

## SOCOTRA ECOTOURISM CENTER

Marwa Esmail<sup>1</sup>, Kholoud Mounai<sup>2</sup>, Nader Azab<sup>3</sup>

<sup>1,2,3</sup>College of Architecture and Design, Effat University, Qasr Khuzam St., Kilo. 2, Old Mecca Road. P.O.BOX 34689, Jeddah 21478, Saudi Arabia

E-mail: <sup>1</sup>[mismail@effatuniversity.edu.sa](mailto:mismail@effatuniversity.edu.sa), <sup>2</sup>[kmoumani@effatuniversity.edu.sa](mailto:kmoumani@effatuniversity.edu.sa), <sup>3</sup>[naazab@effatuniversity.edu.sa](mailto:naazab@effatuniversity.edu.sa)

Received: 30.03.2020

Revised: 28.04.2020

Accepted: 01.06.2020

### Abstract

Natural reserves are a protected area of importance wildlife, flora, geological or any special interest. Ecotourism refers to the tourism involving responsible of travel to natural area that conserves the environment and improves the well-being of local people. This approach of tours is about uniting conservation, communities and sustainable travel that people enjoy it, relax and discover the beauty of nature. This project has an educational part which is in the research center. The aim of this center is to save the natural reserves, protects the rarest plants and maintains the natural environment in Socatra Island. Moreover, encourage people how to save their environment by planting organic plants and spread awareness of the importance of preserving the environment. It's going to be focal point in Socatra as it's a first big project in this island. This study covered the some case studies as the fundamental to build the idea of this project. The space program and site analysis was conducted and the selected location has excellent topography for building, free from pollution and convenient for accessibility.

**Keywords--** Socotra Island, Ecotourism Center, Tourism, Conservation, Nature, Educational

© 2020 by Advance Scientific Research. This is an open-access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)  
DOI: <http://dx.doi.org/10.31838/jcr.07.08.38>

### INTRODUCTION

Socatra Archipelago globally considered for its outstanding biodiversity [1]. It's basis a UNESCO World Heritage Site in 2008 [1]. This Island subjugate for long geological Isolation ensuring preservation of unique ecosystems. It's an Archipelago lies 380 km to the south of RasFatak. It's including a group of islands that's located between Yemen coastal and Somalia [2]. The Island is very isolated. It has been describe as (the most Alien looking place on earth). Total area is about 3682 KM. The population of Socotra is currently about one hundred thousand people, mostly working on fishing, grazing and agriculture. Capital city is Hadibo, located in Northern East Island. This island isolated from the world from August to December during to the monsoon winds coming from the Indian Ocean [3]. This island has around 900 species of plants and trees, 300 of them don't exist in anywhere in the world. The most important one is the Dragons Blood Tree which is the source of valuable resin for varnishes, for medicine and also used in medieval ritual magic and alchemy [4].

This project aim to maintaining the natural processes and environment relations balance and monitored over time , preservation and conservation plants, animals, marine life and genetic sources of these endemic areas or use the stations in their migration route. Also, organize economic exploitation and rational for these vital resources that can arise in these reserves. The reserves banks that keep genetic live saver when exposed to natural disasters or artificial ecosystems. This research center will focus on rehabilitation of the extinct species which are found in similar sites and redevelopment, rehabilitation of rare species. This will restore the balance between nature and the environment.

### CASE STUDIES

This study considered four case studies flora and fauna conservation centers on the world which have unique concepts, constructions, design, and philosophy behind the program. The case studies are:

- Lady Bird Johnson Wildflower Center, Austin
- Alareen Wildlife Park and Reserve, Bahrain, Alareen
- British Wildlife Center, Linfield, United Kingdom
- Cornell Ornithology Laboratory, Ithaca, USA

### Lady Bird Johnson Wildflower Center, Austin

The Lady Bird Johnson Wildflower Center is a 54,000 square foot (Figure 1). It's a sustainable sites initiative (SITES™) is a first attempt to systematically apply the knowledge of ecosystem services to the design and management of designed sites. Former first by Lady Bird Johnson and later Helen Hayes founded the National wildflower Research Center in 1982 to protect and preserve North American's native plans and natural landscapes [5, 6]. The center focuses on Mrs. Johnson's interest in sustainable use and conservation of native wildflowers, plants and landscapes. The Sustainable Sites Initiative™ program provides comprehensive guidelines and benchmarks for developing environmentally healthy landscapes through its voluntary professional rating and certification system.

