

# Privruta Abhivram- “Environmental Life” Wetland Welfare and Environmental Research

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**Abstract :** This topic discusses the welfare and research of wetlands. It explores how people can nurture nature, and how nature can provide a platform for people to reconnect with nature. As humans have evolved, they have destroyed nature and wetlands for their comfort. Wetlands are the kidneys of the earth, providing fresh water and other natural resources to humans and animals. They have their own microclimate, which supports their own unique vegetation. The study proposes creating a welfare center to enjoy environmental life and forget urban chaos. At this center, people can learn about wetlands, their vegetation, species biology, sustainable farming, and aquaculture. The purpose of this center is to create a symbiotic relationship between humans and wetlands. The study is divided into three parts : a tourist center, a native center, and a research center. The tourist center will generate revenue for local people and give them an opportunity to learn about wetlands. The native center will provide a place for native people to learn about and practice their traditional way of life. The research center will explore new ways to construct sustainable modules that will create zero carbon emissions and create a self-sufficient environment that does not depend on the outside world.

**Key Words :** Aquaculture, Humans and wetlands, Reconnecting to nature, Sustainable farming

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## 1. Introduction

In today's era, people are destroying nature for their convenience and comfort every year flora and fauna are getting destroyed because of human activities illegal fishing on wetlands, cattle grazing, using more and more chemical fertilizer due to hydrological fragmentation, salinity, soil erosion and no awareness about the wetland, the life-cycle maintained of the surrounding flora and fauna are getting destroyed and it will be affected on the microclimate of that wetland region.

Wetland is a study of the biology of flora and fauna, and how the ecosystem is working. In what ways every species has its role to perform? How local people are benefiting from this type of ecosystem and how the ecosystem is benefiting by native communities?

The finding of the study identified research gaps that require establishing strategies that consider how native communities surrounding the wetland will get the benefit without harming the wetland.

### 1.1. Role of wetlands and its ecosystem across the globe

Wetlands are defined as locations where water is always present on the soil's surface or is present for extended periods of time throughout the year, including the growing season. Wetlands are an essential component of our natural ecosystem. They prevent erosion, lessen the effects of flooding, filter out harmful substances, and boost overall water quality. They serve as homes for a broad variety of fauna, and many of them are home to species that can't be found anywhere else on Earth.

Humans rely heavily on wetland ecosystems. They provide a source of water and productivity, respectively, for

numerous plant and animal species, making them among the world's most productive habitats and a cradle of biological diversity. Invaluable "ecosystem services" provided by wetlands include flood control, groundwater recharge, and climate change mitigation in addition to freshwater supply, food and building materials, and biodiversity.

### 1.2. Role of flora and fauna in wetland ecosystem

The ecological value of the vegetation that grows around freshwater bodies of water, such as streams, rivers, lakes, and the like, is greater than the ecological significance of marine vegetation. In addition to their function in the food chain, these organisms help to keep the water clean by filtering out particles and nutrients. Waterfowl species will eat the seeds or tubers that can be found in environments that are associated with fresh water. A great number of plants enter the food chain in the form of detritus, which consists of minute plant particles that are created as a byproduct of plant decomposition and are then devoured by invertebrates.

Therefore, freshwater vegetation acts as a breeding ground for both aquatic and terrestrial species of flora and fauna. It gives migratory birds a place to nest while they are here. Submerged water plants are entirely submerged in water and serve as a source of nutrition for the native flora and fauna as well as a habitat for invertebrates. In addition to that, they have the ability to filter. Floating water plants require calm, slow-moving water to thrive, and their roots are typically very shallow. Birds and other flying creatures use them as a source of food. In marshy areas, emergent water plants have their leaves and stems growing above the water while their roots remain submerged. Riparian

water plants are any trees or shrubs that grow along the margins of wetlands or other bodies of water and get their name from their location.



