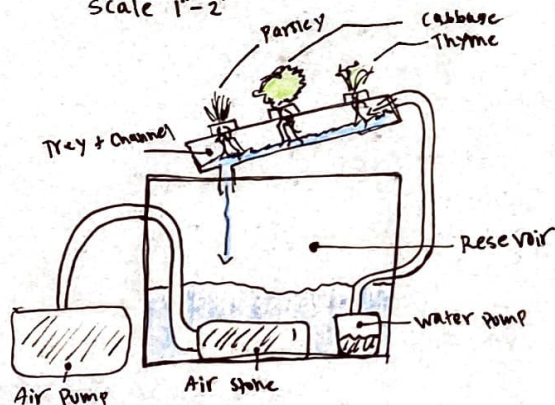
SITE FURNITURE

N.T.S

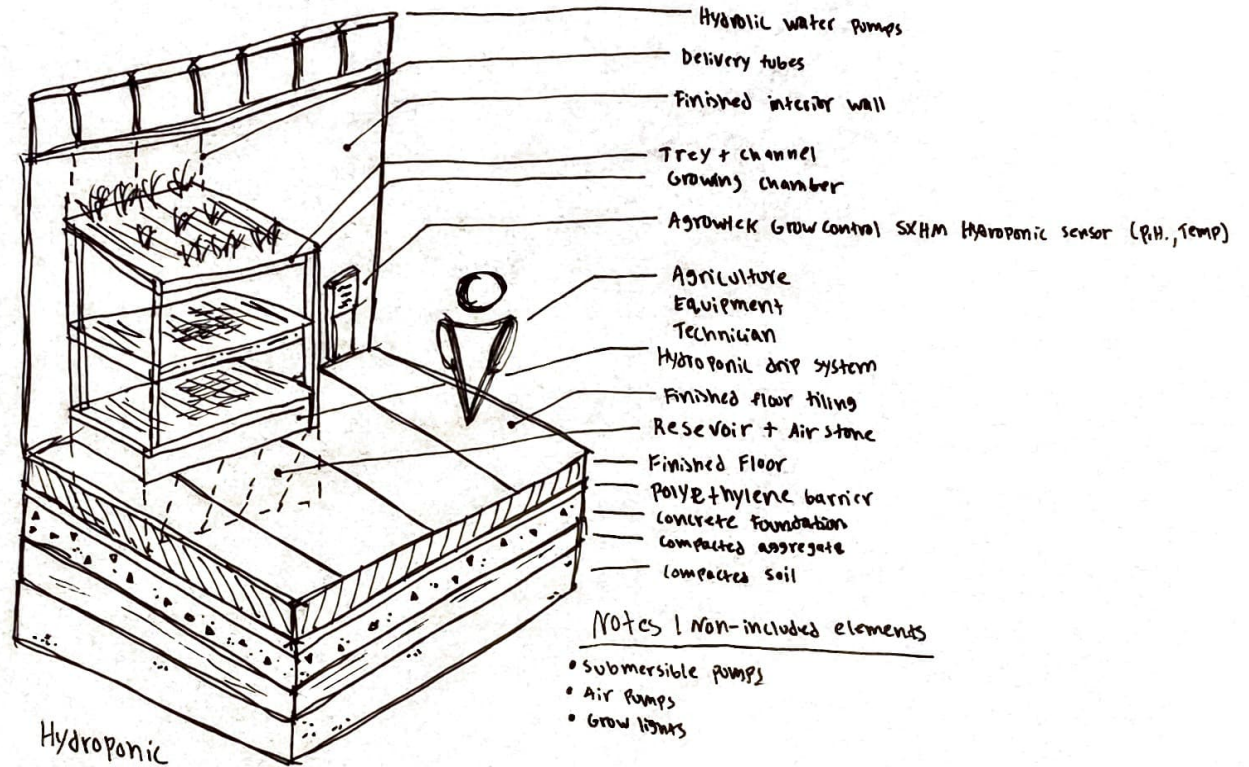
DESIGN DEVELOPMENT



Pivoting window
scale 1"=2'