The organization of the buildings, oriented in the long north and south directions, forms a smaller comfortable space between each structure to make the site less overwhelming in scale. The design of the museum and greenhouse comprises basic geometry and rectilinear forms to mimic local structures. For the greenhouses glass and reflecting pond bounded. Moreover, the large exterior Y structure that lifts the building up enables thin walls and mullions to be used inside.

### Alareen Wildlife Park and Reserve, Bahrain, Alareen

Alareen Wildlife Park and Reserve located in Bahrain, Alareen with 7sqkm (Figure 2). The phenomenon of extinction is not a thing of the past, habitat loss and competition for food, pollution and predation mammals still play a significant role in the kingdom of animals all over the world. Perhaps the Kingdom of Bahrain is one of the first Arab countries that have recognized the growing shortage of many of the local wildlife in the region and the urgent need to take some action in order to maintain these animals [7]. It was the idea of a park and protected Areen as a response of the Kingdom of Bahrain to preserve the wildlife in the area, and the hope that the establishment of such protected incentive for similar projects adopted by other countries in the region.

Al Areen Falcon Hospital offer different services such as check hawks when they come to the Kingdom of Bahrain for the first

time both wild hawks and falcons hatched in captivity, and to make sure they are free from diseases sake of the bird's health in the Kingdom. Second is the action passport to identify hawks and enable the owner to move it across the border in line with international laws governing the movement of birds threatened with extinct. Next is periodic examination of the hawks in the Kingdom to ensure it correctly and proper care they received at their respective owners. The services also include vaccination against hawks' infectious diseases such as smallpox and Newcastle. Treat diseased hawks attended by their owners to the hospital. They also provide the awareness of health care for the Hawks through the work of lectures and seminars for owners of hawks and teach them how to maintain their health [8, 9].

**British Wildlife Center, Linfield, United Kingdom**

British Wildlife Centre was started in 1997 by David Mills with area of 45000 sqm. Before, David had a successful herd of pedigree Jersey cows on the site of what is now the wildlife center. In 1971 the rich milk and cream of the Venn herd of Jerseys was supplied to local homes and businesses [10].

British Wildlife Center aims to help everyone learn more about how these creatures live and what can all do to help them survive in the wild. The popular and informative keeper talks take place every 30 minutes and bring visitors closer to the wildlife that is all around but rarely seen [10].

**Cornell Ornithology Laboratory, Ithaca, USA**

The Cornell Lab of Ornithology is designed by RMJM with area of 80000 sqm, which is a world leader in the study, appreciation, and conservation of birds (Figure 3). Engaging these nature trails provided the inspiration for the entire site and landscape design, developed by Boston landscape architect, Susan Childs. The lab is integrated into an expanded wetland landscape defined by small "islands" set in bio-filters and marshy swales. The visitor approaches the lab from a series of bridges and boardwalks through this naturalized environment [11].

Upon entering the lab, visitors face a two-story wall of windows offering great views of the duck pond, with birds practically coming to their feet. Designers framed the windows, used curved glass, and created random patterns so that birds could detect the windows, while visitors inside could still watch the action outside [11].

Every step of the way, visitors have the opportunity to see and learn more about birds. Wooden chairs are set up throughout the lobby, with telescopes and binoculars available for those who want a closer look at the dozens of local avian species. Even the lobby carpet was chosen with the idea of the bird's natural environment in mind-its dark grey and gold pattern is reminiscent of looking through the forest at shadows of leaves and birds [11].