FIGURE 1 – Types of Wetlands with its ecosystems

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		31	72
		32	74

FIGURE 2 – Number of Wetland in India

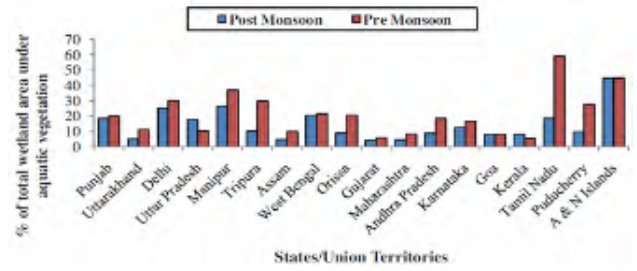


FIGURE 3 – Number of Wetland in India

There are a total of 27,304 wetland areas in India. 23,444 wetland areas found inland. There are 3,959 coastal wetlands that take up 18.4 % of the land area of the country, and of that percentage, 70 % are used for paddy farming. Only 1.5 million hectares of India's total 4.1 million hectares (excluding irrigated agricultural areas, rivers, and streams) of wetland are natural, whereas 2.6 million hectares have been created by humans. It is estimated that 6,750 square kilometers are taken up by the coastal wetlands, the majority of which are covered in mangrove trees. According to a survey conducted by the Wildlife Institute of India, their population is declining at a pace that ranges from 2 % to 1 % every year.

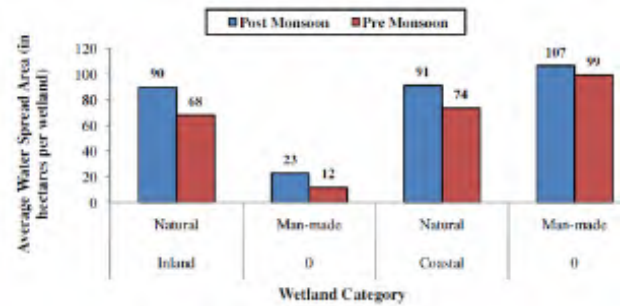


FIGURE 4 – Wetland Category

## 2. Aim, Objective, Scope, and Methodology

### 2.1. Aim

The aim is to create awareness about the unique biodiversity and ecology of the wetland, which could educate the local people and tourists about why wetlands are important in the world and why we have to save them by which humans and nature co-exist. The idea is to teach local communities about sustainable farming techniques and about vegetation so the ecosystem of the surrounding can be maintained.

### 2.2. Objective

1. To create a design that will be harmonized with nature and be built with the exploration in local materials of that region. The activities will be in accordance with the surrounding environment, which adds to the designation of that region's characteristics of the surrounding environment.

2. To design the structure which responds to the climate and minimizes the negative impact on the wetland ecosystem. The idea is to monitor endangered species, migratory birds, and other flora and fauna.
3. The activities will be also training the locals that how can they help the wetland ecosystem as well as the surrounding. Constructing artificial wetlands for water recycling.
4. The idea is to design a management process developed in a phase through time to understand the process that had happened on the site and happening in the site at present
5. To understand the ecology, biology, and biodiversity of the region. Studying the architecture of the wetland ecosystem.
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### 2.3. Scope

The study will explore the different aspects of innovative construction on wetlands with the exploration of local materials. The study can propose how architecture can be used for helping nature and its surrounding. A study will involve the ideas of landscapes and trails for the visiting people. Also, different aspects of sustainable landscape and transitional landscape will be achieved.

### 2.4. Methodology

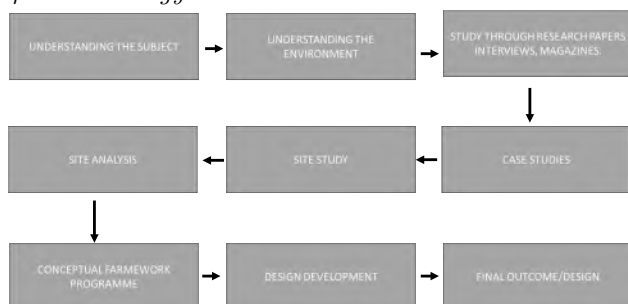


FIGURE 5 – Working Methodology Process

## 3. Site Study

The site brief includes basic site information like site location types of wetlands, wetland area and selected site area.