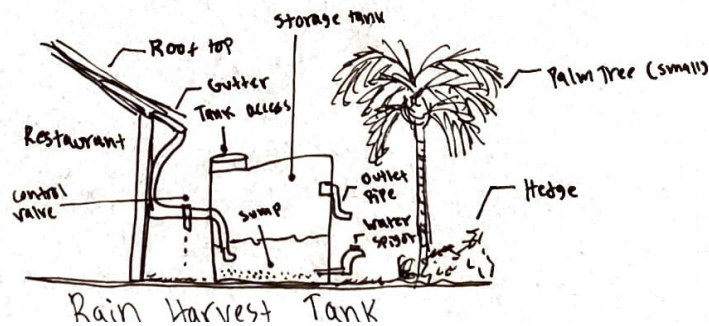
Nutrient Hydroponic System



Hydroponic Farm Interior

Notes / Non-included elements

- Submersible pumps
- Air pumps
- Grow lights



Rain Harvest Tank

SITE FEATURES AND COMPONENTS

MASTER PLAN DESIGN

KEY | LEGEND

- | | | | |
|----|--|----|---|
| A | Dead Man's Reef Atlantic Ocean | B2 | Dead Man's Reef Beach Villas |
| B1 | Of Earth, Land + Sea Resort The Cove Gardens by the Cove | B4 | Helping Hand Garden Participatory Garden |
| B3 | The Reef's Edible Garden Edible Landscape | F1 | Urban Agriculture Small vegetables + Fruits |
| C1 | Queen's Community Garden | F3 | Urban Agriculture Large vegetables + Fruits |
| F2 | Urban Agriculture Medium vegetables + Fruits | F5 | Earth by Sea Villas |
| F4 | Earth by Sea Farmstead | N | Queen's Highway Resort Entrance |
| M | Mangrove Swamp | | |
| S1 | Of Land, Earth + Sea Section Elevation | | |