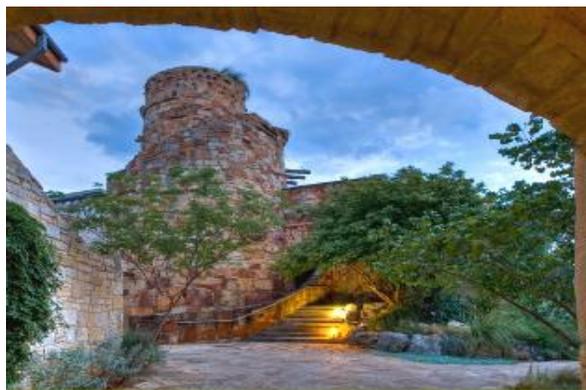


Figure 1. Lady Bird Johnson Wildflower Center [6]



Figure 2. Alareen Wildlife Park and Reserve [9]



Figure 3. Cornell Ornithology Laboratory [11]

**SPACE PROGRAM**

There are six primary zones considered in this project namely research center, administration, culture department, public area, research offices and parking zone. The overall space program is tabulated in Table 1.

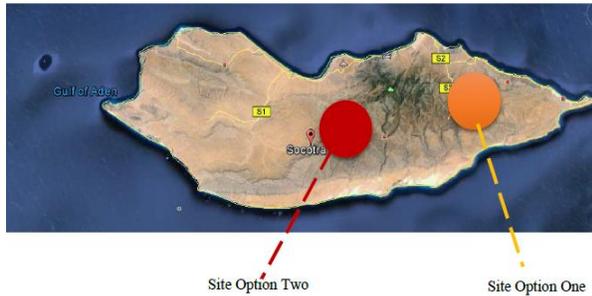
Table 1. Space Program

Items	Area (m <sup>2</sup> )
Research center	1030
Administration	605
Culture Department	2395
Public Area	1970
Research Offices	720
<b>Total Net Area</b>	<b>6720</b>
Circulation	1680
Wall and construction	470.4
Services	537.6
<b>Total Building Gross Area</b>	<b>9408</b>
Parking area	1250
<b>Total Area Site Required</b>	<b>10658</b>

Public Spaces Zone is an area that received visitors gathering in a place or in a building. It's includes lobby, reception area, conference hall, lounge, restaurant, museum, exhibition and library. The zone serves a link point between all the zones of the center. It's an interactive zone that visitors, researchers and users can gather together. Researcher Offices Zone is an area that specific for the researchers where can they stay in their offices, review their works, meet with other researchers and discuss the issues and so on. Research labs Zone is the largest zone in the building, where the researcher can do the testing, experiments, analysis and do the alternative medicine. Reservation Zone highlights the extinction is not a thing of the past, habitat loss, competition of food and pollution. This zone will let the visitors experience the wildlife of Socatra Island, discover the rarest plants around the island, weird birds and the water animals.

**SITE SELECTION AND ANALYSIS**

Socatra Island located between Yemen coastal and Somalia in the Indian Ocean is considered as the site location for this study. Figure 4 shows there are two site options for the project. In order to fulfil the objects of the Natural Reserve and Research Center, a group of site criteria were introduced to select a suitable site. The criteria covered of accessibility, where the site location should be located close to airport and sea-port. The site also should locate close to accommodation area. This would be convenient for tourists and researchers. Besides that, the location should within the natural reserve, large scale site and in a quite zone. Table 2 and Table 3 demonstrate the site evaluation result for accessibility and environmental respectively.



**Figure 4.** Site locations [12]

**Table 2.** Site evaluation for accessibility

Criteria	Site Option One		Site Option Two	
	Comments	Grade (1-10)	Comments	Grade (1-10)
Traffic	Average	7	High	5
Noise	None	10	High	6
Privacy	None	9	Medium	7
Noise Level	None	10	Medium	7
Surrounding Building	None	10	Near Village	6
Circulation	Main Road 3	8	Main Road 2	8
Closeness to the airport	18 km	10	27 km	8
<b>Total</b>		<b>64/70 = 91%</b>		<b>47/70 = 67%</b>