1. Site location :-Nandur Madhmeshwar wetland ,Niphad,Nashik, Maharashtra
2. Type of wetland : -Marsh-barrage and water collection
3. Wetland area : -1400-hectare
4. Selected site area : -50,000 sqm (1st phase)
5. Regional context : Nandur Madhameshwar Wildlife Sanctuary and Wetland, Majargoan, Niphad Taluka, Nashik District

### 3.1. Introduction to Site

It is believed that the Nandur Madhameshwar wildlife sanctuary has been preserved in its current state as a closed area ever since 1983. Other variables that have an effect on the preparation and implementation of the scheme include the many stakeholders in the usage of the reservoir. These stakeholders include the residents of the 11 villages that are located on the outskirts of the reservoir, as well as the fisherman who fish on a regular basis. individuals who work in the galleries or do seasonal cropping, individuals who rely on the reservoir for irrigation or drinking water, visitors, people who enjoy watching birds, and government offices that deal with irrigation, fisheries, and tourism all depend on the forest. As a result, the wildlife sanctuary of Nandur Madhameshwar requires a management strategy that is more adaptable. There are six talukas that make up the district, and their names are Nandurbar, Nawapur, Shahada, Naloda, and Akalkua and Akrani respectively. In total, there are 16,46,177 people living in the Nandurabar district, and the population density there is 276 people per square kilometer. According to the census taken in 2011. The majority of the population is engaged in agricultural activities.

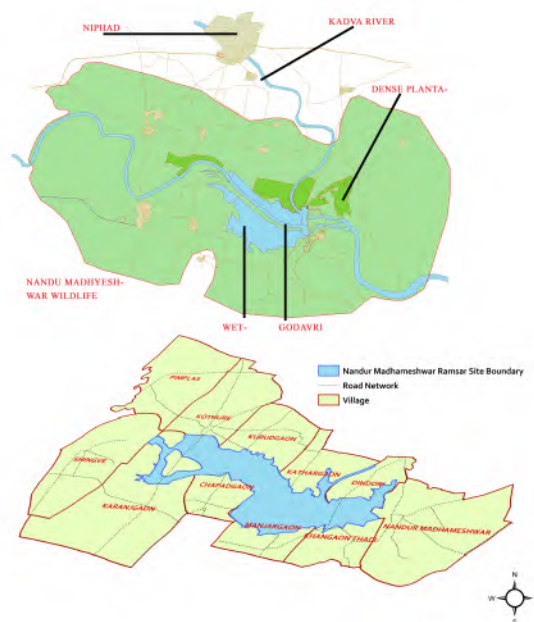


FIGURE 6 – Site Context

3.2. Site Analysis

The Nandur Madhameshwar is located at a distance of about 40 km East of Nishik in Niphad Taluka in the Nashik district of Maharashtra State. It is about 55 km from Nashik Road Railway station. Niphad Township is 12 km to the North of the pick-up weir of Nandur Madhameshwar.

The area is easily approachable by pucca roads from Nashik as well as from Niphad. State transport buses are playing regularly over these roads. The Nandur Madhameshwar reservoir falls in the biogeographic province 6D. of the central plateau region. Topography is mostly flat, with average elevation of 640 Ms. Highest point is 815 Mts.



FIGURE 7 – Site Analysis Diagram

3.3. Demographic Data's

The total population of Niphad Taluka is 493,251 out of which the urban population is 74,398 while the rural is 418,853. As per Census 2011, the total number of families in Niphad was 16,442.

Description	Total	Rural	Urban
Population	493,251	418,853	74,398
Children (0-6 yrs.)	62,999	53,827	9,172
Literacy	83.53%	82.51%	89.92%
Sex ratio	936	937	934
Schedule Caste	10.2%	9.2%	9.5%
Schedule Tribes	19.4%	21.2%	9.5%

3.4. Existing site analysis

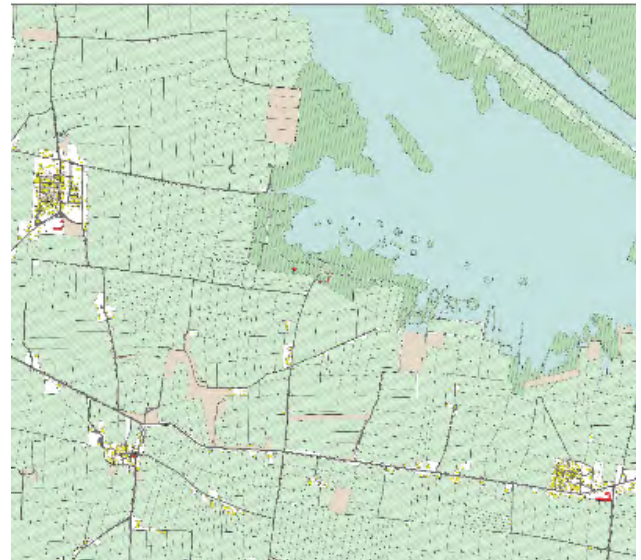


FIGURE 8 – Land use Map



FIGURE 9 – Open Built Map

The above maps show the land use and open building of the site and villages near the context. Other than it also shows human encroachment and how they are expanding their land towards the wetland.