DESIGN RENDERING



INTERIOR OVERVIEW



OUTDOOR FOOD STALL



EARTH BY THE SEA



DESIGN RENDERING



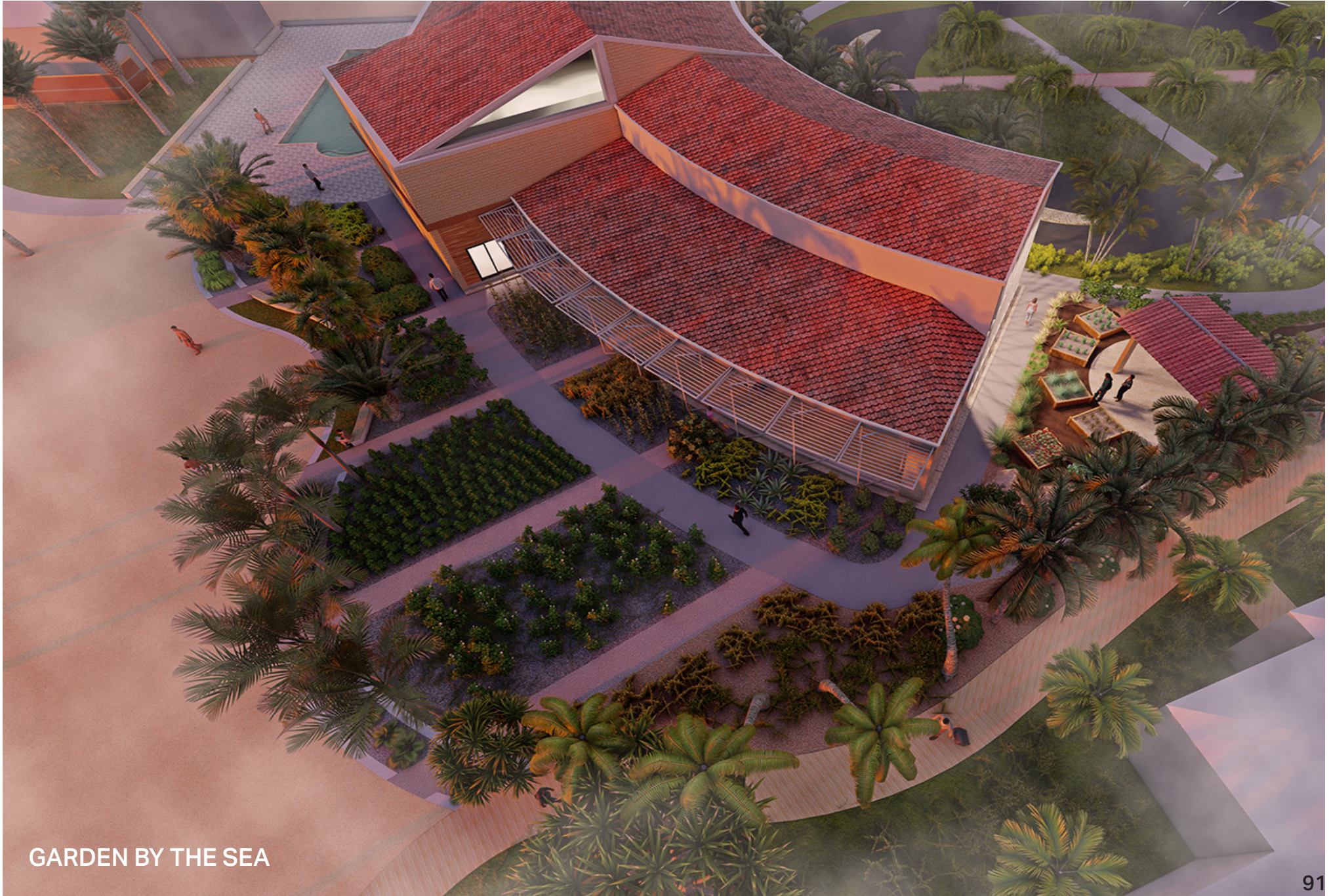
THE COVE: RESTAURANT

DESIGN RENDERING



GARDEN BY THE SEA

DESIGN RENDERING



GARDEN BY THE SEA

DESIGN RENDERING



EARTH BY THE SEA

DESIGN RENDERING



EARTH BY THE SEA

DESIGN RENDERING

KEY | LEGEND

- A Dead Man's Reef | Atlantic Ocean
- B Mangrove Forest
- C Edible Garden
- D The Cove Restaurant
- E Hydroponic Farm
- F One Way Street

OF LAND, EARTH + SEA SECTION ELEVATION



KEY | LEGEND

- A Earth by the Sea I laza
- B Royal Poinciana Cluster
- C Sea Grape Cluster
- D Earth by the Sea Farmhouse
- E Earth by the Sea Shelter

EARTH BY SEA SECTION ELEVATION



DESIGN RENDERING

HELPING HAND GARDEN AND HYDROPONIC FARM DETAIL



DESIGN RENDERING

EARTH BY SEA DETAIL



AGRICULTURE PRODUCTIVITY

PROJECT GOAL 1.1

To develop spaces that will feature a variety of native and non-native plant species that are edible and are designed to be utilized for the proposed resort restaurant

E.g. Potato (Non-Native) | Sea Grape (Native)

PROJECT GOAL 2.2

To generate 25% of recommended daily fruit and vegetable intake.


















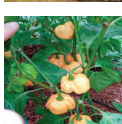



E.g. Recommendation = 2 Cups
Proposal = 1/2 Cup

I.e. 2 Cups of sliced Banana's = 266 Calories
1/2 Cup of sliced Banana's = 66.5 Calories