**Table 3.** Site evaluation for environmental

Criteria	Site Option One		Site Option Two	
	Comments	Grade (1-10)	Comments	Grade (1-10)
Climate	Hot, humanity, rainfall	9	Hot, humanity	8
Topography	None	10	None	10
Soil	Sand	7	Sand	7
Geology	Sand, coral stone and sea shell	8	Sand, coral stone	8
Vegetation	Nature Reserve	10	Nature Reserve	9
Views	Excellent	10	Excellent	10
Historical Resources	Excellent	10	Excellent	10
Building height	No building around the site	9	Near market, residence building	6
<b>Total</b>		<b>73/80 = 91%</b>		<b>68/80 = 85%</b>

According to the site evaluations that site option one is the most appropriate location for the project. The site is located almost in the northern east which most of the natural reserves located. Socotra is characterized by the Higher Mountains and located in the north-western part of the island. The eastern and central parts of the island receive some rain during fall and winter, while the western part of the island is arid.

The humidity of the selected site reaches its highest degree in November and December. The mean temperature is 27 degree. The hottest month is in May reached 30.5 degree and the coldest month in January about 24 degree. The wettest weather is in December when average of 81 mm (3.2 in). Prevailing winds in Socatra is South-Western. From June to September the island is accessible only by plane, due to exceedingly strong monsoon winds and access by sea is virtually impossible due to high seas and strong winds all around the island.

The verity of the topography is the most powerful on the site. This project will add value to Socatra Island and protect for the coming years. This will be the first project in the site so it will be as a focal point and the references for all studies in this island. Moreover, this project will help stimulate the economic on this island and for Yemen as well.

**ZONING AND PROJECT DESIGN**

This project is a new resource for Socotra Island since it's the first project on it and encourage tourist to discover this rare island (Figure 5).

This project's aim is to create a sustainable environment by guiding the visitors to go through a tour which consists of a series starting with the botanical gardens, they travel through biomes seeing, hearing, smelling, touching floras from different regions such as tropical, dessert, Mediterranean Socotra region and polar. In polar session will introduce it as a documentary 3Dfilm so people can live it and feel the dangers that happen nowadays. It's basically a program to have fun with nature, learn how to plants organic food and taste the home food of Socotra island. Also, Socotra ecotourism have a special program for kids called as Sustainable lifestyle, where they have workshops, outdoor classes, and farms on top roof so they learn how to plant plants.

The project was chosen for two things: environment and economic so it takes plant shape and merges it with philosophical idea and how plant related to the economic development. Regarding the design structure, the ecotourism centre will be consisting of space trusses structures and shell structure.

As for the large greenhouses, a mega-structure main arch will be provided for the stability of the structure. As go along, a vertical slope trusses will be connected to the main arch support which will also hold the curtain wall as well as resisting wind loads. The visitors and research centres will be made of white concrete and a curtain wall.

Design elements feature the various buildings of the project and emphasize the purpose of design in relation to the main design concept and philosophy. The design of the Main Building and Research Center is connected through ramps on top buildings, where the people can enjoy the views and see the researchers work through the glasses (Figure 6). In front of the green houses there is a small garden that visitors can buy plants (Figure 7).

Besides that the restaurants and kids sustainable center are located in the middle island connected through bridge via visitor center. Figure 8 and Figure 9 show the cottage view and the main perspective view of the project respectively.