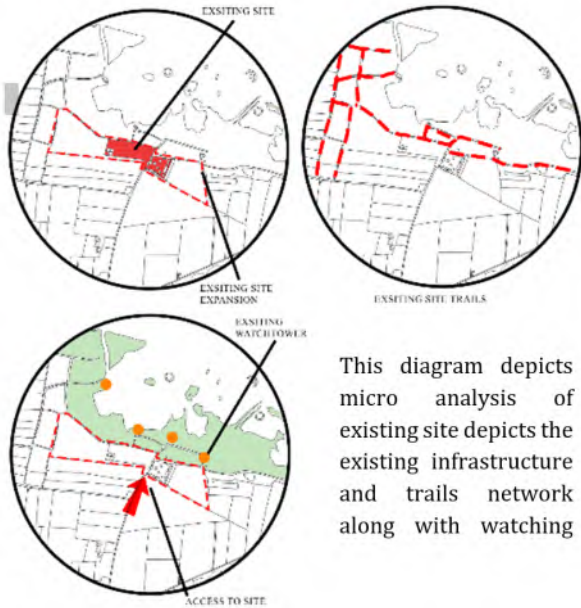


FIGURE 10 – Existing Site and Wetland Mapping



FIGURE 11 – Existing Site and Wetland Images



FIGURE 12 – Site Plan with the extended site and section

### 3.5. SWOT Analysis

#### Strength :

- Every year about 20,000 birds come on the site and because of this there is a major tourist attraction.
- The site is an international wetland.
- It is lifecycle maintaining ecosystem for the migratory and native birds.
- Providing livestock and fishes to native people
- There are already natural birds island on the site, as well constructed watch towers are there.

#### Weakness :

- There is no proper demarcation of anything on the site and because of it there is no control on human activities.
- Site is approachable from secondary road and there are no proper infrastructure facilities on the site.
- Site is surrounded by agricultural land and because of that wetland faces the problem of various chemical as fertilizers, etc.
- There is not proper transportation system form Nashik to Nandur Mdhameshwar

#### Opportunities :

- The project can be developed as Eco-tourism, awareness activities, research, and conservation will give opportunities to the tourist to truly understand the importance of it to the region and life.
- Site can be redeveloped with a new infrastructure which will attract more tourist.
- View from the site of wetland and its surrounding.
- The site has been allotted with spaces for flora and fauna growth. Where by migratory birds will attract people towards it.
- The site will create opportunities for native people for jobs and employment.

#### Threat :

- The water released from the dam water can be affected by the site.
- Excessive use of chemical fertilizer and no crop rotation can de lead to hydrological fragmentation and soil erosion.

## 4. Design Solution And Execution Details

The motive of design is to use architecture and the environment as a tool to harmonize humans and nature. To make them realize that they can co-exist to gather, and because of nature, they are here. The design strategy mixture of architecture and environment to constantly engage them and enhance learning about wetlands.

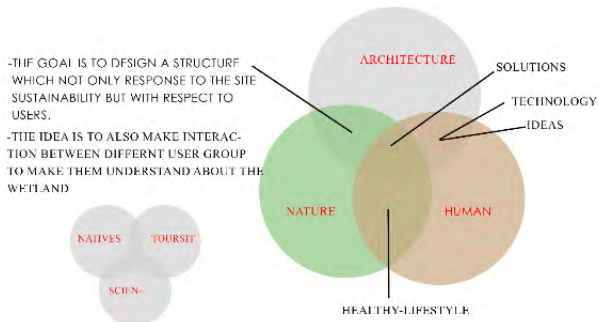


FIGURE 13 – Design concern elements

To design eco-sensitive (architecture) which not only invites humans but also nature, birds and insects. To create spaces that connect to nature and understand the lost importance of reconnecting to nature. To design spaces where one can forget the urban chaos and experience the beauty of architecture, nature, and ecology of the surrounding. The major architectural concern is to create a symbiotic relationship between humans, the environment, and the wet.