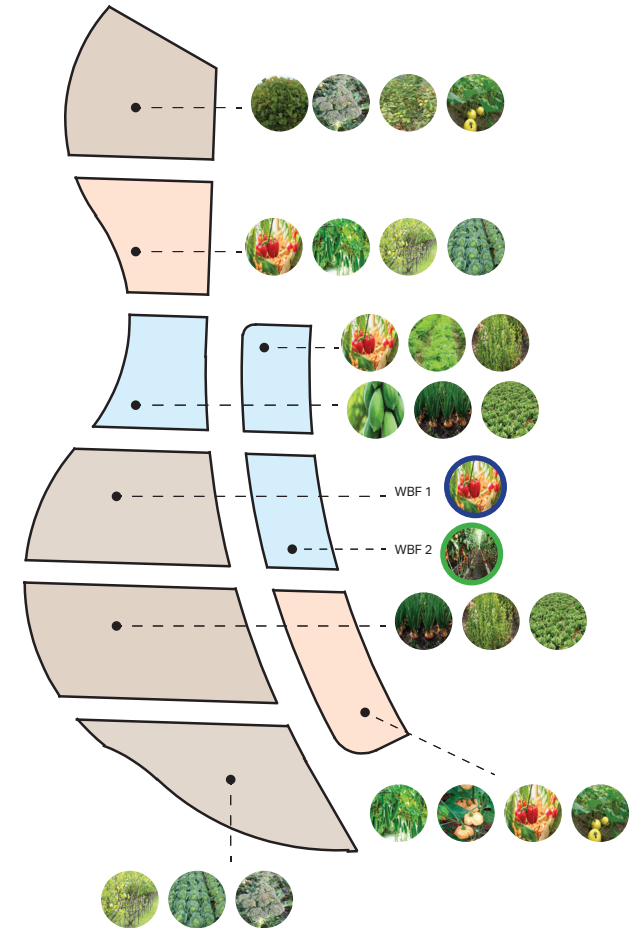
GARDENS BY THE COVE KEY | LEGEND

-  Less than 100 Sq Ft
-  100 - 200 Sq Ft
-  200 - 300 Sq Ft
-  300 - 400 Sq Ft
-  400 - 500 Sq Ft
-  More than 500 Sq Ft

PLANT PALETTE

SEA GRAPE		CABBAGE		POTATO	
TOMATO		BROCCOLI		OKRA	
LIME		SWEET PEPPER		LETTUCE	
THYME		PAPAYA		BANANA	
ZUCCHINI		PINEAPPLE			
MANGO		ONION		GUAVA	
GOAT PEPPER		SQUASH		COCONUT	
PARSLEY					

GARDENS BY THE COVE



CDC RECOMMENDATIONS
CDC guidelines suggests that the average adult male and female consume a daily intake of 2 to 2 1/2 cups of fruits and vegetables a day. Females ages 19 through 30 require about 1,800 to 2,400 calories a day. Males in this age group have higher calorie needs of about 2,400 to 3,000 a day. Calorie needs for adults ages 31 through 59 are generally lower; most females require about 1,600 to 2,200 calories a day and males require about 2,200 to 3,000 calories a day.

(p.95 | Dietary Guidelines for Americans, 2020-2025)

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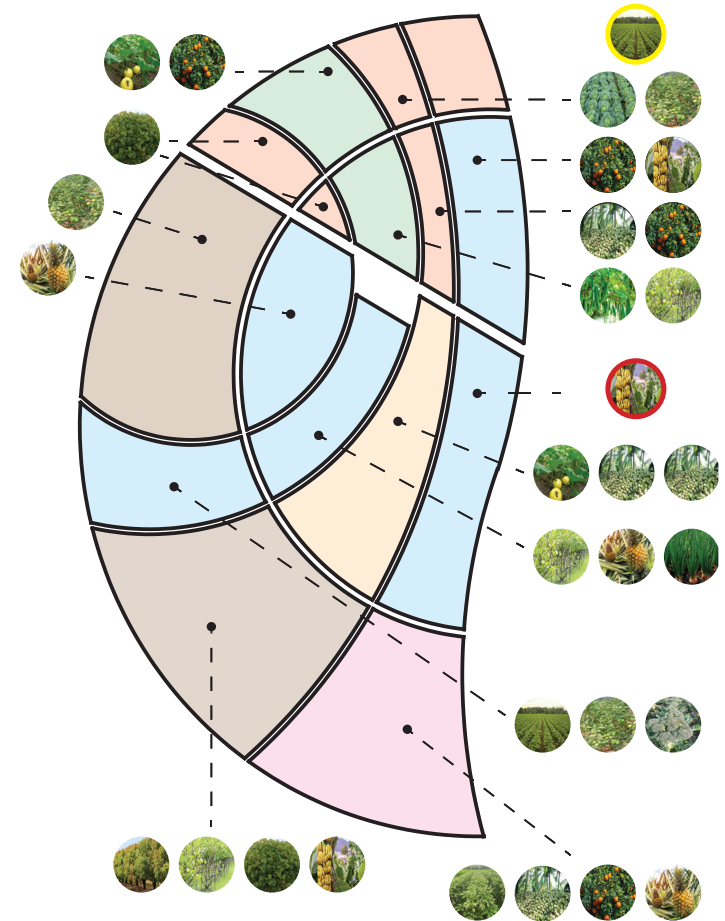
GARDENS BY THE COVE KEY | LEGEND

-  Less than 100 Sq Ft
-  100 - 200 Sq Ft
-  200 - 300 Sq Ft
-  300 - 400 Sq Ft
-  400 - 500 Sq Ft
-  More than 500 Sq Ft

PLANT PALETTE

SEA GRAPE		CABBAGE		POTATO	
TOMATO		BROCCOLI		OKRA	
LIME		SWEET PEPPER		LETTUCE	
THYME		PAPAYA		BANANA	
ZUCCHINI		PINEAPPLE			
MANGO		ONION		GUAVA	
GOAT PEPPER		SQUASH		COCONUT	
PARSLEY					