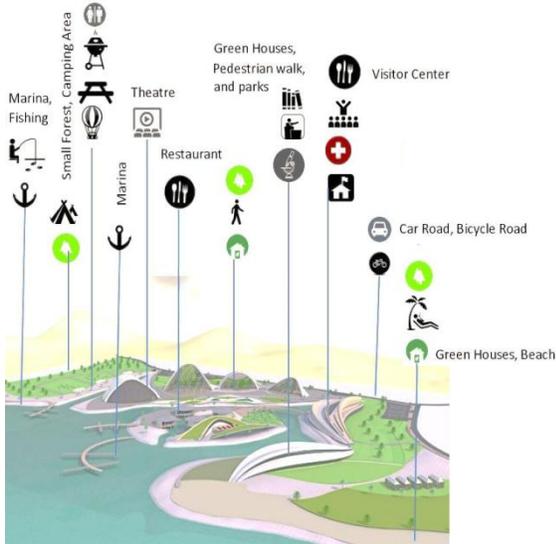


Figure 5. Socotra Ecotourism Central Keys



Figure 8. Cottage



Figure 6. Main Building and Research Center



Figure 9. Main perspective view



Figure 7. Green House

#### CONCLUSION

This project creates the connection between human and nature, which make a different to quality of life, health and environment by learning how to plan organic plants, adventure tourism and discover the rarest plants in the world. The project is proposed in the Socotra Island located between Yemen coastal and Somalia in the Indian Ocean. The selected site has a great topography, rich with natural resource, free from pollution and effective accessibility. This project creates an education based attraction points for tourism as well as add value to Socotra Island and Yemen.

#### REFERENCES

1. Socotra Archipelago [Internet]. Whc.unesco.org. 2008 [cited 8 June 2019]. Available from: <https://whc.unesco.org/en/list/1263>
2. General Information about Socotra [Internet]. Socotra, Yemen. 2006 [cited 8 June 2019]. Available from: [http://socotra.info/general-information-about-socotra.html#\\_XPvBGhYzbIU](http://socotra.info/general-information-about-socotra.html#_XPvBGhYzbIU)
3. A. Weller R, Honjo S. Monsoon Winds and Carbon Cycles in the Arabian Sea [Internet]. Woods Hole Oceanographic Institution. 1997 [cited 8 June 2019]. Available from: <https://www.whoi.edu/oceanus/feature/monsoon-winds-and-carbon-cycles-in-the-arabian-sea/>
4. Interesting facts about dragon blood trees | Just Fun Facts [Internet]. Justfunfacts.com. 2017 [cited 8 June 2019]. Available from: <http://justfunfacts.com/interesting-facts-about-dragon-blood-trees/>

5. Lady Bird Johnson Wildflower Center [Internet]. Mobilemaplets.com. [cited 8 June 2019]. Available from: <http://www.mobilemaplets.com/showplace/3162>
6. Gardens & Spaces - Lady Bird Johnson Wildflower Center [Internet]. Lady Bird Johnson Wildflower Center. [cited 8 June 2019]. Available from: <https://www.wildflower.org/visit/gardens>
7. London Conference on the Illegal Wildlife Trade (October 2018): Declaration Annex (English only) [Internet]. GOV.UK. 2018 [cited 8 June 2019]. Available from: <https://www.gov.uk/government/publications/declaration-london-conference-on-the-illegal-wildlife-trade-2018/london-conference-on-the-illegal-wildlife-trade-october-2018-declaration-annex-english-only>
8. Falcon Clinic [Internet]. Alareen.org. [cited 8 June 2019]. Available from: <http://www.alareen.org/ConservationandPreservation/FalconClinic.aspx>
9. Al Areen Park visitors reaches 323,286 in 2017 [Internet]. bizbahrain. 2018 [cited 8 June 2019]. Available from: <http://www.bizbahrain.com/al-areen-park-visitors-reaches-323286-2017/>
10. Our Story - British Wildlife Centre [Internet]. British Wildlife Centre. [cited 8 June 2019]. Available from: <https://britishwildlifecentre.co.uk/aboutus/our-story/>
11. Cornell Ornithology Laboratory by RMJM | ARCHiTRACKER [Internet]. Architracker.co. [cited 8 June 2019]. Available from: <https://www.architracker.co/projects/rmjm-cornell-ornithology-laboratory>
12. Google Maps [Internet]. Google Maps. 2019 [cited 8 June 2019]. Available from: <https://www.google.com/maps/place/Socotra/@12.4605364,53.7494471,11.33z/data=!4m13!1m7!3m6!1s0x3db6a3302ac94bf1:0x850a7ddff0ac426b!2sSocotra!3b1!8m2!3d12.4634205!4d53.8237385!3m4!1s0x3db6a3302ac94bf1:0x850a7ddff0ac426b!8m2!3d12.4634205!4d53.8237385>