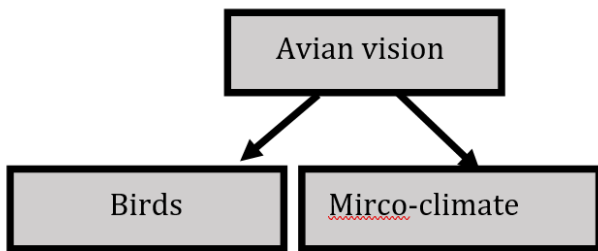


FIGURE 14 – Design concern elements

4.1. Design Considerations



FIGURE 15 – Ecological Landscape : • Meadows and forests that provide • Habitat and other environmental Benefits • Nature parks • Rapid reforestation



FIGURE 16 – Rain water harvesting : • landscapes that capture Stormwater and clean air • Large lake • Swales+ infiltration medians • Smaller retention carbon forces • Infiltration Park Pond

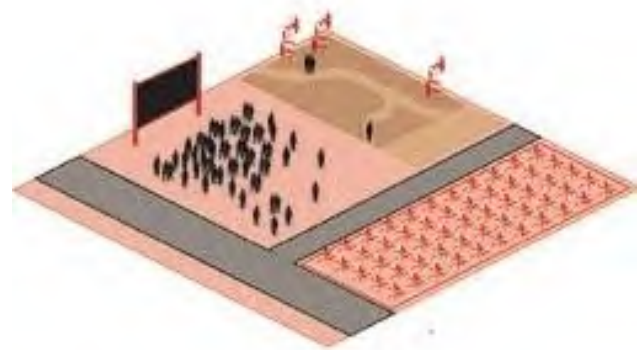


FIGURE 17 – Productive Landscape : • Landscapes that Generate new Knowledge, grow Energy and food. • Create new urban Experiences • Research Landscape • Urban farm • Aquaculture Hydroponics • Algae-culture • Energy field or forest



FIGURE 18 – Transitional Landscape : • Temporary landscapes that clean soil and enable new forms of social life and creative displays • Event landscapes • Remediation fields or Forests • Art-scopes • urban meadows



FIGURE 19 – Conceptual Zoning



FIGURE 20 – Design Master Layout of proposed site

#### 4.2. Design Solution

Author analysis how site segregation can be achieved which is shown in the below diagrams. Whereas, the most sensitive areas which need soft light and ventilation are to be placed towards the north-east and north-west sides. The author wants the design of site as centered around promoting the conservation and preservation of the wetland ecosystem along with providing a space for visitors to learn and appreciate its significance. The thoughtful placement of the various areas on the site ensured ease of access and convenience for all visitors, promoting a positive and immersive learning experience. The center of the site featured an exhibition center and a cafe, creating a central hub for visitors to congregate and learn about the wetland ecosystem.

On the eastern part of the site, the author has designed research areas and a constructed wetland. Where the placement of blocks is such that they are easily accessible by scientists and other researchers in a very convenient way, the loading and unloading system is properly worked out for the particular zone. Apart from that, it will be used to collect rainwater for research on aquatic plants and fish species. This approach promoted sustainability and provided valuable data on the wetland ecosystem's ecological health.

To the left of the exhibition center, I designed a learning center for the local community that was connected to the farm areas, providing an educational space for visitors to learn about sustainable agriculture and its importance in the ecosystem. And the clustering of blocks is designed in a manner that it creates a courtyard that acts as an extended space for the activities designed.

Finally, on the far-left side of the site, the author has designed a rehabilitation center that is connected to a clinic for birds. This approach ensured that the rehabilitation process was carried out without any interference, allowing the birds to recover and adapt to their natural habitat under the proper supervision of doctors.

#### 4.3. Observation Tower / Watch Tower

The observation tower is designed in a way, it is light in weight and it is made from bamboo and metal. Apart from that creepers are used for hiding metal frames so that they can blend with the surroundings so that people can experience maximum closeness to bird species. To have an accurate analysis of the birds the design of the tower is made of 4 floors and a height of 12 mts.

The conservation and learning area are designed with a focus on sustainable and eco-friendly materials such as mud, recycled timber, straw, and a green timber roof. The walls were constructed with an outer layer of mud, which was designed to blend seamlessly with the wetland surroundings, with a moss media culture layer that would absorb moisture and promote the growth of moss. The inner walls were made of mud blocks, with bamboo insulation in between and timber sheathing.



FIGURE 21 – Plan of Observation Tower



FIGURE 22 – Section of Observation Tower

The roof was made of straw, which was locally sourced from the wetland area, reducing the project's carbon footprint and promoting sustainability. Some models also incorporated a green roof, which not only attracted birds and insects but also helped the conservation and learning area blend into the surrounding environment.