GARDENS BY THE COVE



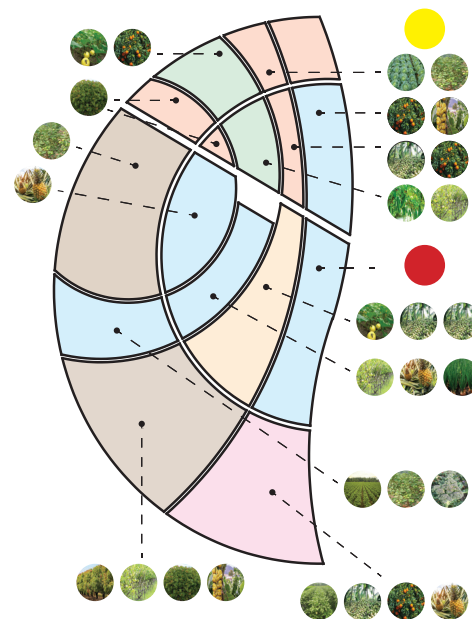
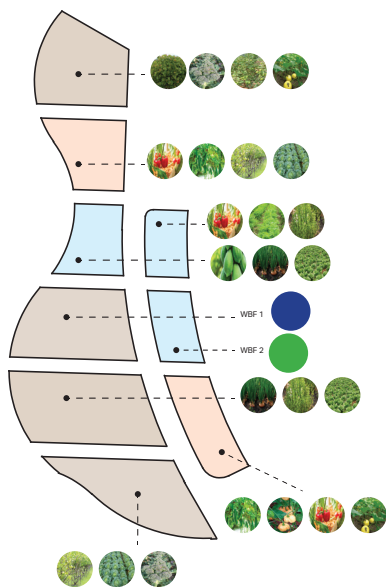
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(p.95 | Dietary Guidelines for Americans, 2020-2025)

AGRICULTURE PRODUCTIVITY

AREA SELECTION	AREA SQ FT	PLANT PALETTE	PRODUCTION (YR)	DAYS TO MATURE	DAILY CALORIES (100)
WBF 1	570	180 Sweet Peppers	525 Sweet Pepper	105 - 125 Days	53 Calories
WBF 2	225	91 Tomatoes	302 Tomatoes	85 - 110 Days	18 Calories
EF 1	4,611	1,500 Potatoes	6,843 Potatoes	74 - 80 Days	3,055 Calories 18.6 Potatoes
EF 2	12,776	90 Banana Trees	21,600 Bananas	300 - 450 Days	6,195 Calories 50 Cups



PERFORMANCE CRITERIA

SUMMARY

Paradise Cove Beach Resort is located off of Queen's Hwy, west of Freeport and near Dead Man's Reef. The major components of the resort include two beach villas, capable of hosting 12 guest each, and a main building which features a bar and aquatic rentals. Other site elements include Dead Man's Reef and its opportunities to explore the natural corrals as well as the artificial reef balls. The resort current lot size is 6.0 acres in size while bounded by the edge of the existing mangrove swamp as well as the shoreline. The resort as it is right now relies on importation of produce, resources and water in order to function. Nevertheless, the resort on average receives 30 to 40 daily visitors. With this new proposal, the resort will become an Eco-tourist resort that's objective is to explore sustainable practices such as rain water harvesting, solar energy, edible landscapes, urban agriculture, Mangrove conservation, and to continue towards expanding corral restoration. This proposal also seeks to expand upon aquatic and recreational activities as well as programmed activities. The proposal will also seek to pursue the idea of farm-to-table towards the new proposed restaurant with edible gardens, a hydroponic farm, and large scale urban agriculture.

1 EDIBLE LANDSCAPES

The proposed edible landscapes will feature a community garden, participatory garden and an edible garden. Each garden will serve its own proposed purpose towards achieving the idea of farm-to-table through consumption of locally grown produce such as fruits and vegetables. This idea will improve the quality of the site through its shortened supply distance as well as decreasing the cost of ordering fruits and vegetables off-site in bulk. Although there will be a lavish cost in the early developments of the proposal, throughout the phases and timeline there will be a milestone in which the cost will eventually offset.

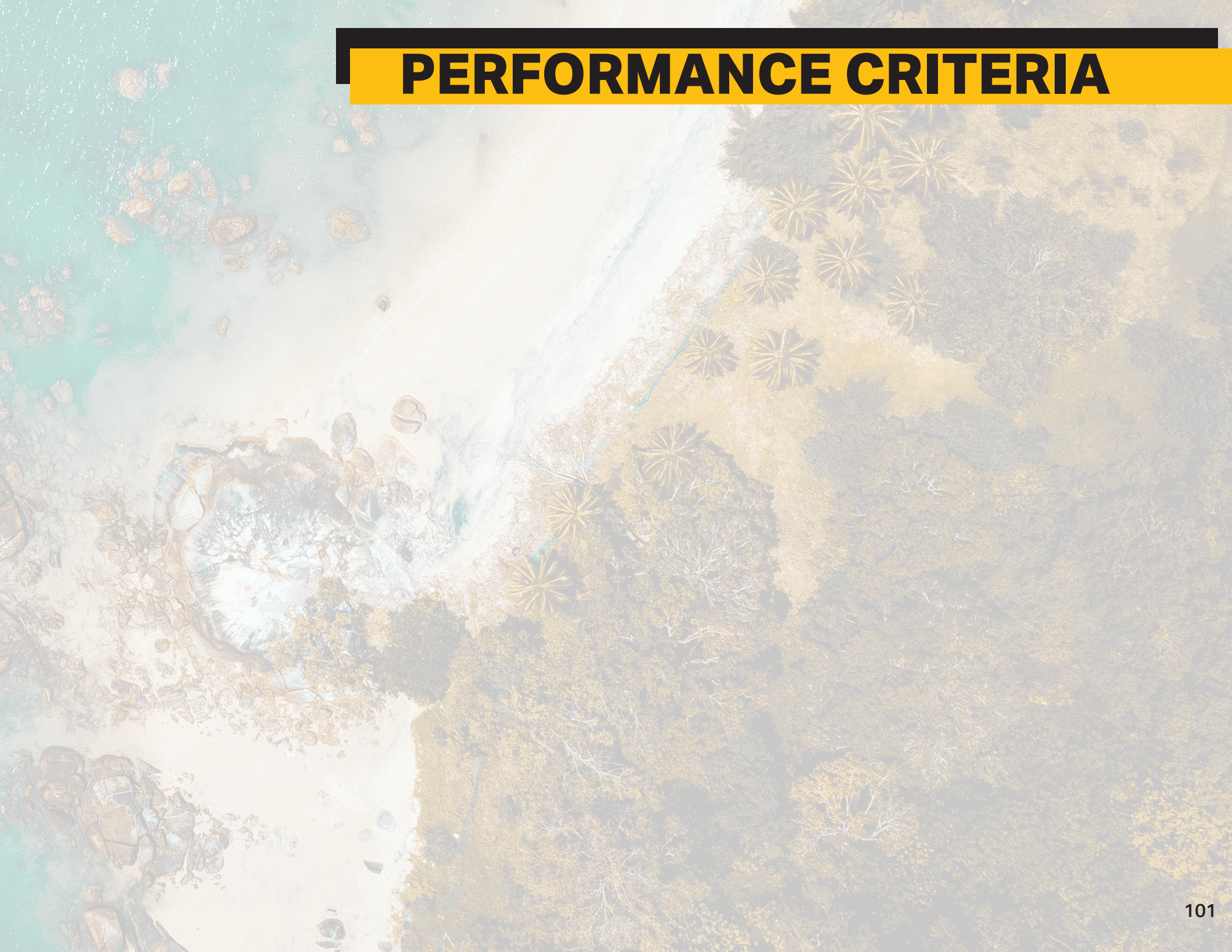
2 PRODUCTIVITY

The proposed urban agriculture will seek to develop 9.1 acres of arable farm land in order to mass produce fruits and vegetables for the resort to consume year round. Through the diversity in plant species and allocated space dedicated towards agriculture it is expected to produce enough resources in order to exceed the goal generating 25% or more of the daily recommended calories for each guest on the site (p.97-99) The farmlands of the resort will utilize the captured rain water as a method towards irrigating the crops as well as utilizing solar energy from solar panels in order to power the farmstead and its equipments. Nevertheless, this will also create opportunities towards creating jobs for local Bahamian farmers and a way to educate resort guest about Bahamian agricultural lifestyle. This will also serve as an opportunity to develop a community garden that will host locals and encourage the idea of growing local produce as well as reinforcing the idea of *Backyard Farming in the Bahamas*.