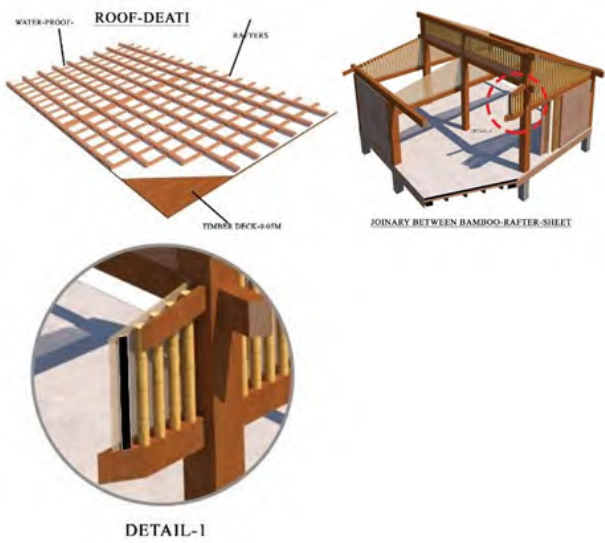


FIGURE 23 – Framing detail

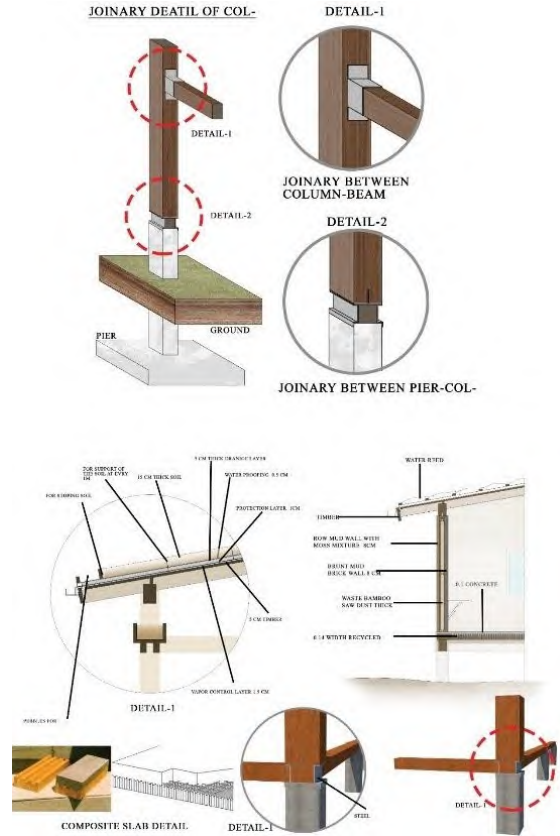


FIGURE 25 – Joinery and Roofing Details

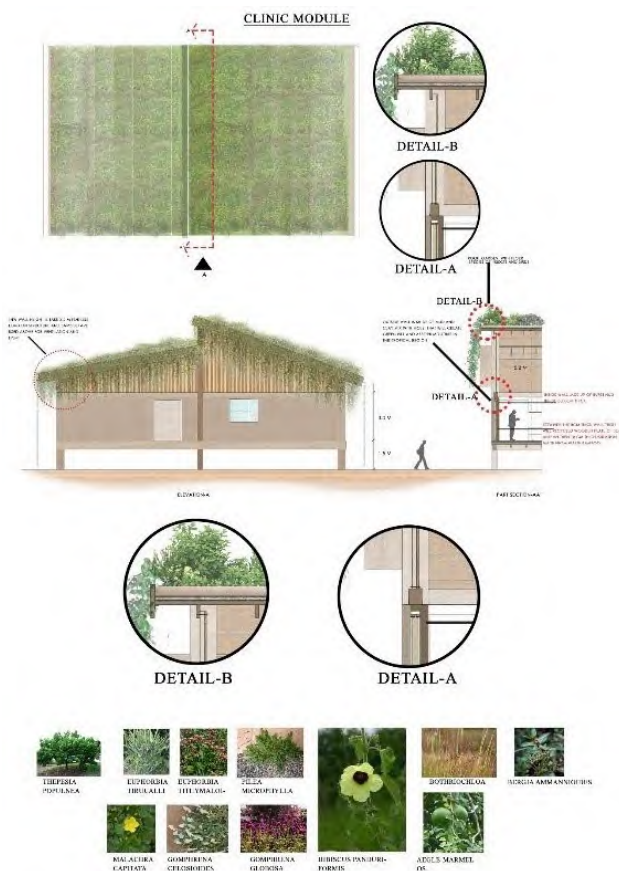


FIGURE 24 – Detail of Green-roof and Plant species

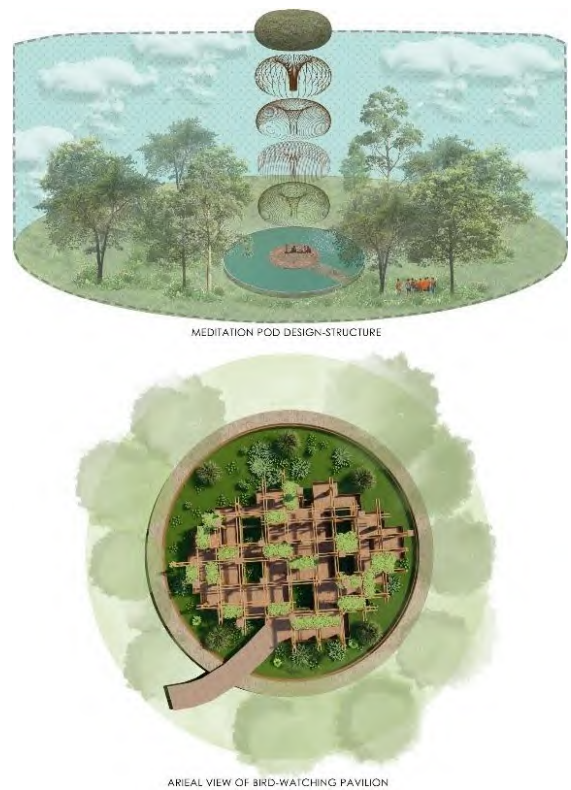


FIGURE 26 – Meditation-pod and Pavilion



FIGURE 27 – View of Bird Rehabilitation Center



FIGURE 28 – Module View



FIGURE 29 – Module View



FIGURE 30 – Internal view of Bird Rehabilitation

## 5. Conclusion

The research paper highlights the concern that as we progress in the technological era, humanity has become

detached from nature, forgetting its crucial role in our survival and the development of civilization. As per the inspiration acquired through author's grandfather's wisdom, the author recognized the value of nature and decided to act upon it. This research led everyone to focus on wetlands, which are currently under threat due to human activities, despite being critical ecosystems that produce twice as much oxygen as other ecosystems.

To raise awareness about wetlands and their significance, the author tries to design a sustainable and energy-efficient park along with a research, training, and learning center. The project incorporates various features such as water harvesting, research on flora and fauna, medical research, a training center for local villagers, where the built blocks are designed from a mud moss wall that provides insulation which changes color to blend with nature