3 LAYOUT

The proposed layout of the site will seek to achieve connecting all components of the site cohesively through the shortened walking distances and provided opportunities of activities. The layout also looks at programming the spaces within the 60 acre site in order to accommodate the goals of edible landscapes and urban agriculture. This will also look into establishing a hydroponic farm that will be connected to the resort restaurant in order to accommodate the idea of Farm-to-table. This proposal will also pursue sustainable practices throughout the site such as rain harvesting, led motion sensor technology, utilizing solar energy and preserving the native mangrove swamps on site. The site is laid out in a sense where it is also environmentally conscious of the surrounding mangrove and shoreline. It is crucial to preserve the reef and the mangrove forest.

PERFORMANCE CRITERIA



PLANT CALENDAR

Plant Species	Salt Tolerant	Drought Tolerant	Large Scale	Small Scale	Availability	Hydroponic Capability	Space Needed Apart	No. Running Feet of Row (56)	Total RFoR (96)	Seed & Plant Guide	Days to Mature	Sq Ft for 56	Sq Ft for 96	Total Sq Ft
Cabbage	N			x	Nov-June		24-36" 12-14" R	60' per 5	672	1152	80-115	722	1202	
Sweet Pepper	N			x	Oct-Aug	x	18" 30-36" R	20' per 5	224	384	105-125	274	434	
Okra	N			x	May-Dec		3'	75' per 5	840	1440	60	890	1490	
Goat Pepper	N			x	May-March	x	18-24"	20' per 5	224	384	105-125	274	434	
Tomato	M			x	Nov-June		18-24"	150' per 5	1680	2880	85-110	1730	2930	
Zucchini	M			x	Nov-March	x	36"							
Lettuce *	M	M		x	Dec-May	x	12-18"	150' per 5	1680	2880	60-90	1730	2930	
Squash (Y)	Y			x	Jan-Julv	x	3-6'	12 Hills pe	134.4	230.4	42-52	184.4	280.4	
Broccoli	Y			x	Nov-May	x	18-24" 36" R	40' per 5	448	768	115	498	818	
Papaya	N		x		Year-Round		7-10'							
Banana	N		x		Year-Round		12'				300 - 450			
Coconut	Y	Y	x		Year-Round		20'							
Lime (p)	M			x	June-Mar		12"							
Mango	N		x		Feb-Sept		25-30'							
Pineapple	M	N		x	Nov-July		5'							
Thyme	N	Y		x	Year-Round	x	12-24"							
Guava	M	Y		x	Year-Round		10-15'							
Sea Grape (H)	Y		x		July-Sep		3-4'							
Potato (I)	M			x	Mar-May		12" 3' R	200' per 5	2240	3840	75-80	2290	3890	
Parslev	N			x	Nov-June	x	6-8"							
Orange (OJ)	N		x		Oct-July		12-25'					N/A	N/A	37,228
Onion	N			x	Mar-June	x	2-4" 12-18" R	80' per 5	896	1536	42-45	946	1586	

N = Not Tolerant
M = Moderately Tolerant
Y = Tolerant

PLANTING CALENDAR	January	February	March	April	May	June	July	August	September	October	November	December
Cabbage	X	X						X		X	X	X
Sweet Pepper	X	X					X					X
Okra	X	X	X	X	X	X	X					
Goat Pepper	X	X					X		X	X	X	
Tomato	X	X	X	X	X	X	X					
Zucchini								X				
Lettuce *	X	X	X					X				
Squash (Y)	X	X										
Broccoli								X			X	X
Papaya	X	X	X	X	X	X	X	X	X	X	X	X
Banana	X	X	X	X	X	X	X	X	X	X	X	X
Coconut	X	X	X	X	X	X	X	X	X	X	X	X
Lime (p)												
Mango												
Pineapple	X	X	X	X	X	X	X				X	X
Thyme	X	X	X	X	X	X	X	X	X	X	X	X
Guava	X	X	X	X	X	X	X	X	X	X	X	X
Sea Grape (H)												
Potato (I)	X	X	X					X		X	X	
Parslev	X	X								X	X	X
Orange (OJ)												
Onion	X	X	X							X	X	