throughout the seasons. The objective of this park is to change people's perspectives and expand their understanding of the importance of wetlands, especially for those living near the, as they use chemical fertilizers and pesticides, leading to hydrological fragmentation and disruption of the ecosystem.

Moreover, the park aims to support sustainable farming practices for the local community and facilitate advanced medicinal research for the benefit of the Nandur Madhameshwar wetland. Ultimately, this project not only benefits humans but also helps preserve endangered species and the land and aquatic ecosystems of the Nandur wildlife sanctuary.

In a nutshell, the design proposal serves as a platform to raise awareness, promote sustainable practices, and contribute to the preservation of the Nandur Madhameshwar wetland, benefiting both humans and the environment.

## 6. References

1. Mitsch, W. J., & Gosselink, J. G. (2007). *Wetlands* (4th ed.). John Wiley & Sons.
2. Mitsch, W. J., & Jorgensen, S. E. (2003). *Ecological engineering and ecosystem restoration*. John Wiley & Sons.
3. Davidson, N. C., Finlayson, C. M., & van der Valk, A. G. (Eds.). (2019). *The wetland book : I : Structure and Function, management, and Methods* (Vol. 1). Springer.
4. *Wetland Restoration : A Handbook for British Columbia* by David M. Bell.
5. *"Restoring Wetlands : An Ecological Approach"* by Donald A. Hammer.
6. *"Ecological Design and Planning of Wetlands"* by John L. Gallagher and Kenneth D. Potter.