Ornamental Plant List	Type	Height	Spread	Salt tolerant
Pigeon Plum	Tree	25'-30'	20'	Yes
Lignum Vitae	Tree Shrub	8'-12'	8'-12'	Yes
Railroad Vine	Vine	16"	N/A	Yes
Silver Buttonwood	Tree Shrub	15'-20'		Yes
Bay Lavender	Shrub	24"	24"	Yes
Allspice	Shrub	10'	12'	Moderate
Royal Palm	Tree	50'-75'	20'-25'	Moderate
Queen Palm	Tree	50'	20'-25'	Moderate

PROJECT CONCLUSION

DISCUSSION

This thesis proposal studies the potential possibilities towards the idea of large scale urban agriculture for an Eco-tourist resort while incorporating sustainable practices throughout all elements of the site via architecture and landscape architecture. It has provided an innovative and insightful perspective on how to expand upon Eco-tourism while also emphasizing on the economic aspects of hospitality. The intent of this proposal will be used to display a template on how Eco-tourism can be approached in the Bahamas and how it can be a worthy investment that will revitalize not only the economy but the beauty of the Bahamas. In this booklet I have addressed the following points:

- How urban agriculture and edible landscapes can be utilize to generate local produce
- Mangrove Preservation
- Redefining Eco-Tourism through the approach of agriculture
- Statistics to ensure that the proposed agriculture meets or exceeds the goal of generating 25% of the daily recommended calories
- Designing with environmental and contextual hardship

LIMITATIONS

The limitation of the this thesis proposal includes working within the site boundaries of 60 acres and the restrictions of excavating the protected mangrove forest. Nevertheless, the soil and site location also made it challenging towards designing a functional and comprehensive site plan that will accommodate the layout of the resort.

RESEARCH

Throughout the duration of this proposal, this thesis proposal dove into the different methodologies across different points of times and investigated each method and determined what made their process successful in agriculture. By looking into the different methodologies it was decided that all methods each had their own unique way to solve their own problems in which was taken into account when programming the planting palette and plant species. Looking into the methods eventually led to the quantitative data that was generated in order to ensure how each of these methods can be measured numerically in order to showcase its own area of success and weakness.

DESIGN

Analysis of Paradise Cove Beach Resort and the surrounding environment was the driving factor when designing the overall master plan. The design took into account the mangrove forest while also working around the shoreline and reef. By looking into the soil and analyzing it, the design for the urban agriculture and edible landscapes were ultimately determined by which locations were best fit to host vegetation without it being susceptible to salt water and wildlife. Nevertheless, the aesthetics of indigenous and aboriginal were used throughout the architecture in order to reflect the pre colonial society of the Lucayan natives. What determined the shapes and forms of the site were to explore non-linear forms in order to reflect the free flow and form of the ocean water.

APPENDIX



IMPORTANT SOURCES

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THE AUTHOR

Sina Lee



"I am thankful for being a part of the NDSU Landscape Architecture program. The professors, curriculum and student environment have been truly memorable. Without the support of the program, I would not have the skills and drive I do today."



A new journey ahead

STUDIO EXPERIENCE

2nd Year

LA 271 | Intro to Landscape Arc Studio | Fall 2018 | Prof. Anna Maria Visilia
Tea House | Moorhead, MN
Greek Square | Itea, Greece

LA 272 | Parks & Open Spaces | Spring 2019 | Prof. Dominic Fischer
Twenty Below Coffee Pock Park | Fargo, ND
Rheault Farm | Fargo, ND

3rd Year

LA 371 | Site Planning & Design Studio | Fall 2019 | Prof. Jason Kost
Dike East Park | Fargo, ND
Spicy Pie Plaza | Fargo, ND

LA 372 | Community Planning & Design Studio | Spring 2020 | Prof. Anna-Maria Visilia
NDSU Plaza | Fargo, ND
State Capitol Grounds Competition | Bismarck, ND

4th Year

LA 471 | Urban Design Studio | Fall 2020 | Prof. Dominic Fischer
Miami Dade Revitalization | Miami, FL
Green New Deal | New Town, ND

LA 472 | Remediation & Planting Studio | Spring 2021 | Prof. Jason Kost
Estes Park River walk | Estes Park, CO

5th Year

LA 771 | Performance Base Design Studio | Fall 2021
Prof. Dominic Fischer, Charles Anderson & Morgan Kollman

Landscape Performance In Medora | Medora, ND
S.I.T.E.S in "Old Town" Scottsdale | Scottsdale, AZ